Determinants of Coordination Effectiveness of Selected International Agri-food Supply Chains: A Structural Equation Modelling Approach

A thesis presented in partial fulfilment of the requirements for the degree of
Doctor of Philosophy in

Logistics and Supply Chain Management

School of Engineering and Advanced Technology

Massey University, New Zealand

by

Pervaiz Akhtar

March 2013

DECLARATION

The thesis entitled, *"Determinants of Coordination Effectiveness of Selected International Agri-food Supply Chains: A Structural Equation Modelling Approach" is* submitted to Massey University for the degree of Doctor of Philosophy. I, Pervaiz Akhtar, declare that this thesis is the outcome of my own research work. The material used from other resources is acknowledged. I also certify that the work contained in the thesis, or any part thereof, has not been previously submitted for a degree, diploma or other qualifications.

Signed  ……..….

Student ID: 08489815

Full Name: Pervaiz Akhtar

ABSTRACT

One of the current discussions in the literature is that intangible (chain coordinators' competencies/skills) and tangible resources are the key determinants of the effectiveness of supply chain coordination (operational, social and financial performance). Chain coordinators' abilities (formal and informal education, training and experience), leadership styles (participative and directive), effective communication (communication quality and frequency) and analytical skills (internal and external applications) are found to be the promising intangible resources. The tangible resources consist of human (a number of people for coordination activities) and non-human (budget and technology for coordination activities) assets.

Both tangible and intangible resources determined the effectiveness of supply chain coordination. In other words, the theoretical model proposed that the above mentioned resources were significantly correlated with the effectiveness of supply chain coordination. Also, operational (service and product quality) and social (satisfaction with and trust in supply chain partners) dimensions significantly influenced financial performance (profit, sales and market share). Therefore, these resources, including operational and social dimensions, were considered as the key determinants for coordination success among supply chain partners.

Thus, the development of the proposed model and subsequent testing it based on collected data achieved the study objectives. This first led to investigate the nature of supply chain coordination and to identify chain coordinators from the selected international agri-food supply chains (dairy, meat, apples, onions and wine) of New Zealand, UK and Pakistan. The nature of supply chain coordination showed potential close interactions occur among farmers, chemical suppliers, logistics providers, food processors, wholesalers (importers and exporters) and retailers. These chain partners exchange information and work together to achieve the effectiveness of supply chain coordination. Moreover, these chain partners generally believe in closer coordination rather than arm's-length relationships. However, the intensity of coordination varies across regions. For instance, it was found that the limited coordination (low-to-medium) occurs in Pakistani selected chains but the chains in New Zealand and the UK use a better integrated approach.

Additionally, importers and exporters play a major role and they also support other chain partners. At organizational level, they (importers and exporters) act as chain coordinators. Within these organizations, chain coordinators (as person) are managing directors or owners in small companies. Chief executive officers (CEOs) and head of departments (marketing managers, supply chain managers, channel or chain managers) play the role of chain coordinators in medium-sized enterprises.

Following the identification of chain coordinators and collecting the data from them, the quantitative analyses were conducted based on a total of 225 and 112 useable responses received from New Zealand and the UK respectively. Overall, the results obtained from the New Zealand sample showed that nearly 85% of the total structural coefficients were significantly correlated with the effectiveness of supply chain coordination whereas the findings based on the UK sample revealed that almost 77% of the total structural coefficients were significant. The findings indicated that education (formal and informal – excluding multiple language skills), training, experience, a participative leadership style, effective communication and analytical skills were the key competencies for chain coordinators. Chain coordinators' competencies together with non-human resources (budget and technology) determined the effectiveness of supply chain coordination. Additionally, operational and social dimensions had highly significant effects on financial performance.

Therefore, it was concluded that chain coordinators who have the above mentioned competencies or skills are in a better position to understand modern agri-food supply chains. They also perform supply chain activities effectively, in turn, it keeps supply chain partners connected and motivated to achieve the effectiveness of supply chain coordination. Thereby, the study made substantial contributions in the field where there has been a lack of such findings. Also, the directions for future research provide further interesting outcomes and useful guidelines.

ACKNOWLEDGEMENT

First and foremost, I thank Almighty and Merciful God who helped me to complete this thesis. I would also like to express my sincere gratitude to Dr. Norman Marr, Dr. Elena Garnevska and Prof. Dr. Christian Fischer for their constant encouragement, tremendous assistance and guidance. As advisors and supervisors, they have provided the constructive critique to refine the content. The completion of this research work would not be possible without their valuable support and guidelines. Their extensive knowledge, strong analytical skills and commitment to the excellence of research and teaching have truly benefited this thesis. Researching and working with them has proven to be interesting, enjoyable and a great rewarding experience. Hearty thanks to all!

Additionally, I would like to acknowledge Massey University for providing excellent research facilities and financial support. Thanks also to the Venture Trust Inc. which provided financial support to conduct the pilot survey.

I also sincerely thank Dr. David Harness (Hull University) who helped in collecting the data from UK importers. Particularly, I acknowledge my gratitude to the research participants who donated priceless time from their busy schedules.

Last, but not least, many thanks are due to all my family members, friends and colleagues for their unconditional love and support.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 INTRODUCTION

1.1 Introduction

This chapter introduces the thesis and is organised into five sections. Following the introduction, the research background is discussed in section two. Section three explains the research problem that coincides with the research aims, objectives and questions presented in section four. The chapter is completed by section five which outlines the structure of this thesis.

1.2 Research Background

Supply chain coordination has received considerable recognition in the academic literature (Wysocki et al., 2006). A supply chain can be defined as a network of interconnected business activities. Within a supply chain, supply chain coordination is a process through which the activities can be brought together to create a competitive position (Cao et al., 2008). In other words, chain partners (farmers, processors, distributors, wholesalers, importers, exporters and retailers) exchange data, information and share processes to keep the whole system connected and to provide better products and services. This system of working together is called supply chain coordination (Akhtar et al., 2012a; Soosay et al., 2012).

The coordination among supply chain partners is the core of supply chain management. It also plays a vital role in facilitating firms to work together to manage globally-scattered chains (Mehta et al., 2006). The recent rapid pace of coordination in agri-food supply chains has also got significant attention (Moura et al., 2009). These supply chains have become a network of complex relationships. Coordination among supply chain partners manages the network relationships in order to achieve certain objectives (Gereffi et al., 2005). For instance, it builds good bonds among business partners, reduces costs and provides a competitive advantage. It also maximises the value of an enterprise and describes its behavioural characteristics (Mentzer, 2004; Van Der Vorst, 2006). Additionally, the number of drivers such as globalization of production, consumers' awareness, safety risks and rapid biotechnological advances urge the development of coordination. Because of these facts, it is believed that supply chain

partners can no longer easily reap the benefits and achieve a competitive advantage by working individually (Sporleder et al., 2005).

Research recently shows a coordinated trend among organizations. For example, Zineldine and Bredenlöw (2003) and Bamford et al. (2004) believed that more than 20,000 organizations coordinated over the past decades. Merely in the USA, the number of such companies rose by 25% each year from 1987 to 2003. The examples of such companies include Hewlett Packard, Nike and Cisco (Draulans et al., 2003), Delta and Swissair, Singapore Airlines and Lufthansa. These companies have proven track records to achieve coordination objectives (Pangarkar, 2009). In support of coordinated trends, Akhtar et al. (2012a) also found that the potential close interactions occur in selected New Zealand and UK agri-food supply chains. Chain players generally believe in closer coordination rather than arm's-length relationships, and involved partners consider supply chain coordination as a promising factor that contributes in the overall agri-food supply chain performance.

On the other hand, 50–70% of such collaborative enterprises have failed to achieve their coordination objectives (Speckman et al., 1996; Zineldin and Bredenlöw, 2003; Bititci et al., 2009). Coca Cola and Nestle (Arino et al., 2001), IKEA (a Swedish furniture company), Royal Dutch Airlines and Northwest Airlines, GM and Daewoo group, Ericsson and Honeywell, Publicise Communication and Foote and Cone and Belding are the examples of such organizations (Pangarkar, 2009). In the same vein, Gulati et al. (2012) stated that the failure rate of collaborative organisations is more than 50 percent.

The above statistics and examples raise complicated questions such as why coordinated organizations fail and who is (are) responsible for the failure. The success of coordination among different organizations depends on specific characteristics of chain coordinators. Chain coordinators can be defined as the key players who are involved in major decision-making, leading and controlling of main coordination activities of supply chains (Rosenbloom, 2004; Mehta et al., 2006; Fischer et al., 2007; Heggde, 2008; Akhtar et al., 2011). The coordinators play a role of communication-hub that provides infrastructure, information systems, training programs and other facilities.

Also, chain coordinators' leadership to the coordinated organizations manages customers' portfolio, priorities, centricity and concerns (Galbraith, 2001).

Wong et al. (2005) blamed chain coordinators' leadership which could not develop effective coordination among supply chain partners. Such coordinators perform below expectations and are mainly accountable for the failure. In support, Patzelt and Shepherd (2008) also stated that ineffective chain coordinators are one of the main reasons of underperforming and such coordinators often fail to build trust and maintain the balance of power among supply chain players. They need to reconcile different aspects of coordination such as sustainable commitment, financial performance, effective leadership, sharing of risks and benefits. Furthermore, the most recent global developments such as food safety regulations, high consumer demands, economic downturns and unstable political environments in certain countries have created difficulties in achieving coordination objectives. The effectiveness of supply chain coordination in such challenging environments often depends on the existence and the development of certain characteristics which successful chain coordinators must possess (Patzelt and Shepherd, 2008; Akhtar et al., 2012).

The effectiveness of supply chain coordination consists of three dimensions of performance, namely operational, social and financial. Operational performance assesses product quality and service quality (Chen and Paulraj, 2004; Aramyan et al., 2007; Joshi et al., 2012). Satisfaction with and trust in supply chain partners represent social performance and financial performance increases profit, sales and market share (Acquaah, 2007; Demirbag et al., 2010; Akhtar et al., 2012a; Joshi et al., 2012).

The characteristics of proficient chain coordinators who have intangible resources (relevant education, experience, good leadership abilities, communication and analytical skills) should significantly contribute to the effectiveness of supply chain coordination (Mehta et al., 2003; Neven et al., 2005; Rosenzweig and Roth, 2007; Werder and Holtzhausen, 2009; Soriano and Castrogiovanni, 2012). Besides these intangible determinants, tangible characteristics such as specifying a number of people, budget and technology for coordination activities can also play a pivotal role to achieve the effectiveness of supply chain coordination (Nakos et al., 1998; Greasley and Oxley,

2005; Rosenzweig and Roth, 2007; Lao et al., 2012). Moreover, financial outcomes often receive more attention. In this regard, operational and social dimensions can be the significant determinants (Batt, 2003; Ciliberti et al., 2009; Lado et al., 2011; Stuart et al., 2012).

1.3 Research Problem Statement

Researchers (Mehta et al., 2002; Akhtar et al., 2012a) identified that only a few organizations have an official chain coordinators' position. In addition to this, Kale et al. (2002) found that only 37% of companies have formal and informal teams for coordinating supply chain activities. These findings raise the question, who is a chain coordinator. Especially in agri-food supply chains, the potential caveat is a lack of empirical investigations that identify chain coordinators and their competencies/skills (Mehta et al., 2002; Tripples, 2010; Akhtar et al., 2011).

Additionally, one of the current discussions in agri-food supply chains is what prerequisite characteristics (competencies and resources) chain coordinators require to achieve the effectiveness of supply chain coordination (Russel et al., 2011; Akhtar et al., 2011). These characteristics can be seen as tangible resources (skilled workers, technology, reliable transport and finance) and intangible assets (leadership, relevant education, extra efforts and experiences) that add value to the effectiveness of supply chain coordination (Akhtar et al., 2011).

However, little is known so far which prerequisite capabilities a chain coordinator needs to coordinate modern organisational structures successfully. A number of studies in certain industries (Shapiro, 2001; Mehta et al., 2003; Smith, 2006; Ness, 2009; Akhtar et al., 2011) scrutinised some characteristics of chain coordinators (or coordination challenges) that lead to success of coordination activities. For example, in automobile industry, Mehta et al. (2003) empirically analyzed and found that participative leadership skills of chain coordinators positively impact on performance. Likewise, in manufacturing industry, a case study consisted of 25 interviews conducted by Zineldin and Bredenlöw (2003) explored coordination challenges. Also, Karami et al. (2006) conducted a survey in electronics industry to find out the relationships between chain coordinators' characteristics and strategy development. To explore chain coordinators'

rational practices, Smith (2006) and Ness (2009) emphasised retail sectors. In agriculture industry, Spriggs et al. (2000), Moura et al. (2003), Gereffi et al. (2005), Abdulai and Birachi (2008), Tripples (2008: 2010) and Akhtar et. (2012a) have studied supply chain coordination or some characteristics of chain coordinators, however, no systematic investigation has been conducted to estimate the linkages between chain coordinators' characteristics and the effectiveness of supply chain coordination. Moreover, the results showed that some competencies and practices could be effective in one situation but ineffective in other circumstances. In such uncertain conditions, chain coordinators need to practise adaptable approaches to monitor, lead, control and take decisions.

How globally-scattered agri-food chains can be coordinated effectively and efficiently has become a vital question for practitioners and researchers (Gereffi et al., 2005; Moura et al., 2009; Tripples, 2010; Soosay et al., 2012). Finding an answer to this question also implies to investigate so far unknown characteristics of effective chain coordinators who keep the entire business system functional as well as beneficial for all involved chain partners. It is also pivotal to explore how tangible resources are related to the effectiveness of supply chain coordination. Moreover, the estimations of the linkages between the dimensions of coordination effectiveness further produce new research outcomes.

1.4 Research Aims, Objectives and Questions

The main aim of this research is to investigate the core competencies/skills of chain coordinators and tangible resources (number of people, budget and technology for supply chain coordination) which are the key determinants of the effectiveness of supply chain coordination. This also leads to identify chain coordinators and scrutinises the linkages between the dimensions of coordination effectiveness (operational, social and financial performance).

The central assumption is that the effectiveness of supply chain coordination can be expressed as a function of coordinators' innate or acquired abilities (experience, formal and informal education), leadership styles, effective communication (quality and frequency of communication and spending extra time on communication), analytical

skills (analysing gaps for improvements) and existence of tangible resources. The hypothesised assumption has been developed by studying the literature on the nature of supply chain coordination, in general, and more specifically of agri-food supply chains. The study employs qualitative and quantitative analytical tools to achieve the following objectives:

Objective 1: to investigate the nature of coordination in selected agri-food supply chains (dairy, meat, apples, onions and wine).

Objective 2: to identify who are the chain coordinators in the selected agri-food supply chains.

Objective 3a: to examine the intangible core competencies/skills required to be considered an effective chain coordinator.

Objective 3b: to scrutinise the relationships between tangible resources and the effectiveness of supply chain coordination.

Objective 4: to investigate the relationships between the dimensions of coordination effectiveness.

The following research questions are framed to achieve the objectives of this study.

Question 1. What is the nature of coordination in vertical business systems, particularly in selected agri-food supply chains (dairy, meat, apples, onions and wine)?

Question 2. How to identify chain coordinators from the selected agri-food supply chains?

Question 3a. What are intangible core competencies/skills required to be considered an effective chain coordinator?

Question 3b. How are the key tangible resources related with the effectiveness of supply chain coordination?

Question 4. How are the dimensions of coordination effectiveness linked?

1.5 Structure of the Thesis

Chapter 2 provides background information on the selected agri-food chains (dairy – milk, butter and cheese; meat – beef, lamb and mutton; apple; onion; and wine). It discusses two main perspectives: global and national levels. At the global level, it only discusses global production, consumption and trade (exports and imports). Due to the focus of this study (exports from New Zealand to the UK) and sample members' (chain coordinators) identification from the selected New Zealand export and UK import sectors, at the national level, the chapter especially emphasises the selected exports from New Zealand to the UK. Thus, at the national level, the chapter does not provide detailed information about production, consumption, New Zealand imports and the UK exports. It is also worthwhile to note that this chapter does not give background information on Pakistani-selected chains. Pakistan was only remained part of the pilot survey and the country was excluded for the main data collection because of contradictions in findings during the pilot survey and some security reasons. Thus, the background literature on the selected chains includes New Zealand and the UK only. However, the major facts about the Pakistani selected chains are summarised in Appendix A.

Chapter 3 reviews the literature on supply chain coordination and chain coordinators, including relevant definitions and theories. This mainly includes the concepts of supply chain management, supply chain coordination, chain coordinators, issues related to performance measurement and effectiveness of supply chain coordination. Based on the discussion and findings (issues related to the measurement of supply chain performance), this chapter also eventually selects suitable constructs (variables) to help to determine the effectiveness of supply chain coordination.

Chapter 3 also presents a two-stage conceptual model and developed hypotheses based on the reviewed literature. The first stage of the model consists of tangible and intangible resources which determine the effectiveness of supply chain coordination and thus, indirectly, overall supply performance. The chapter also graphically draws the effectiveness of supply chain coordination. Based on the relationships between the constructs, a total of 12 hypotheses were developed to test the model. The hypotheses

also address the research objectives. The second stage of the model describes the larger context of supply chains (abilities of chain partners, types of supply chains and business environments).

Chapter 4 describes the methodology used in this study. It first reviews the literature on research philosophies, research approaches and data collection methods. Sampling, sampling techniques, reliability, validity and data analysis techniques are also discussed. After reviewing the literature, it explains the methodology and techniques used in this thesis (development of two questionnaires, used sampling method, research methods, data collection and data analysing techniques). Additionally, statements related to author's own published work are included in chapters 1, 3 and 4.

Chapter 5 presents the results of the pilot survey. The pilot survey identified chain coordinators (sample members) and explored the nature of the selected agri-food supply chains of New Zealand, UK and Pakistan. A number of analyses (characteristics of respondents, evaluation of items, exploratory factor analysis, checking normality and reliability) are also presented. The analyses are based on 225 respondents from New Zealand and 112 respondents from the UK and these numbers are found to be enough to apply structural equation modelling.

Chapter 6 focuses on the main results produced from structural equation modelling. It provides the evaluation of measurement and main models based on the data sets (New Zealand and UK). Also, the linkages between the dimensions of coordination effectiveness are presented.

Chapter 7 addresses the research objectives and hypotheses against conclusions. The interpretation and discussion of the results lead towards certain managerial implications. The links between the key studies, hypotheses and objectives are also presented. The chapter further draws the limitations of the thesis. Lastly, the substantial contributions, which also direct certain avenues for future research, are discussed.

DRC 16

MASSEY UNIVERSITY
GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
TO DOCTORAL THESIS CONTAINING PUBLICATIONS

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: **Pervaiz Akhtar**

Name/Title of Principal Supervisor: **Dr. Norman Marr/Director –LSCM**

Name of Published Research Output and full reference:

A theoretical framework [Akhtar, P., Fischer, C., Marr, N., 2011. Improving the effectiveness of food chain coordinators: a conceptual model. *Acta Horticulturae.* 895, 15–21].

Exploring the nature of coordination in HRC and identification of chain coordinators [Akhtar, P., Marr, N.E., Garnevska, E., 2012. Coordination in humanitarian relief chains: chain coordinators. *Journal of Humanitarian Logistics and Supply Chain Management* 2 (1), 85–103].

Exploring the nature of coordination in agri-food chains and identification of chain coordinators [Akhtar, P., Marr, N.E., Garnevska, E., 2012a. Chain coordinators and their role in selected agri-food supply chains: lessons from Pakistan, New Zealand and United Kingdom. *Food Chain* 2 (1), 104–116]

In which Chapter is the Published Work: **Chapter 1**

Please indicate either:

- **The percentage of the Published Work that was contributed by the candidate:**
  App. 8% of Ch.1 / 0.30% of the thesis; **and / or**
- **Describe the contribution that the candidate has made to the Published Work:**

  Definition of SC coordination; a summary of existing coordination practices; identification of chain coordinators, tangible and intangible resources

Candidate's Signature — 20 March 2013 (Date)

Principal Supervisor's signature — Date

CHAPTER 2 SELECTED CHAINS' BACKGROUND

2.1 Introduction

The purpose of this chapter is to provide background information on the selected agri-food chains or products (dairy, meat, apple, onion and wine). At the global level, the chapter presents information on global production, consumption and trade (exports and imports). Due to the focus of this study, which is the exports from New Zealand to the UK, and the data sampled from the selected sectors, the chapter at the country level especially emphasises the exports from New Zealand to the UK.

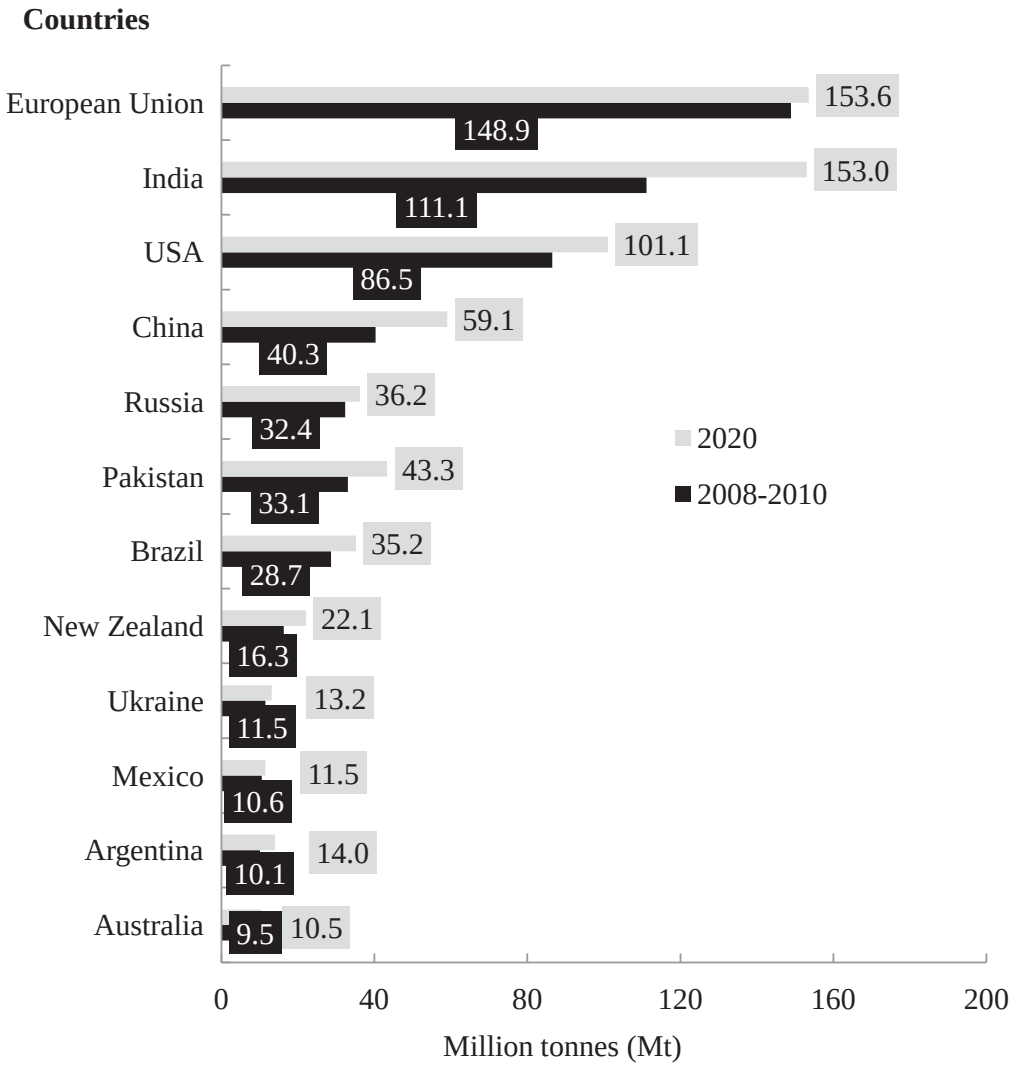
2.2 Dairy Industry

Global Production, Consumption and Trade

After slow economic growth in 2009, global milk production rebounded and reached to 713.6 million tonnes in 2010 (OECD, 2011; FAO, 2012). The production was estimated to be 730.1 million tonnes (Mt) in 2011(OECD, 2011). In 2012, this production could reach to 750.1 Mt (FAO, 2012). It is also anticipated that the average annual production could grow about 2% for the next few years. The production growth in the last decade was 1.9% and it might rise to 2.1% in the next decade (OECD, 2011).

Leading milk producing countries, their milk production (2008–10) and future production expectations (by 2020) are shown in Figure 2.1 (OECD, 2011; FAO, 2012). The major (more than 73%) growth in the production is predicted from developing countries mainly from India, Pakistan and China. These countries are expected to account for 38% of the total increase. The European Union (EU) collectively is anticipated to produce almost the same amount of milk as that of India. The milk production in the US, Russia and Brazil could reach to 101 Mt from 86.5 Mt, 36.2 Mt from 32.4 Mt and 35.2 Mt from 28.7 Mt respectively. The production in New Zealand is predicted to rapidly increase with an annual growth rate of 2.3%. Other countries such as Ukraine, Mexico and Australia are also expected to increase their production level. However, the growth rate is forecasted to remain less than 2% except for Argentina, which is 3% (OECD, 2011).

Figure 2.1: Leading Milk Producing Countries and Future Expectations



Source: (OECD, 2011)

According to the latest available data (2010) to date (July 2012), Table 2.1 shows top ten milk producing countries. The top three producers, India, the USA and China produce about 34% of global milk production (FAO, 2012a). The top ten countries together produce nearly 60% of the total production, and India alone accounts for about 16%. The US and China produce 12% and 6% respectively. Pakistan and Russia each adds 5% in the total. Germany, Brazil and France collectively contribute 3 to 4 percent whereas New Zealand and the UK together produce 4 percent of the total production (FAO, 2012a).

Table 2.1: Top Ten Milk Producing Countries, 2010

Ranking	Country	Production (tonnes)	%
1	India	117,000,000	16
2	USA	87,461,300	12
3	China	41,150,406	6
4	Pakistan	35,491,000	5
5	Russia	32,136,130	5
6	Germany	31,815,749	4
7	Brazil	29,665,300	4
8	France	24,205,616	3
9	*New Zealand*	*17,010,500*	*2*
10	*United Kingdom*	*13,960,000*	*2*
	Global total production	720,870,390	59

Source: (FAO, 2012a)

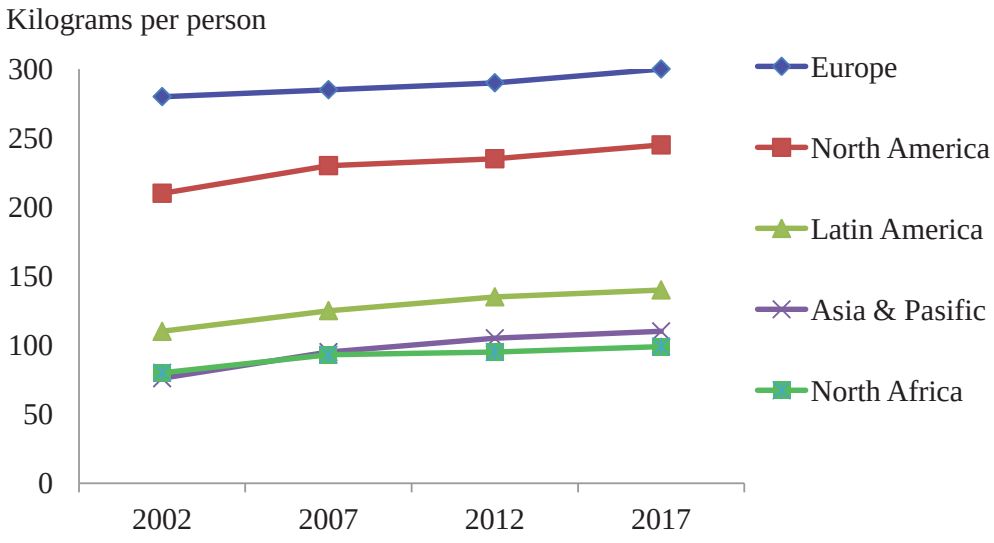
In the last few years, a stagnated trend was also seen in the production of butter, cheese, milk powders and fresh dairy products (FDP). However, growth in the production was recently seen in skim milk powders (SMP) and butter (OECD, 2011).

The production of whole milk powders (WMP), butter and FDP is predicted to rise 26% by 2020 as compared to 2008–10. For the same period, cheese and SMP growth could increase up to 19% and 15% respectively (OECD, 2011). Three-quarters of the total growth in butter is anticipated from India and Pakistan, whereas New Zealand and the US each could contribute up to 10%. The largest additional production in SMP is expected from New Zealand (33%), followed by the US (24%) and India (18%). The EU and the US dominate global cheese production and it is expected that they might provide 55% of the total cheese outputs. China and New Zealand are the major producers of WMP and jointly two-third of the total growth in WMP is predicted from these countries (OECD, 2011).

The people in developed countries consume more food than those who live in under developed countries. For example, in 2011, the annual per capita consumption of developed countries was 234.3 kilograms (kgs) compared to 104.5 kgs consumption in developing countries (FAO, 2012a).

It is expected that the consumption rate might increase up to 2.5% of the total consumption (FAO, 2012a). As shown in Figure 2.2, the overall trend of per capita consumption of milk and dairy products is increasing. The annual per person consumption of milk and dairy products in the EU is about 280 kgs and this consumption is expected to reach 300 kgs by 2017. With an increasing trend, the consumption in North America is expected to reach 245 kgs by 2017. The consumption in Latin America, North Africa, Asia and Pacific regions is anticipated to remain below 150 kgs. However, the consumption rate in these countries has also been increasing (FAO, 2011).

Figure 2.2: Average Per Capita Consumption of Dairy in Leading Countries



Source: (FAO, 2011)

New Zealand and Australia (Oceania) are the most significant exporters of dairy products. Both countries account for more than 40% of the global export markets. Particularly, New Zealand exported milk is expected to accelerate up to 6%. However, Australian dairy export may remain stagnated. The EU is the second largest exporter of dairy products and its growth might increase up to 4%. Asia is the third largest exporter, followed by North America and South America (OECD, 2011).

The major dairy exporting countries are New Zealand, Australia, Argentina, Belarus, the EU–27, Egypt, Saudi Arabia and the US. The detail of export quantities of each country is shown in Table 2.2. New Zealand is the largest exporter of whole milk powder and butter. New Zealand exports of butter, whole milk powder, skim milk powder and cheese account for 50%, 48%, 21% and 11% of the total respectively. The EU leads in cheese and SMP exports with 682 and 518 thousand tonnes accordingly (FAO, 2012a).

Table 2.2: Major Exporters of Dairy Products, 2011

Products	Exporters	Quantities (thousand tonnes)
Whole milk powder (WMP)	Global	2,277
	New Zealand	1110
	EU*	390
	Argentina	200
	Australia	116
Skim milk powder (SMP)	Global	1,707
	EU*	518
	United States	436
	New Zealand	362
	Australia	140
Butter		
	Global	826
	New Zealand	414
	EU*	126
	Belarus	64
	United States	64
	Australia	41
Cheese		
	Global	2,412
	EU*	682
	Saudi Arabia	284
	New Zealand	*253*
	United States	226
	Egypt	175
	Australia	168

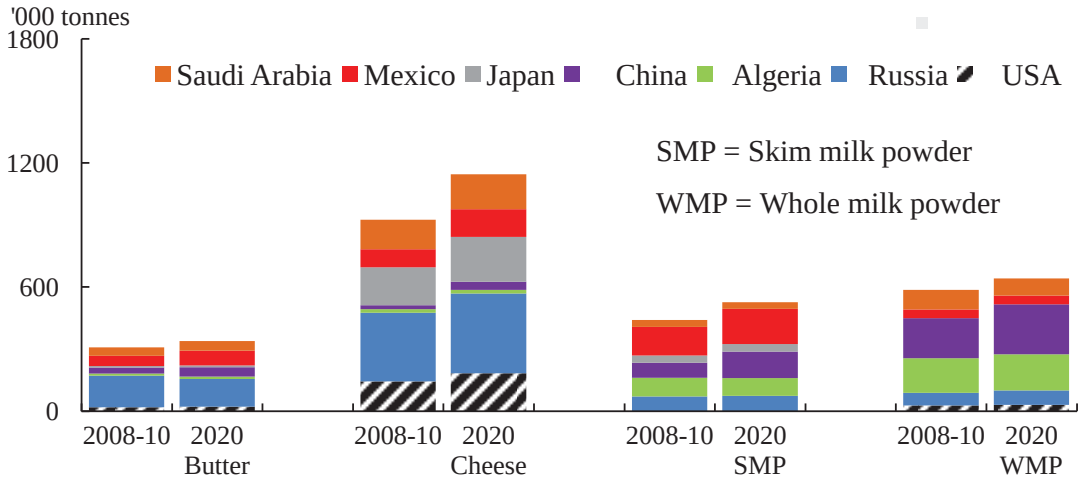
* excluded trade between the EU member states

Source: (FAO, 2012a)

The EU is the second largest exporter of whole milk powder (WMP) and butter with 390 and 126 thousand tonnes correspondingly. Belarus, the US and Australia are the third, fourth and fifth largest butter exporters. Argentina and Australia export 200 and 116 thousand tonnes of WMP respectively. The USA is the second largest exporter of skim milk powder (SMP) with 436 thousand tonnes. Australia is ranked the 4th largest exporter of SMP. Saudi Arabia with 284 thousand tonnes is the second largest cheese exporter, followed by New Zealand (253 thousand tonnes), the US (226 thousand tonnes), Egypt (175 thousand tonnes) and Australia (168 thousand tonnes) (FAO, 2012a).

As far as imports are concerned, Asia is also the largest region of dairy imports, followed by Africa. Central America and Eastern Europe also significantly contribute in dairy imports. Figure 2.3 shows that, between 2008 and 2010, WMP was mainly imported by China and Algeria. The demand for SMP was particularly increased in Mexico, China, Algeria and Russia. Cheese was mainly exported to Russia and Japan. An increase in cheese demand was also seen in Mexico whereas butter was primarily imported by Russia, Mexico and Saudi Arabia. SMP and WMP are also imported by Mexico, Japan, China and Saudi Arabia. Also, these dairy importing countries are expected to increase their import quantities by 2020 (FAO, 2012a). .

Figure 2.3: Major Importers of Dairy Products (2008–10) and Future Expectations



Source: (OECD, 2011)

New Zealand and UK Dairy Industry

The New Zealand dairy industry originally started in 1814 when missionary Samuel Marsden imported two cows and a bull (MAF, 2011; Fonterra, 2011). The first dairy co-operative company in the country was established in 1871. The number of dairy cooperatives rose by the start of the 20th century and reached more than 400 in 1930s (Fonterra, 2011).

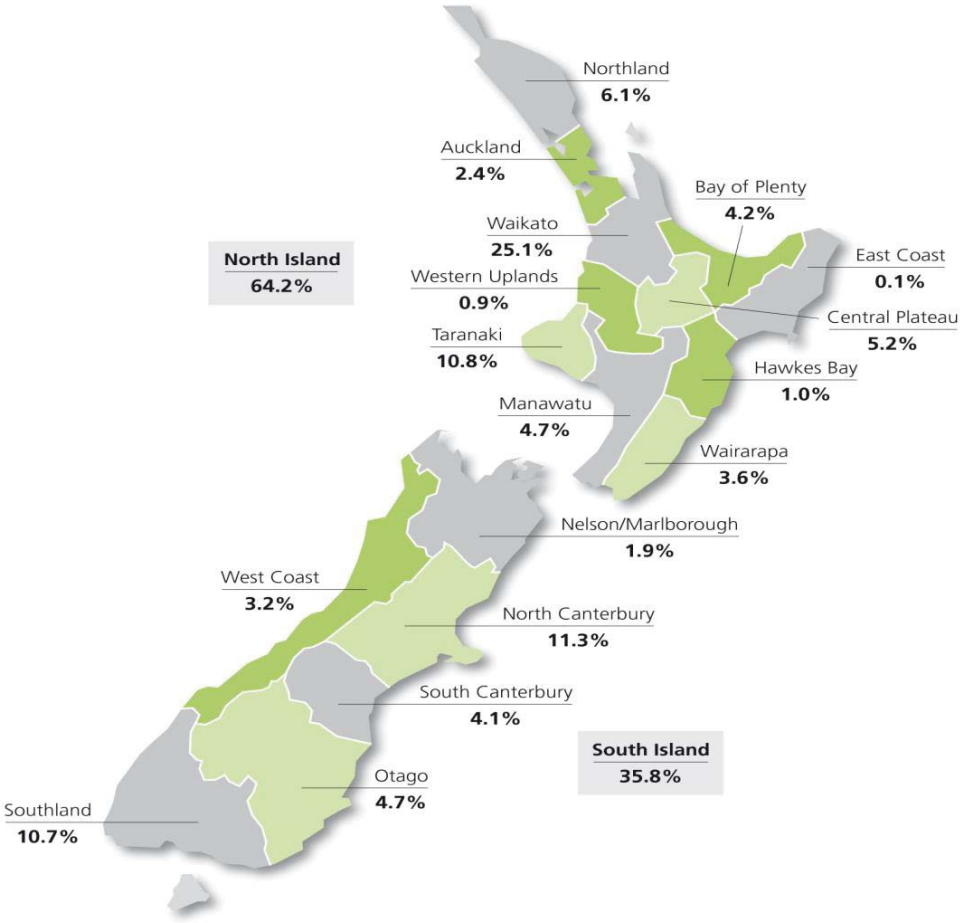
The development of land and refrigeration technology mainly contributed in New Zealand dairy exports. The small-to medium-sized farms of the North Island played a major role in this development. Farmers grew their land ownership which diffused the issue of land monopoly. Later, similar growth in dairy land was seen in the South Island (Greasley and Oxley, 2005). Moreover, the government established the Dairy Board in 1923. The Board controlled all dairy exports and supported farmers to access overseas markets. Further developments were also made from 1930 to 1960. For example, the industry started consolidation and joined forces to use more advanced technology (Fonterra, 2011). Technology development underpinned farming and processing methods which improved the quality of dairy products, in turn, it boosted dairy exports. Also, the export progress was associated with growth in per capita income and turning income distribution in favour of landowners (Greasley and Oxley, 2005).

The industry diversified and new markets were particularly needed when the UK joined the European Economic Community in 1970s. The number of associated companies increased up to 19 in the 1980s. The New Zealand Dairy Board became stronger and the number reached to 80 by 1995. In 2001, Fonterra Co-operative Group Limited was formed as a result of the merged between New Zealand Dairy Board, New Zealand Dairy Group and Kiwi Co-operative Dairies Limited. The company (Fonterra Co-operative Group Limited) is owned by New Zealand dairy farmers who represent more than 95% of all dairy farmers in the country (Fonterra, 2011). Moreover, Fonterra processes about 95% of all dairy in New Zealand and approximately 83% of organic dairy farms also supply to Fonterra (Schewe, 2011).

Figure 2.4 shows the regional distribution of dairy herds in New Zealand. The majority of cows (64.2%) are in the North Island. Within the North Island, Waikato and Taranaki

represent 25.1 % and 10.8% of the total dairy cows respectively. The South Island accommodates over one-third (35.8%) of all cows. In South Island, North Canterbury (11.3%) and Southland (10.7%) are the largest regions based on cow numbers. The remaining regions represent 0.1–6.1% of the total cows in New Zealand. In terms of farm area and cow numbers, on average, the forms in the South Island produce more than those in the North Island. In 2010/11, the total cows, 4.5 million, produced 17,339 million litres of milk. As a result, the dairy companies processed 859 million kgs of milk fat, 654 million kgs proteins and 1,513 million kgs milk solids. The majority of these outputs were exported (New Zealand Dairy Statistics, 2010–11).

Figure 2.4: Regional Distribution of Dairy Cows in New Zealand, 2010/11



Source: (New Zealand Dairy Statistics, 2010–11)

The export markets and agri-food products are crucial for New Zealand's economy because the domestic market consists of only 4.32 million people (Tripples, 2010). The agri-food products contribute over half of the merchandise exports and the top export products (dairy, meat, wine, wool, fruit and vegetables) produce about 16% of the country's GDP and also employ approximately 15% of the workforce (New Zealand Ministry of Foreign Affairs, 2011).

The New Zealand dairy industry mainly depends on export markets; almost 95% of its entire dairy produce is exported. In 2009, New Zealand exported approximately 9 billion US dollars (1USD = 1.2263 NZD on 31 October 2011) of dairy products that resulted in about 35% of the total global trade in dairy products. Moreover, the dairy exports contributed about 23 million US dollars (Schewe, 2011) in New Zealand's export earnings. This export development made the country one of the world's leading dairy exporters. In 2010, the total export value of New Zealand dairy exports was about 8,582 million US dollars (MAF, 2011). In 2011, New Zealand's total exports accounted for 38.33 billion US dollars (1 USD = 1.2447 NZD on 20/07/12) and agri-food products generated 21.77 billion US dollars. In other words, agri-food products contributed 56.80% in the total export value (Statistics New Zealand, 2012). As far as milk is concerned, New Zealand produced 2% of the total global production. Of the total, 17.3 billion litres was exported which resulted in 25% of the country's total export earnings (DairyNZ, 2012). The dairy export products were consumed in more than 150 countries. The major dairy importers were Australia, China, the US, Japan, Korea and the EU (MAF, 2011).

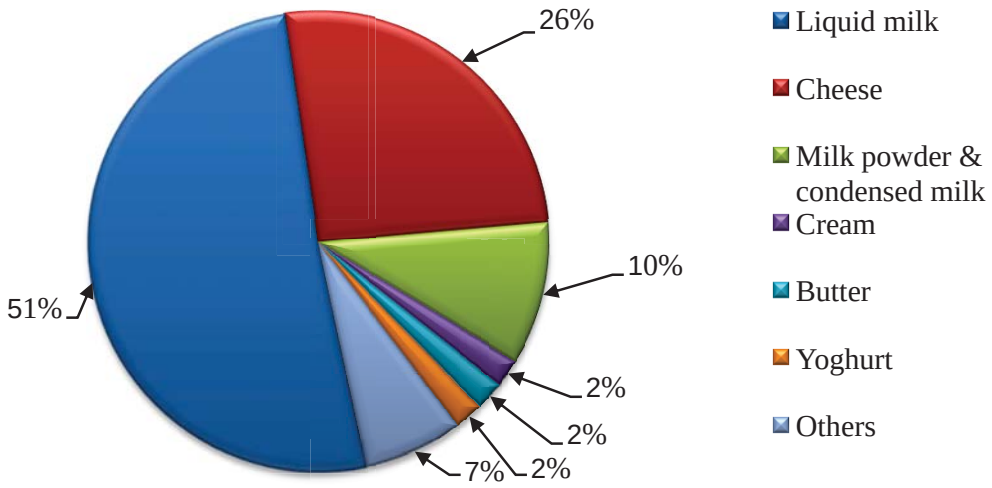
In 2011, Australia, China and the US were remained top three importers. Australia imported 23% of New Zealand's total exports, followed by China (12%) and the US (8.4%). Moreover, Asia-Pacific Economic Cooperation (APEC) countries together accounted for 71% ($27.07 billion USD) of the total exports. The EU including the UK imported 11% of the total exports and contributed 4.34 billion US dollars in the revenue (Statistics New Zealand, 2012).

The UK is the third largest milk producer in the EU and is globally placed at number nine in the list of largest milk producing countries. The country annually produces

approximately 13 billion litres of milk which resulted in about 5.31 billion US dollars, generating 16.1% revenue of the country's total agri-food outputs (Hawkins, 2011).

The total milk production in the UK was static between 1995 and 2005. Between 2005 and 2009, the production decreased. However, the production level again went up in 2010. Figure 2.5 illustrates the distribution of processed milk in 2010. The largest quantity (51%) was utilised for liquid milk, followed by cheese (26%), milk powder and condensed milk (10%), cream, butter and yoghurt (2% each) (Hawkins, 2011).

Figure 2.5: Distribution of Milk Processed in the UK, 2010



Source: Based on (Hawkins, 2011)

In May 2012, England and Wales produced 853 million litres (Ml) of whole milk; nearly the same output was seen in May 2011. The liquid milk used 369 Ml of whole milk and 100 Ml of skim milk. Moreover, the cheese production utilized 197 Ml of whole milk and 25 Ml of skim milk (DEFRA, 2012).

The imports of agriculture products into the UK are considered pivotal due to the fact that the country's own agriculture industry only generates around 0.5% of the national income. "Currently the UK imports more than 40% of its food compared to 25% twenty five years ago" (Momagri, 2011 p. 1). Thus, it makes the country highly dependent on

food imports. According to the national forecasts, the UK population will be about 70 million after a couple of decades. This means to fulfil the need of these people, 50% of a meal will come from food imports (Momagri, 2011).

Although the UK does not do remarkable overseas trade in liquid milk, the country substantially imports processed dairy products. Table 2.3 shows that the UK imports considerable quantities of butter (102,000 tonnes) and cheese (435,000 tonnes). Cheese is particularly imported from the EU countries (Ireland, France, Germany, Italy and Belgium) and butter mainly comes from New Zealand, Denmark and Ireland. The country has also shown net exports in cream (65,000 tonnes imports and 72,000 tonnes exports) and milk powder (75, 000 tonnes imports and 92,000 tonnes exports) (Dairy UK Statistics, 2011; Hawkins, 2011).

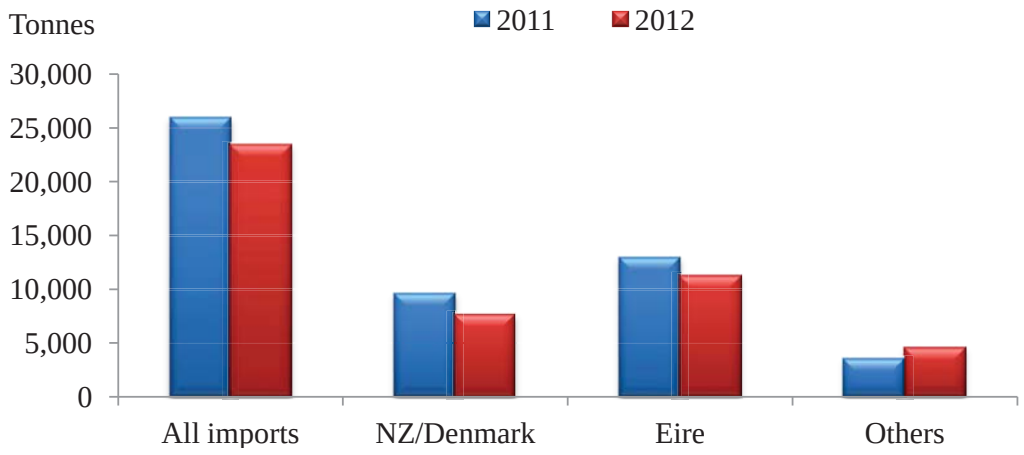
Table 2.3: UK Trade Balance of Butter and Cheese, 2010

Products	Imports (000 tonnes)	Exports (000 tonnes)	Countries
Butter	102	27	*New Zealand*, Denmark & Ireland
Cheese	435	112	EU countries
Cream	65	72	
Milk powders	75	92	

Source: (Dairy UK Statistics, 2011; Hawkins, 2011)

Figure 6.2 shows the UK butter imports. The data includes imports from Denmark because New Zealand and Australia trade via this country. The total butter imports between January and May 2012 decreased by 9.6% (2,491 tonnes) compared to 2011 level. The UK mainly imports butter from New Zealand (via Denmark). The cumulative (January–May 2012) butter imports from New Zealand were also decreased by 20.2% compared to the same period in 2011. The total quantity of butter imports from New Zealand remained less than 10,000 tonnes (DairyCo Datum, 2012).

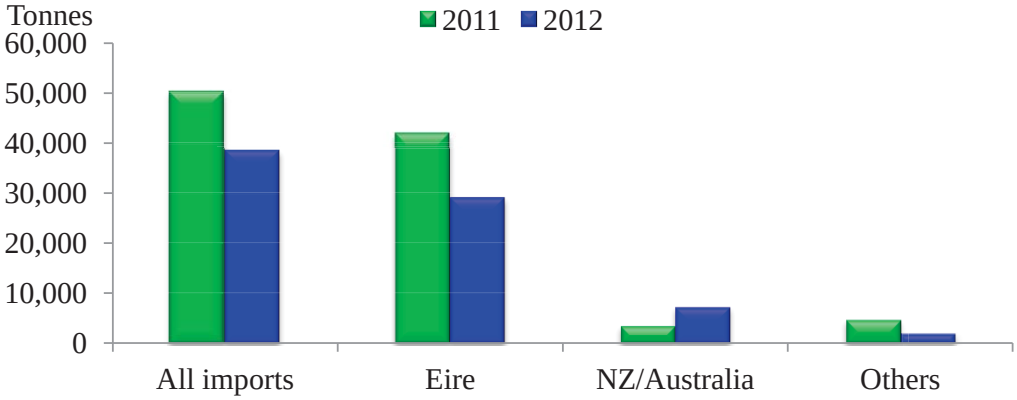
Figure 2.6: UK Butter Imports, 2011 and 2012 (January and May)



Source: (DairyCo Datum, 2012)

Figure 2.7 depicts the UK cheddar imports. The total cheddar imports between January and May 2012 were 23.2% (11,646 tonnes) lower than the same period in the last year. The UK also imports cheddar from New Zealand and Australia. The cumulative (January–May 2012) cheddar imports from New Zealand and Australia were increased compared to 2011 level and the imported volume was nearly 10,000 tonnes (DairyCo Datum, 2012).

Figure 2.7: UK Cheddar Imports, 2011 and 2012 (January and May)



Source: (DairyCo Datum, 2012)

2.3 Meat Industry

Global Production, Consumption and Trade

Global meat production reached nearly 248 million tonnes in 2003, showing an increase of 8.35% since 1999 (Thankappan and Flynn, 2006). The production has mainly increased in the developing countries and these countries produced more than half of the developed countries' production (Green, 2005). In 2010, the production was 294.6 million tonnes and went up to 297.2 million tonnes in 2011. The production is expected to reach 302.0 million tonnes in 2012 (FAO, 2012). By 2030, the figure is forecasted to reach 386 million tonnes (Walker et al., 2005).

Table 2.4 highlights important facts about global meat production, consumption and trade in 2011. Developing countries together produced 177,485 thousand tonnes of meat and developed countries accounted for 119,727 thousand tonnes (FAO, 2012).

Table 2.4: Meat Production, Trade and Consumption (Thousand Tonnes), 2011

Continents/countries	Production	Consumption	Exports	Imports
Asia	120,402	133,251	4,364	14,214
Europe	57,970	57,866	4,463	4,359
North America	46,760	39,680	9,277	2,197
South America	38,396	32,134	7,310	1,048
Africa	16,118	18,274	131	2,287
Central America	8,651	10,696	478	2,523
Oceania	5,915	3,805	2,499	389
Top three producers:				
China	79, 931	81,892	1,887	3,847
USA	42,408	36,338	7,535	1,465
Brazil	24,443	18,510	5,976	44
Developing countries	177,485	181,257	12,228	15,999
Developed countries	119,727	114,450	16,296	11,018
Global production	**297,212**	**295,707**	**28,522**	**27,017**

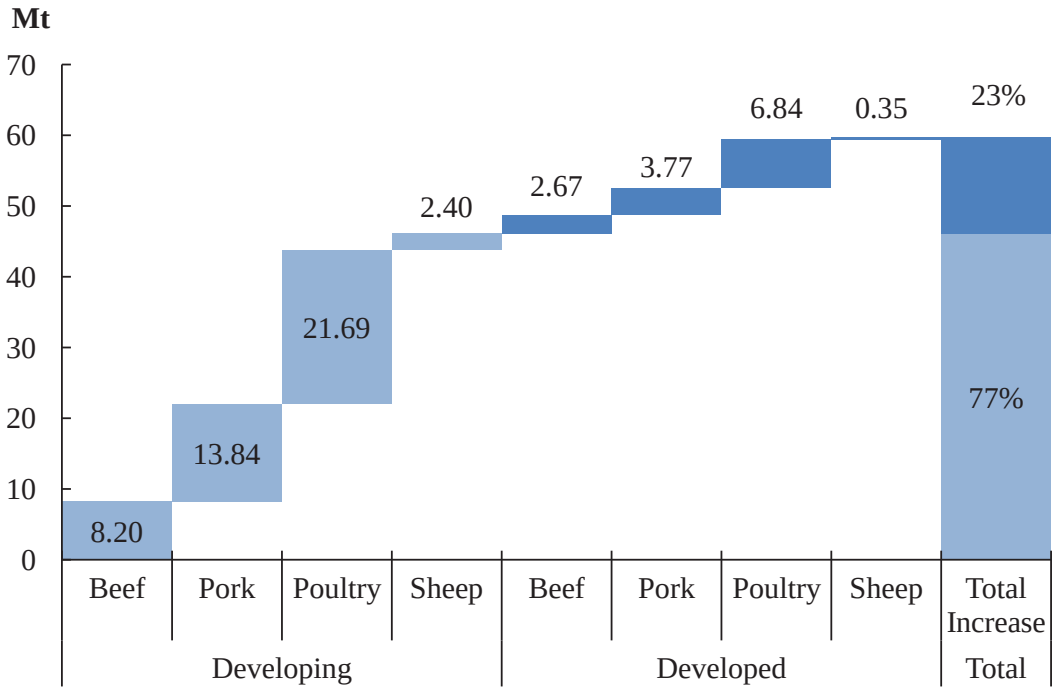
Source: Developed based on (FAO, 2012)

Asia with 120,402 thousand tonnes was the largest producer of meat among the continents, followed by Europe (57,970 thousand tonnes), North America (46,760

thousand tonnes), South America (38,396 thousand tonnes), Africa (16,118 thousand tonnes), Central America (8,651 thousand tonnes) and Oceania (5,915 thousand tonnes). Table 2.4 also shows top three meat producing countries. China is the largest producer of meat (79,931 thousand tonnes). The USA and Brazil are ranked second and third with 42,408 and 24,443 thousand tonnes correspondingly (FAO, 2012).

Figure 2.8 shows that the growth rate in meat production is dominated by developing countries. In the next decade, developing countries may achieve up to 77% incease in the total production. In the last decade, the annual average growth rate of global meat production was 2.2% and it is expected that this might come down to 1.8%. The lower production growth rate in Brazil, Argentina and Russia might affect the total production (OECD, 2012).

Figure 2.8: Developing Countries Increase in Meat Production, 2011



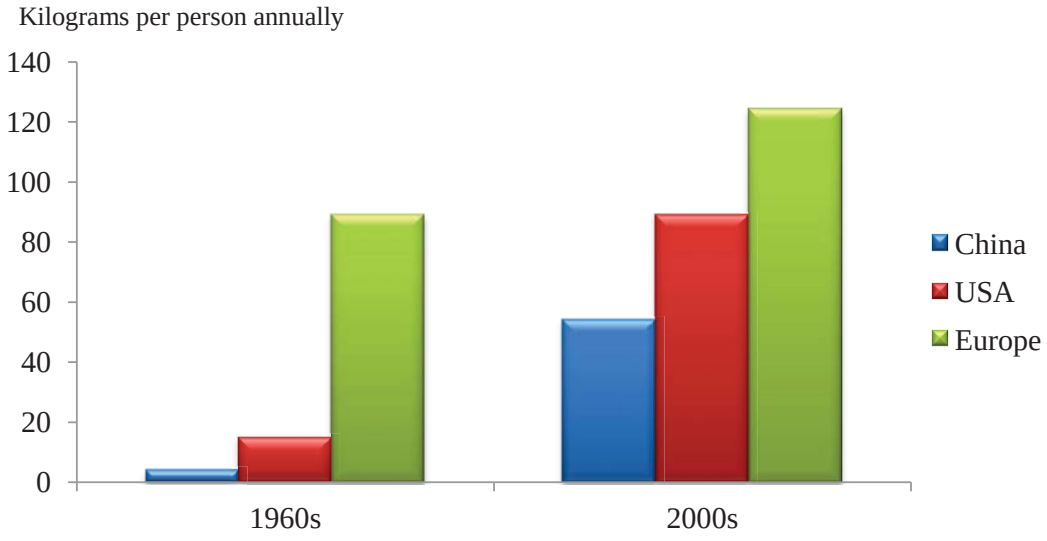
Source: (OECD, 2012)

With an increasing trend, global meat consumption tripled in the last five decades (Thankappan and Flynn, 2006). It is anticipated that global demand for meat might be almost double by 2020 (Walker et al., 2005).

Meat consumption is high in advanced countries than less developed countries. For instance, the average per capita meat consumption in the EU and the US is 124 kilograms (kgs) and 89 kgs respectively while the consumption in China is 54 kgs. In the US, a person on average derives 67% (in total equal to 10 billion animals' consumption each year in the country) of protein from meat whereas the world-wide average consumption is only 34% (Walker et al., 2005; Thankappan and Flynn, 2006).

Figure 2.9 shows average meat consumption in major regions. The overall consumption increased between 1960s and 2000s (Thankappan and Flynn, 2006). Consequently, the per capita annual meat consumption increased from 89 kgs to 124 kgs in the Europe and from 15 kgs to 89 kgs in the USA. The consumption in China also reached to 54 kgs from 4 kgs (Thankappan and Flynn, 2006).

Figure 2.9: Increase in Meat Consumption in Major Regions, 1960s–2000s



Source: Developed based on (Thankappan and Flynn, 2006)

Furthermore, the most significant demand for meat has occurred in Asia and South America. In Asia, the meat consumption increased to 81.5 million tonnes (MTs) from 13.5 MTs since 1970 till 1999. Similarly, in the same era, the meat consumption in South America reached to 20.6 MTs from 6.5 MTs (Thankappan and Flynn, 2006).

As mentioned in Table 2.4, in 2011, developing countries consumed 181,257 thousand tonnes (TTs) of meat while developed countries consumed 114,450 TTs. Asia with 133,251 TTs remained the largest consumer of meat, followed by Europe (57,866 TTs), North America (39,680 TTs), South America (32,134 TTs), Africa (18,274 TTs), Central America (10,696 TTs) and Oceania (3,805 TTs). As far as countries are concerned, China is ranked first, followed by the USA and Brazil (FAO, 2012).

Table 2.4 also shows export and import quantities. The top five exporting regions are North America (9,277 TTs), South America (7,310 TTs), Europe (4,463 TTs), Asia (4,364 TTs) and Oceania (2,499 TTs). Regarding countries, the USA is the leading exporter with 7,535 TTs of meat exports while China exports only 1,887 TTs. Hence, China has a negative trade of balance (imports > exports) while the US and Brazil both have a trade surplus (exports > imports) (FAO, 2012).

Additionally, developed countries export more meat than developing countries. For example, the USA exported 7,535 TTs of meat while China merely exported 1,887 TTs. The main reason could be an increase of population or production outcomes in developing countries that creates more demand for meat (FAO, 2012).

Regarding imports, Asia with 14,214 TTs of meat imports is the largest importer, following by Central America (2,523 TTs), Africa (2,287 TTs), North America (2,197 TTs), South America (1,048 TTs) and Oceania (389 TTs). China with 3,847 TTs is the leading importer among the countries (FAO, 2012).

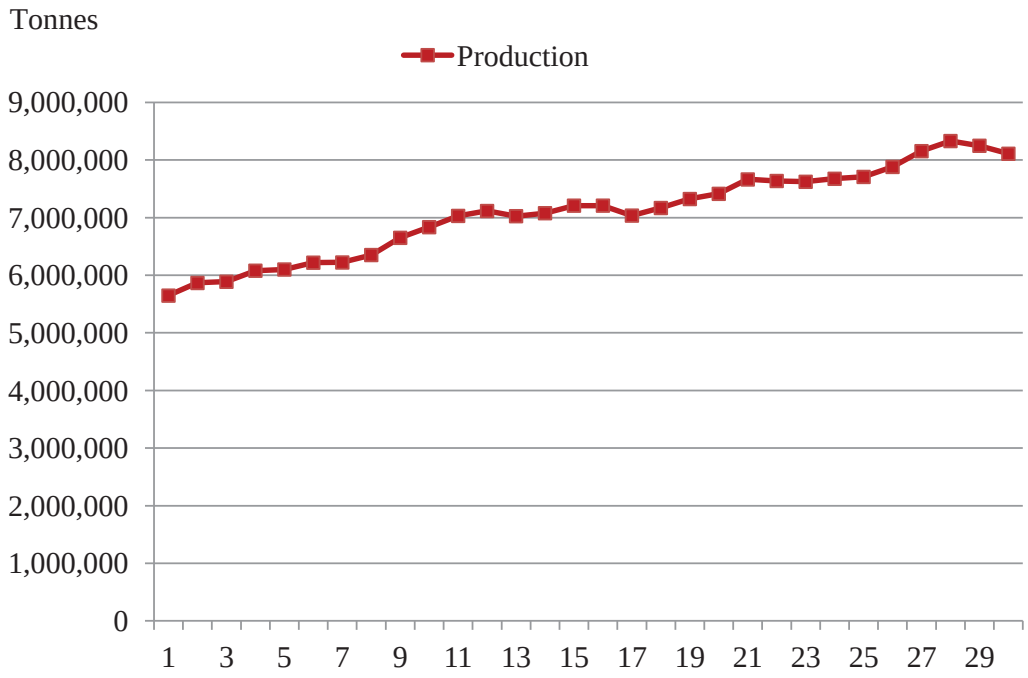
This study focuses on the selected produce group that is mainly exported from New Zealand to the UK. Hence, the review particularly focuses on sheepmeat and beef (not other types of meat such as chicken). The term “sheepmeat” is used for mutton, lamb and goat-meat unless indicated otherwise.

The global sheep population reached a peak of 1, 040 millions in 1970. A decline was seen in the numbers until 1975. The largest stock was in Soviet Union, Australia and India (each had over 100 million sheep). New Zealand, Turkey, China, South Africa, Iran and Argentina each had more than 30 million of sheep. France, Greece, Spain, Bulgaria, Romania, Mongolia, Brazil, UK and South America each owned over 10 million sheep (Blyth, 1981).

Overall in 1970s, the total sheep numbers and sheepmeat production were reasonably stable with some ups and downs in certain regions. The numbers slightly increased in the Soviet Union and East European countries. However, the actual production expectations were hardly ever achieved in these countries. The fluctuation in sheep population was seen in Africa. In Asia, particularly in India, Pakistan and China, the industry expanded and the same trends were noticed in several countries of the Middle East. A relative stability was maintained in Oceania. The sheep population in New Zealand decreased in the early 1970s; however, it was recovered quickly. The sheep numbers in North and South America declined continuously since 1943 (Blyth, 1981).

Figure 2.10 shows an increasing trend in the global sheepmeat production in the last three decades (1980–2009) (FAO, 2011c). In 2009, an incease in the production was seen in Eastern Europe because of recent recovery from summer drought. However, because of dry weather, the production was affected in Oceania, South America and certain parts of Africa. In 2011, the global production of sheepmeat reached 13.6 million tonnes with an increase of 1% compared to the last year. Australia and New Zealand supplied more than 80% of the global sheepmeat. The sheepmeat production is expected to increase in, particularly, Sudan, Nigeria, Ethiopia, India, Iran, Pakistan and Turkey. In Oceania, Australia and New Zealand have reversed four years of declining trend and it is expected that the production will rise by 3% in 2012. A high demand for Kiwi and Australian sheepmeat is expected from the EU, the US and China. Moreover, the export of sheepmeat from Pakistan to Middle Eastern countries is also anticipated to increase (FAO, 2012).

Figure 2.10: Sheepmeat Production in the Last 30 Years, 1980–2009



Source: (FAO, 2011c)

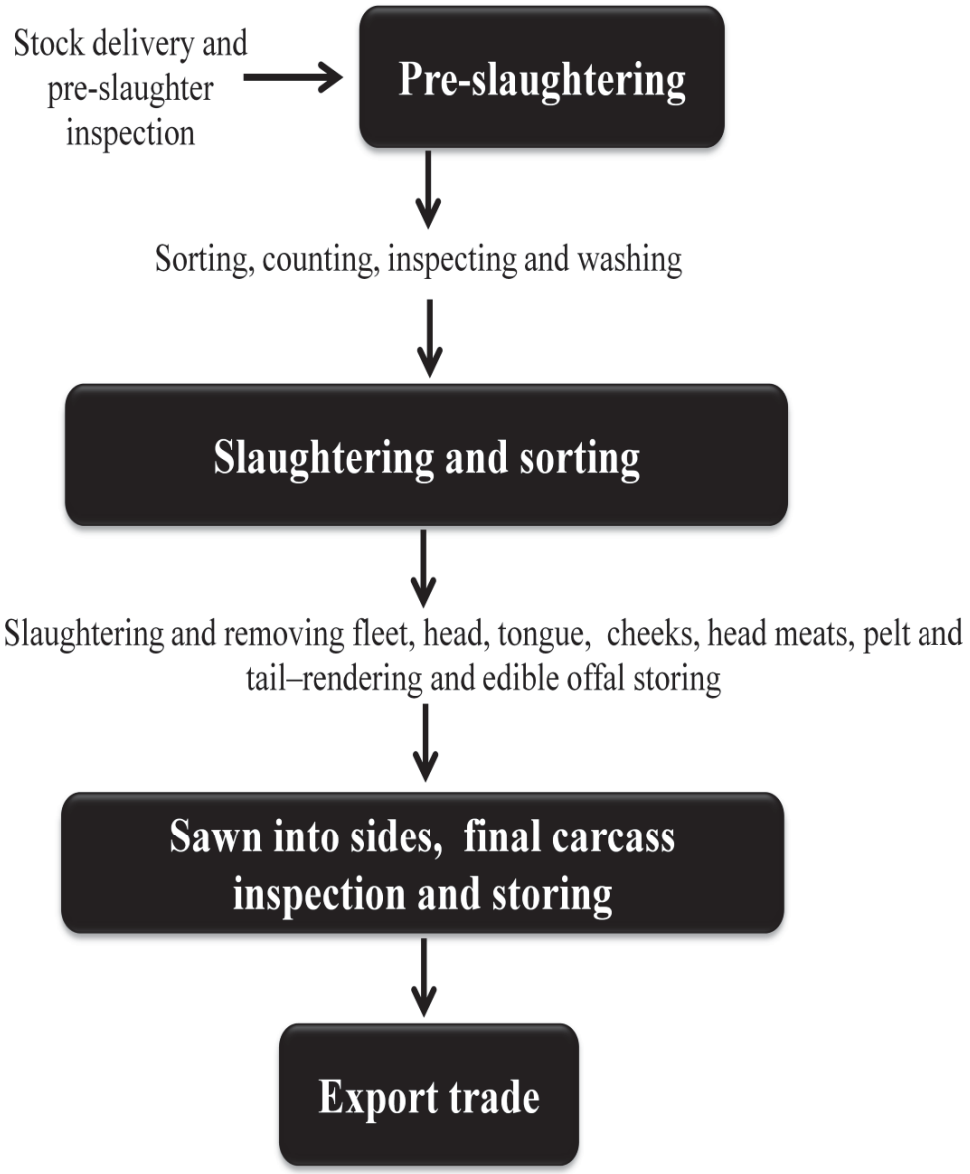
Global beef production in 2009 was 64.7 million tonnes (FAO, 2010). In 2011, with an increase of 4% compared to the previous year, the global beef production reached about 67 million tonnes. In 2012, the production is expected to increase in certain countries such as India, Korea, Indonesia, Brazil, Argentina, Canada, Australia and New Zealand. However, the reduction in cattle numbers in the EU, the Russian Federation, Ukraine and the US could decrease the production in developed countries. In Africa, the production is expected to increase; however, most of the areas in Africa are affected by pasture conditions and water unavailability (FAO, 2012).

Because of short domestic supplies, the large imports of beef are forecasted from the US and the EU. Egypt, Saudi Arabia, Malaysia, Philippines and Vietnam are also expected to increase their imports. Although Argentina, New Zealand and Australia are expected to increase their beef exports, the most significant growth rate in 2012 is anticipated from developing countries, especially from Brazil and India (FAO, 2012).

New Zealand and UK Meat Industry

A graphical view of New Zealand's export supply chain is shown in Figure 2.11. The supply chain consists of four stages; pre-slaughtering activities, slaughtering and sorting different parts, final inspections and exports (Beef and Lamb New Zealand, 2011).

Figure 2.11 New Zealand's Meat Export Chain



Sources: Developed based on (Beef and Lamb New Zealand, 2011)

Overall, the New Zealand meat industry is categorised into three distinctive networks, namely: (a) export (b) domestic and (c) domestic-informal. The majority of chain players belong to the first two networks. The domestic-informal chains are operated in rural areas where butchers sell regulated and unregulated meat. The regulated meat is slaughtered by licensed processors whereas the unregulated meat is managed on premises (Tanaka, 2005).

The first consignment of frozen meat from New Zealand was shipped to the UK in 1882 and the consignment reached in three months (Blyth, 1981). Until the mid-1950s, more than 95% of meat from New Zealand was exported to the UK. The exports were mainly dominated by sheepmeat and beef accounted for only 18% of the total exported meat (Curtis and Reveley, 2001). In the late 1960s, New Zealand had to update its export standards because of new hygiene and inspection requirements mainly from the US and the UK. Also, the UK joined the EU in 1973. This development changed the pattern of New Zealand's export markets. A market diversification was seen and the exports geographical scattered in other parts of the world (Rosenvold and Wiklund, 2011).

New Zealand was recently ranked third in the world for producing mutton and lamb and thirteenth for beef production (Tanaka, 2005). For lamb, the country is also considered the world's largest exporter and contributes more than 40% of the global total exports (Ledgard et al., 2011). Additionally, New Zealand's economy makes about 3 billion US dollars (1 USD = 1.24869 NZD 20 October 2011) from meat exports. The country achieved a surplus of 562,951 US dollars from meat exports in 2010. As a result, meat is considered as the second largest export of the New Zealand agrifood industry and accounts for about 12% of the country's total exports. Also, nearly 90% of meat exported from New Zealand is consumed in more than 100 countries (Statistics New Zealand, 2011).

The percentages of sheepment (lamb and mutton), beef and veal exported to the major regions are shown in Table 2.5 (Beef and Lamb New Zealand, 2012). From July to April 2012, 41% of sheepmeat exports were supplied to the EU. Of this, the UK alone accounted for 47% whereas 53% was shipped to the rest of EU countries. The next largest sheepmeat export market was Northern Asian (24%). China and Hong Kong,

within Northern Asia, imported 79% of the total. North America (11%) and the Middle East (10%) imported almost the same quantity of sheepmeat. Within North America, the US accounted for 55%. Canada and Mexico imported 32% and 13% respectively. Pacific regions together represented only 4% of the total sheepmeat exports (Beef and Lamb New Zealand, 2012).

Table 2.5: Main Export Markets for New Zealand Meat, July to April 2012

Lamb and mutton		Beef and Veal	
Regions	Percentage	Regions	Percentage
EU	41	North America	50
Northern Asia	24	North Asia	26
North America	11	Southern Asia	14
Middle East	10	EU	3
Pacific	4	Pacific	3

Sources: Developed based on (Beef and Lamb New Zealand, 2012)

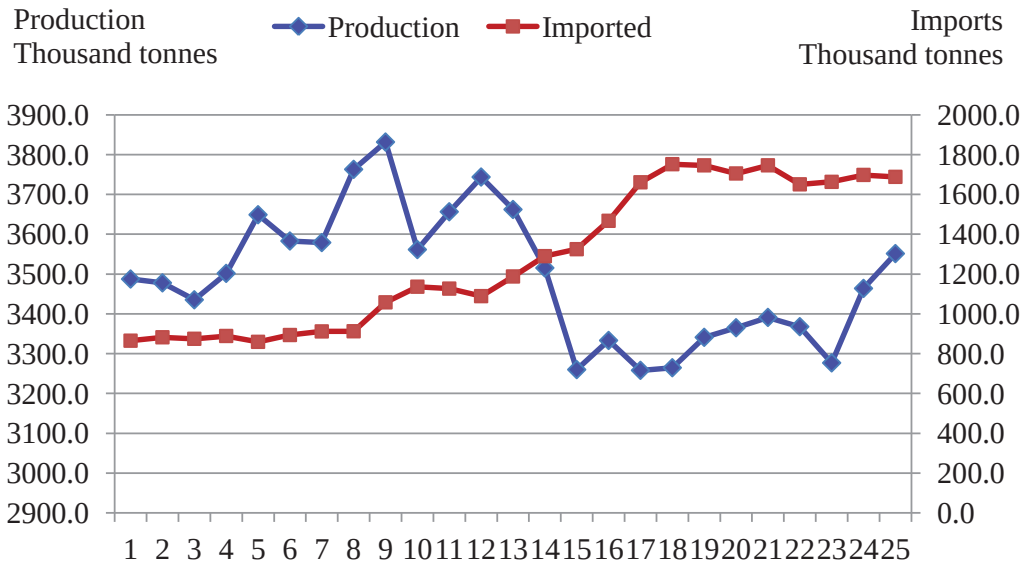
North America with half of the New Zealand total exported beef represented the leading beef importer for the 10-month period to the end of April 2012. Within the region, the US alone imported 86% of the total. The next largest beef importer was North Asia (26%), followed by Southern Asia (14%), the EU and Pacific (each 3%). The export to the EU also includes the quantity exported to the UK which is still a major market for New Zealand exports (Beef and Lamb New Zealand, 2012).

The UK meat industry has the third largest cattle herd (after France and Germany) in the EU. The cattle system in the UK can be categorised into two groups. The first group is based on breeding and rearing. Some of the farms in this group continue to fatten all or part of their own stock. The other group sell only store cattle. The cattle are sourced from individual farmers, producer groups and cattle markets. Moreover, the role of auction market is important and it provides 55% of the total cattle for slaughtering house. The remaining 45% cattle are supplied by farmer or producer groups (Thankappan and Flynn, 2006).

However, it is particularly difficult for small companies to meet the stringent requirements such as special hygiene and safety standards demanded by retailers. Therefore, small companies only handle slaughtering, removing skin, liver, kidneys intestines and other parts. These companies sometimes also involve in products packaging and selling them to retailers, wholesalers or meat industry directly. Also, the role of independent wholesalers is declining because they have integrated their chains with large distribution companies and centralised buying units. The principle customers of wholesaling companies are butchers. These companies also market a broad range of activities (e.g., cutting and consumer packaging) which add value to their products and retain their customers (Thankappan and Flynn, 2006).

In 2011, the total carcase weight of meat production in the UK was 3551.3 thousand tonnes (TTs) and the country imported further 1688.2 thousand tonnes to fulfil the local demand. In the first quarter of 2012, the total production was 880.3 TTs, and the country imported 378.6 TTs. Figure 2.12 shows the history of the total meat production and imports in the UK. Overall, the UK meat production fluctuated during the last 25 years and the imports increased (DEFRA, 2012b).

Figure 2.12 UK Meat Production and Imports in 25 Years, 1987–2011



Source: Developed based on (DEFRA, 2012b)

Twenty five years ago (1987), the production was 3487.4 TTs of dressed carcase weight and it increased to 3831.6 TTs in 1995. The lowest production (3259.8 thousand tonnes) was in 2001. However, the production trend went up in the last three years (DEFRA, 2012b).

Regarding the imports, the UK imported 865 TTs of dressed carcase weight in 1987. With an increasing trend, the imported meat quantity reached to 1751.8 TTs in 2004, the highest in the last twenty five years. The imports quantity was almost doubled in 2011 compared to 1987 (DEFRA, 2012b).

The UK used to be a main importer of New Zealand sheepmeat. However, the quantity of sheepmeat imported by the UK decreased over 40% since the late 1950s till 1980. Particularly, mutton imports from New Zealand became negligible. The lamb imports were still remarkable till 1980 and accounted for about half of the lamb consumption in the UK (Blyth, 1981). The main reason for the decrease in imports was that of the UK joined the EU in 1973, and it restricted the proportion of the total New Zealand exports. As a result, the exports the UK dropped to below 40% from 90% (Dungen, 2011).

Recent research showed that UK consumers spend about 24% of their food expenditure on meat, and beef represents more than half of red meat consumption (Thankappan and Flynn, 2006). In the recent years, the total annual meat consumption in the UK has reached 80 kgs per person (FAO, 2008). Also, the average daily intake of red meat for men is 96 grams and 57 grams for women. The daily average consumption of red and processed meat is 76 grams (EBLEX, 2011).

To fulfil the above mentioned local requirements, the UK mainly imports sheepmeat from New Zealand, Australia and European countries. Because of recently meat production growth in the UK, the overall imports of sheepmeat dropped 27% in January and February 2012 compared to the same months in 2011. Table 2.6 shows the detail of declining trends in the imports quantity from different countries. In the first two months of 2012 (comparing to 2011 levels), the import volumes of sheepmeat from Australia and New Zealand declined 63% and 22% respectively. When compared to 2010 volumes, the import quantities from New Zealand and Australia were down 38% and 36% respectively (EBLEX, 2012).

Table 2.6: UK Sheepmeat Imports, 000 Tonnes

	Jan-Feb 2010	Jan-Feb 2011	Jan-Feb 2012
EU-27 countries	2.2	1.5	1.5
New Zealand	*15.1*	*12.1*	*9.4*
Australia	1.4	2.4	0.9
Frozen	9.9	9.2	5.6
Fresh/chilled	9.1	7.1	6.3

Source: (EBLEX, 2012)

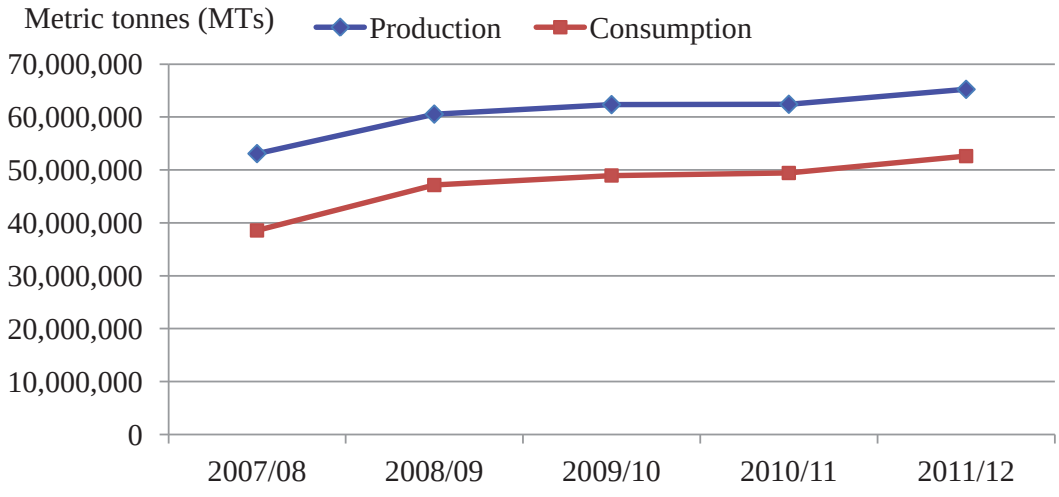
During January and February 2012, the UK imported a total of 37,000 tonnes of beef. The imports mainly came from Ireland, Netherlands, Germany, Spain, Italy, Uruguay, Brazil, Australia and New Zealand (EBLEX, 2012b).

2.4 Apple Industry

Global Production, Consumption and Trade

Global apple production and consumption are shown in Figure 2.13. With a sharp increase between 2007 and 2009, the overall production and consumption increased (USDA, 2011).

Figure 2.13: Global Apple Production and Consumption, 2007–2012

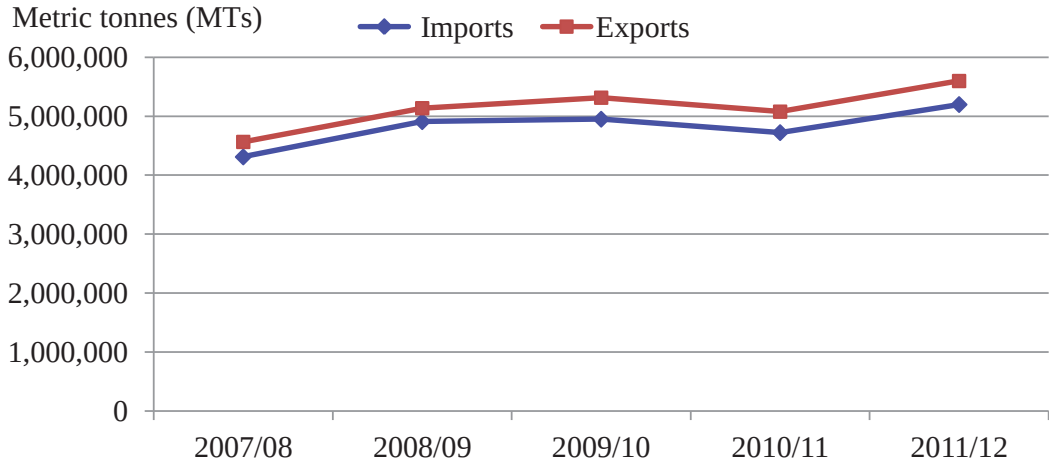


Source: Developed based on data (USDA, 2011)

However, between 2009 and 2011, a slow growth rate was observed. In 2010/11 season, the production and consumption accordingly were 62.4 million metric tonnes (MTs) and 49.4 million MTs. It is anticipated the total production for 2011/2012 season could reach at a record 65.2 million MTs and the consumption is forecasted over 50 million MTs (USDA, 2011).

Global apple imports and exports are summarised in Figure 2.14. The imports and exports both increased in the last few years, particularly between 2007 and 2009. Because of the lower production and consumption between 2009 and 2011, slow growth was seen in apple trade. In 2010/11 season, the export volumes were particularly low. However, for 2011/12 season, it is forecasted to rebound 10%, reaching to a record 5.6 million MTs (USDA, 2011).

Figure 2.14: Global Apple Trade, 2007–2012



Source: Developed based on data (USDA, 2011)

Table 2.7 lists the top ten global apple producers and consumers. In 2011, China with 35,000,000 MTs was the leading producer among the top ten countries. Together, the EU–27 produced 11,834,000 MTs, followed by US (4,227,338 MTs), Turkey (2,700,000 MTs), India (1,750,000 MTs), Chile (1,410,000 MTs), Brazil (1,240,000 MTs), Ukraine (1,050,000 MTs), Russia (955,000 MTs) and Argentina (860,000 MTs) (USDA, 2012).

Table 2.7: Top Ten Apple Producers and Consumers, 2011

Producers	Production (Mt)	Consumers	Consumption (Mt)
China	35,000,000	China	28,975,000
EU-27	11,834,000	EU-27	7,772,300
US	4,227,338	Turkey	2,540,500
Turkey	2,700,000	US	2,153,108
India	1,750,000	India	1,915,000
Chile	1,410,000	Russia	1,324,000
Brazil	1,240,000	Ukraine	1,145,000
Ukraine	1,050,000	Brazil	1,115,000
Russia	955,000	Japan	705,150
Argentina	860,000	Mexico	684,500

Source: (USDA, 2012)

In terms of consumption, China (28,975,000 MTs) and the EU-27 (7,772,300 MTs) were also the leading consumers. Turkey (2,540,500 MTs) and the US (2,153,108 MTs) held third and forth positions respectively. India, Russia, Ukraine and Brazil each consumed more than a million MTs of apples while Japanese and Mexican apple consumption was less than one million MTs (USDA, 2012).

The top ten global apple importers and exporters are shown in Table 2.8. Russia with over 1.2 million MTs of apple imports was the leading importer in 2011. The EU-27 and Indonesia imported 550,000 MTs and 235,000 MTs respectively (USDA, 2012).

Table 2.8: Top Ten Apple Importers and Exporters, 2011

Importers	Imports (Mt)	Exporters	Exports (Mt)
Russia	1,210,000	EU-27	1,500,000
EU-27	550,000	China	1,100,000
Indonesia	235,000	US	833,000
Canada	200,000	Chile	750,000
Mexico	190,000	South Africa	340,000
India	185,000	New Zealand	270,000
Algeria	175,000	Argentina	180,000
UAE	167,500	Serbia	140,000
US	167,000	Turkey	65,000
Saudi Arabia	155,900	Brazil	55,000

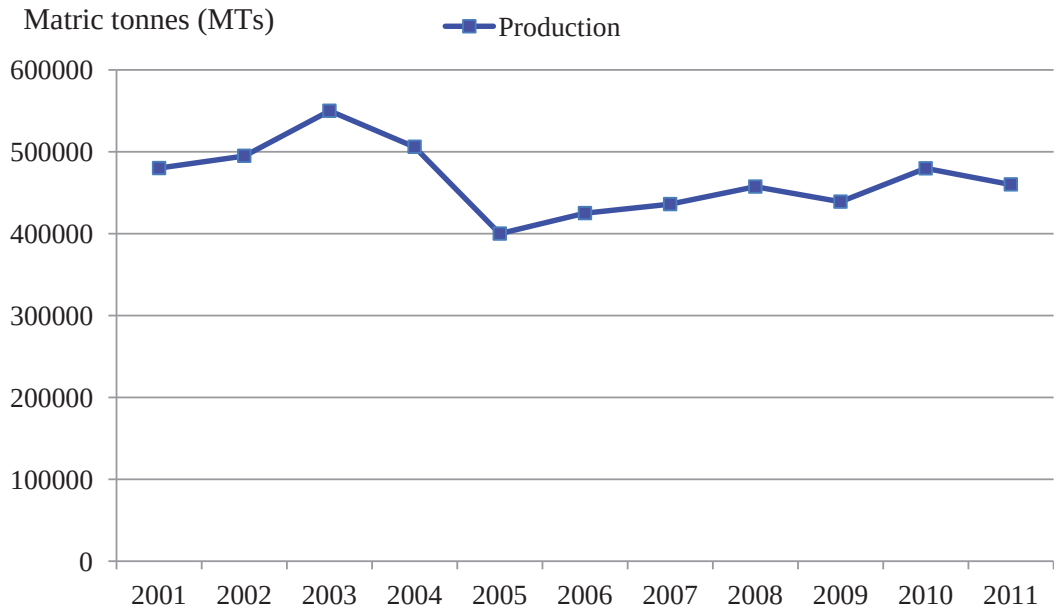
Source: (USDA, 2012)

Canadian apple imports reached two hundred thousand MTs while the imports in Mexico, India, Algeria, the UAE, the US and Saudi Arabia ranged from 155, 900 MTs to 190,000 MTs. As far as exports are concerned, the EU-27 and China with 1,500,000 MTs and 1,100,000 MTs of exports remained the top two exporters, followed by the US (833,000 MTs), Chile (750,000 MTs), South Africa (340,000 MTs), New Zealand (270,000 MTs), Argentina (180,000 MTs), Serbia (140,000 MTs), Turkey (65,000 MTs) and Brazil (55,000 MTs) (USDA, 2012).

New Zealand and UK Apple Industry

New Zealand produces only 0.50% of the total global apple production (FAO, 2011). Although the apple production in New Zealand showed a fluctuating trend in the last four decades, the overall production increased. Figure 2.15 shows recent apple production in New Zealand. The highest production volume (550,000 MTs) was seen in 2002/03 season. The lowest production (436,000 MTs) was recorded in 2004/05 season whereas the production remained 460,100 MTs in 2011 (USDA, 2012a).

Figure 2.15: Apple Production in New Zealand, 2000–2011



Source: Developed based on data (USDA, 2012a)

The majority (about 66%) of apple production in New Zealand comes from Hawke's Bay district, followed by Nelson district (28%) and Otago district (3%) (Bio-security Australia, 2011).

Considering the variety of exported apples, Royal Gala and Braeburn are supplied in the greatest quantities as given in Table 2.9. Jazz and Fuji are the next two largest export varieties (in terms of volume). The largest production of Royal Gala and Fuji is produced in Hawke's Bay district. Nelson district produces the largest quantity of Braeburn and Jazz. Additionally, other varieties of apples each contribute less than 5% of the total exported apples (Bio-security Australia, 2011).

Table 2.9: Apple Districts and Varieties in New Zealand

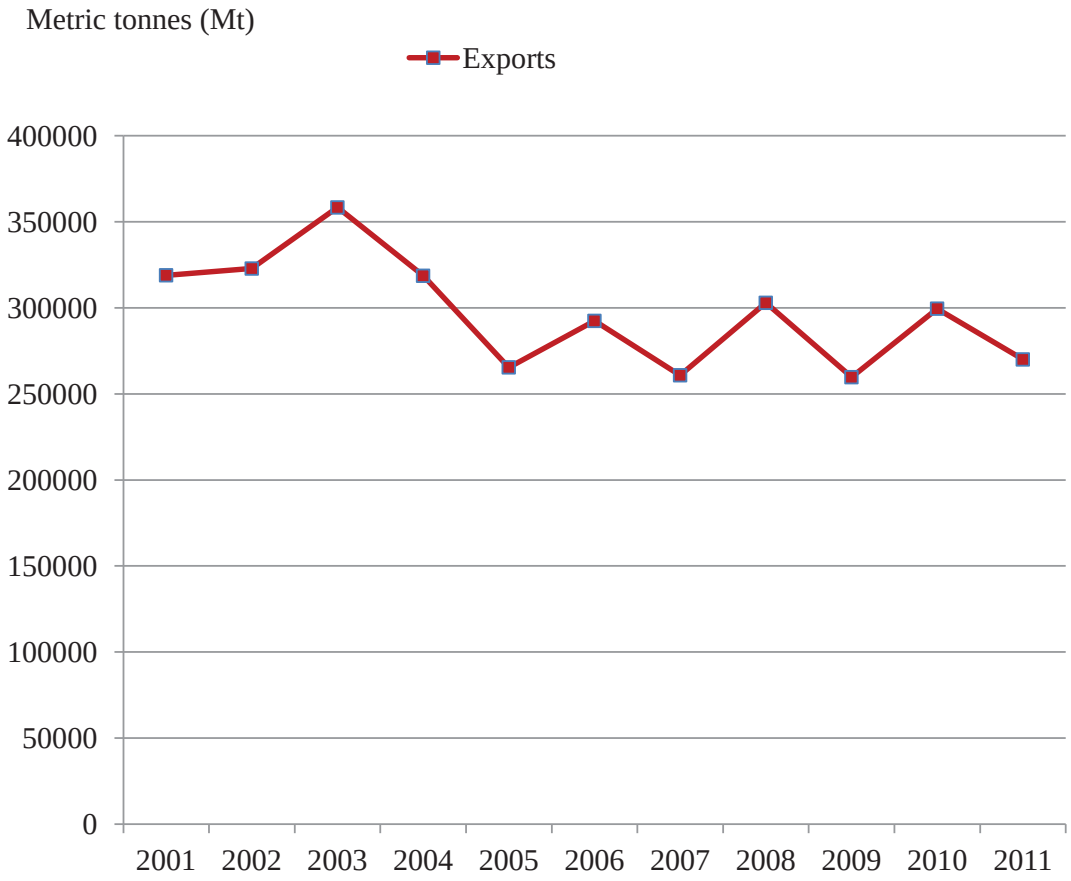
Apple	Hawke's Bay (%)	Nelson (%)	Central (%)
Royal Gala	39.1	27.2	26.4
Braeburn	29.3	41.3	17.0
Fuji	11.8	2.8	7.1
Jazz	3.8	14.3	5.4

Source: (Bio-security Australia, 2011)

The first apple consignment was sent from New Zealand to Chile in 1888 (TEARA, 2011). The country now exports more than 64% of its total apple production to over 65 countries. The quality of exported apples is high which means low quality apples each year remain extremely low. In addition to the standard quality check, New Zealand also provides special assurance to certain countries if required. For example, Taiwan and China concern about codling moth (cydia pomonella-an agriculture pest), a key pest of pipfruit. New Zealand certifies that apples are harvested with low pest dominance for codling moth. Similarly, apples exported to Australia (must) come from commercial orchards and are supplied by commercial operators. Furthermore, maturity test to determine the best harvest date is conducted to meet the requirements of destination markets (MAF, 2011a). The measures such as maturity and symptomless, traceability of original source, without rots and hail damage ensure better export quality (Bio-security Australia, 2011).

Figure 2.16 shows the recent apple exports from New Zealand. The highest export volume (358,300 MTs) was recorded in 2002/03. The lowest export quantity (259700 MTs) was seen in 2009. After a regain in 2011, New Zealand exported 259,700 MTs (USDA, 2012b).

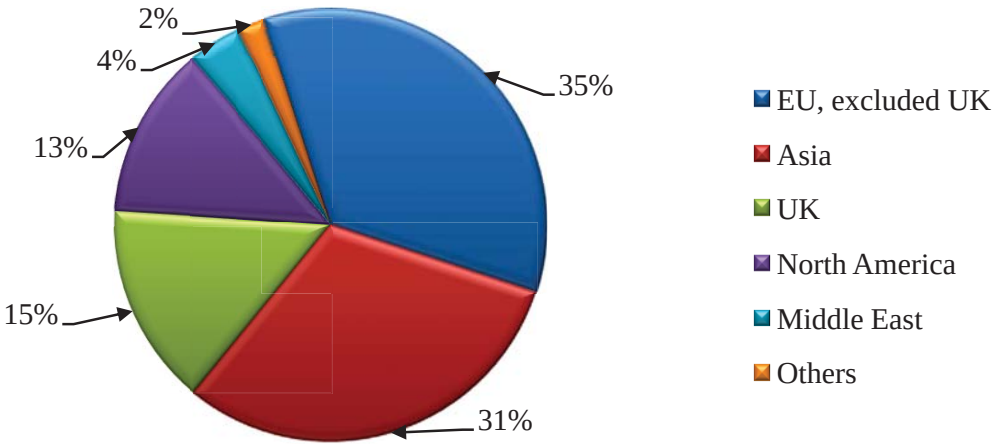
Figure 2.16: Apple Exports from New Zealand, 2000–2011



Source: Developed based on data (USDA, 2012b)

The major overseas markets for New Zealand grown apple are shown in Figure 2.17. The EU with 35% of the total exports remained the largest market, followed by Asia (31%), the UK (15%), North America (13%) and the Middle East (4%) (USDA, 2012c).

Figure 2.17: Apple Export Markets for New Zealand, 2011

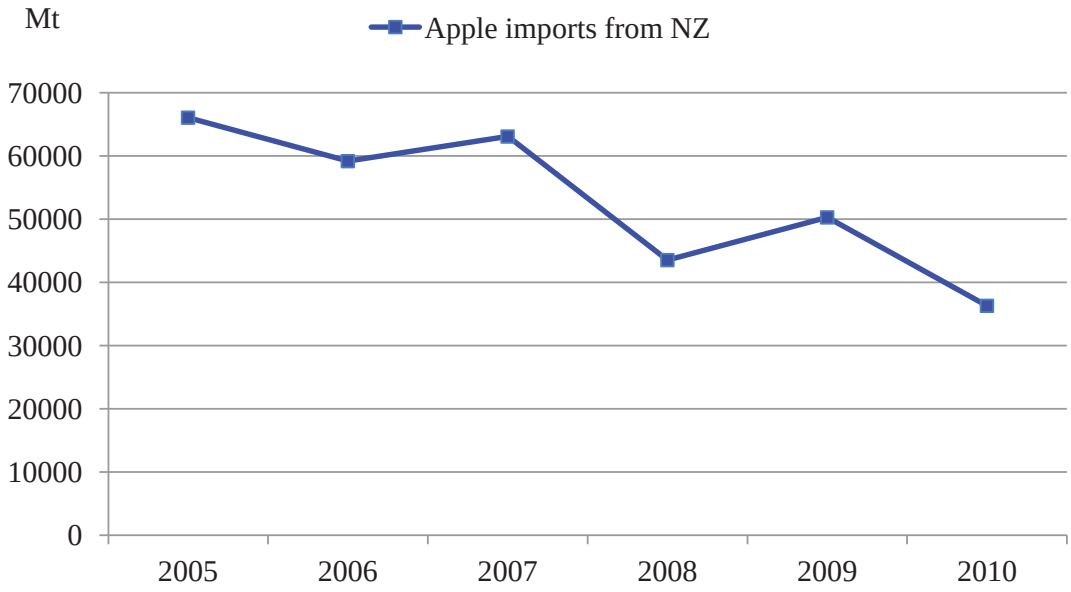


Source: (USDA, 2012c)

The UK produces only 0.34% of the total global apple production (FAO, 2011), and the country only provides about 31% of the total apple consumption. Although the UK's own apple production increased from 25% to 40% between 2003 and 2010, apple imports also went up from 446, 400 tonnes to 522, 100 between 2000 and 2007 (IFR, 2009). The production in 2010 reached to 214,000 MTs. For 2011, it is estimated 219,000 MTs, showing 2% increase compared to the previous year (USDA, 2011a).

The UK mainly imports apples from France, South Africa, New Zealand, Chile, the Netherlands, Italy, the USA and Germany. These major countries represent about 88% of the total apple imports. The remaining countries (Argentina, Australia, Austria, Belgium, Brazil, Canada, Denmark, Iran, Ireland, Lebanon, Lithuania, Poland, Portugal, Slovakia, Slovenia, Spain and Uruguay) account for the rest of 12% supply (FAO, 2011b). Figure 2.18 shows the total quantity of the apple imports from New Zealand. It can be seen from the figure that the imports of apple from New Zealand have been continuously declining because of the improvements in domestic apple production in the UK. In 2005, the UK imported 66,059 MTs and the quantity decreased to 36297 MTs in 2010, showing nearly 28% decrease compared to 2009. However, the UK is still a major importer of New Zealand grown apple (USDA, 2011b).

Figure 2.18: UK Apple Imports from New Zealand, 2005–2010



Source: Developed based on data (USDA, 2011b)

In 2010/11 season, the UK imported 7.7% of Royal Gala exported from New Zealand. In the same season, 90% of the total Braeburn (72, 693 MTs) and 70% of the total Jazz (32,077 MTs) were imported by the EU, including the UK (USDA, 2012c).

2.5 Onion Industry

Global Industry

Global onion (including shallots and green) production reached to 77,838,847 tonnes in 2010. The detail of the total production is shown in Table 2.10. According to the latest FAO available data (2010/11 season), Asia was the leading dry onion producing continent with 48,735,838 tonnes, followed by America (9,164,585 tonnes), Europe (8,517,612 tonnes), Africa (7,572,817 tonnes) and Oceania (259,957 tonnes). Asia with 2,172,682 tonnes was also the largest producer of green onion (including shallots). Africa was the second largest producer, followed by Europe, America and Oceania (FAO, 2012b).

Table 2.10: Onion Producing Regions, 2010/11 Season

Onions dry		Onions green (including shallots)	
Continents	Production (tonnes)	Continents	Production (tonnes)
Asia	48,735,838	Asia	2,172,682
America	9,164,585	Africa	608,890
Europe	8,517,612	Europe	348,770
Africa	7,572,817	America	252,732
Oceania	259,957	Oceania	204,964

Source: Developed based on data (FAO, 2012b)

Table 2.11 shows the major onion producing countries. China is the leading onion producer. In 2010/11 season, China production was 20,507,759 tonnes of dry onions and 838,300 tonnes of green onions. The second largest dry onion producer was India (13,372,100 tonnes), followed by the US (3,320,870 tonnes), Egypt (2,208,080 tonnes), Iran (1,922,970 tonnes) and Turkey (1,900,000 tonnes). In terms of green onion producers, Japan (543,900 tonnes) was the second largest producer, followed by Korea (417,229 tonnes), Nigeria (252,732 tonnes), Tunisia (235,500 tonnes) and New Zealand (215,000 tonnes) (FAO, 2012b).

Table 2.11: Onion Producing Countries, 2010/11 Season

Onions dry		Onions green (including shallots)	
Countries	Production (tonnes)	Countries	Production (tonnes)
China	20,507,759	China	838,300
India	13,372,100	Japan	543,900
US	3,320,870	Korea	417,229
Egypt	2,208,080	Nigeria	252,732
Iran	1,922,970	Tunisia	235,500
Turkey	1,900,000	*New Zealand*	*215,000*

Source: Developed based on data (FAO, 2012b)

Dry onion export leaders are: India, Netherlands, China, Mexico, US, Spain, Egypt, Argentina and Turkey. New Zealand is the world largest green onion exporter with 66% (129,461 tonnes) of the total global green onion exports. Other major green onion

exporters include France, Indonesia, the Netherlands, Austria, Germany, Thailand, Tunisia and Algeria (FAO, 2012b).

The global major dry onion importers are: Bangladesh, Malaysia, Russia, UK, Japan, US, Saudi Arabia, Germany, Netherlands and UAE. The major green onion importers include Pakistan, Brazil, Cote d'Ivoire, Indonesia, Mauritania, Paraguay, Gambia, Saudi Arabia, Germany, Trinidad and Tobago and the UK (FAO, 2012b)

New Zealand and UK Onion Industry

The major onion producing regions in New Zealand are Franklin/Waikato (67%), Hawke's Bay (14%), Canterbury (14%) and Manawatu (5%) (Onions New Zealand, 2012). Figure 2.19 shows onion production in New Zealand from 2005 to 2011. The onion total production was 165,000 tonnes in 2005. In 2006, the production increased to 210,000 tonnes. The production remained just over 200, 000 tonnes for the next four years. The onion production in New Zealand increased 15% (233,450 tonnes) in 2011 as compared to 2009 production (FAO, 2012b; Statistics New Zealand, 2012a).

Figure 2.19: Onion Production in New Zealand, 2005–2011

Source: Developed based on data (FAO, 2012b; Statistics New Zealand, 2012a)

Table 2.12 shows the quantity of onion exports from New Zealand during the last five years. The major onion export markets include the EU, the UK, Pacific Islands, Indonesia, Malaysia, Japan, Taiwan and Hong Kong (NZ Customs, 2012).

Table 2.12: Major Export Markets for New Zealand Grown Onions, 2007–2011

Regions/countries	2007	2008	2009	2010	2011
EU	72,092	79,995	58,456	69,153	57,796
UK	45,928	43,794	32,338	27,138	19,532
Pacific Islands	14,841	14,835	15,390	15,574	19,084
Indonesia	10,539	7,716	8,192	12,845	20,591
Malaysia	9,452	4,900	2,621	13,314	7,990
Japan	6,950	2,442	4,194	23,018	12,778
Taiwan	3,285	527	1,781	3,110	507
Hong Kong	3,119	2,616	2,578	1,862	1,444

Source: (NZ Customs, 2012)

In 2011 (as compared to 2007), the exports to Indonesia, Japan and Pacific Islands increased about 49%, 46% and 22% respectively. On the other hand, the onion exports to the UK constantly decreased and reached to 19,532 tonnes in 2011 from 45,928 tonnes in 2007. The exports to the EU, Malaysia, Taiwan and Hong Kong also significantly decreased (NZ Customs, 2012).

The UK produces only 0.51 % of the total global onion production and consumers' demand is fulfilled by importing onions (FAO, 2011). Although the UK imports the largest volume (93,966 tonnes) of onions from Spain, the country is a leading importer of New Zealand grown onions. The UK also imports a considerable quantity of onions from other European countries (FAO, 2011b).

2.6 Wine Industry

Global Wine Industry

The systematic cultivation of grapevines for wine production started from Black and Caspian Seas at least 6,000 years ago. By 2,500 BC, The knowledge of production and

cuttings progressively spread across other countries such as Egypt, Greece and Spain. This development was then extended to Italy and Sicily before the 8th century BC. Around 600 BC, viticulture was commenced in France. Consequently, these European countries were referred as Old-World wine producing countries. In the same time (600 BC), wine consumption was declining in the Middle East because of religious reasons (Anderson et al., 2003).

South America, Mexico and South Africa took initiatives for exploring the wine industry between 1500 and 1650. In Australia, the first grape cultivation was started by the British people in 1788. After about three decades, the New Zealand wine industry started its development (Anderson et al., 2003).

Both New World and Old World have played a pivotal role in developments of wine industry. The five largest New World producers are the US, Argentina, Australia, South Africa and Chile. These countries account for about 23% of the total wine production (Castaldi et al., 2006; Datamonitor, 2010). Furthermore, the EU (called Old World) countries produce 50% of the global production. Additionally, developing countries mainly China and India have also played a vital role in global wine exports (Thorpe, 2009).

Recently, the wine industry has become increasingly global. Until the early 1990s, the industry was relatively localised and producers were isolated from each other. Most of the countries used either local or imported wines from neighbouring countries. For example, UK consumers only used French wine in those days. However, countries have changed their trade and consumption patterns which brought the concept of wine globalization. This development has come due to the fundamental changes such as decreasing tariffs, logistics cost reductions and new technology implementations. As a result, the global share of wine trade has gone up from 18% to 30% between 1990 and 2005 (Castaldi et al., 2006).

According to the latest available FAO data, the top wine producers are shown in Table 2.13. The top countries produce more than 80% of the global production. The wine production in different countries generally (except for Spain, China and Argentina) decreased in 2010/11 season as compared to 2009/10 season. As a result, the total

production in 2010/11 season came down to 26,216,967 tonnes from 26,562,921 in 2009/10 season. In 2010/11, Italy with 4,580,000 tonnes of wine production was the leading producer, followed by France (4,541,820 tonnes), Spain (3,610,000 tonnes), the US (2,211,300 tonnes), China (1,657,500 tonnes), Argentina (1,625,080 tonnes), Australia (1,133,860 tonnes), South Africa (921,700 tonnes), Chile (915,238 tonnes) and Germany (720,000 tonnes) (Global Markets Research, 2011; FAO, 2012b).

Table 2.13: Top Wine Producing Countries, 2009/10 and 2010/11

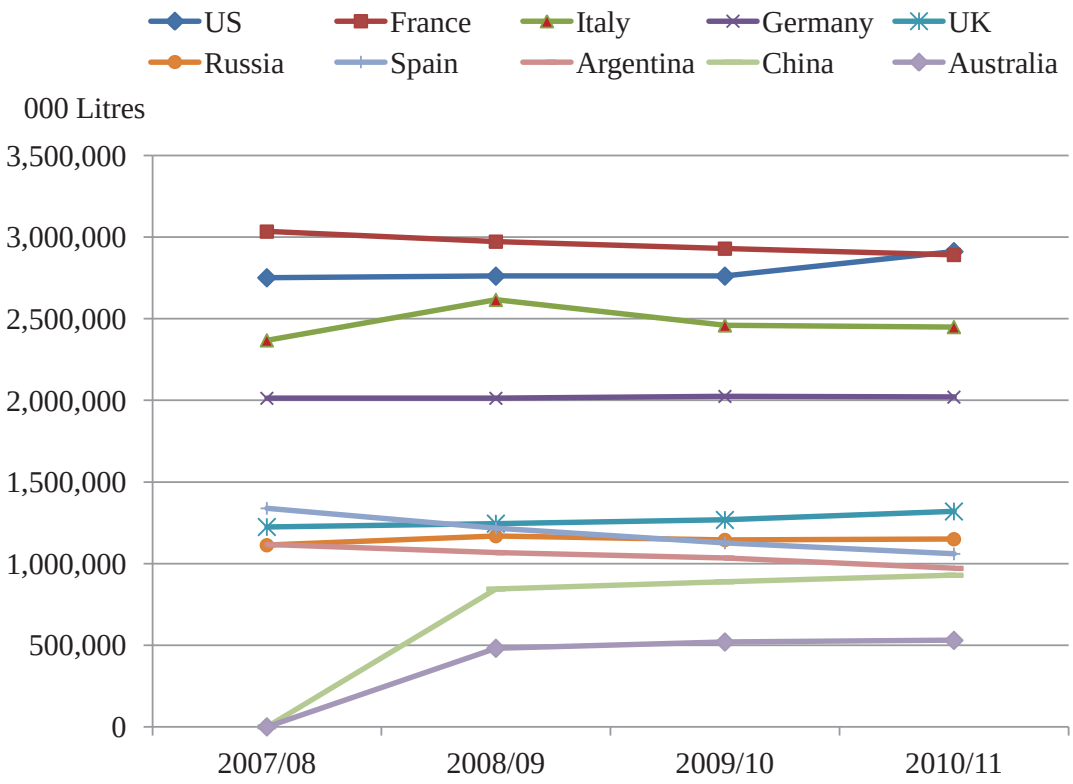
Countries	Production (tonnes), 2009/10	Production (tonnes), 2010/11
Global total	26,562,921	26,216,967
Italy	4,994,940	4,580,000
France	4,630,800	4,541,820
Spain	3,250,610	3,610,000
US	2,231,600	2,211,300
China	1,580,000	1,657,500
Argentina	1,213,550	1,625,080
Australia	1,178,440	1,133,860
South Africa	1,050,000	921,700
Chile	986,935	915,238
Germany	950,000	720,000

Source: (Global Markets Research, 2011; FAO, 2012b)

The overall per capita wine consumption in the old-world countries fell in the recent years. For instance, French total wine consumption in the 11 years to 2006 declined about 400 million litres. Similarly, in the same period, Italian wine consumption dropped 461 million litres (Global Markets Research, 2011). The declining trend started because of changes in lifestyles in various European countries particularly in France and Italy where other soft drinks took place. Together, France and Italy both used to account for 45% of the total wine consumption, but the aggregate share went less than 24% in 2008 (FAO, 2009; FAO, 2012). However, the consumption increased in New-World countries, particularly in the US, Russia, China and Australia (Global Markets Research, 2011).

The total wine consumption fell to 23,213,782 litres in 2010/11 from 23,232,181 litres in 2007/08 season. Figure 2.20 shows major wine consumers and illustrates the trends in wine consumption. Wine consumption in the US, Russia, China and Australia increased in the last four years whereas the consumption rate in Old-World countries fell. In 2010/11 season, the US with 2,912,041 litres of wine consumption was ranked the largest wine consumer, followed by France, Italy, Germany, the UK, Russia, Spain, Argentina, China and Australia (Wine Institute, 2012).

Figure 2.20: Major Wine Consuming nations, 2007/08–2010/11



Source: Developed based on data (Wine Institute, 2012)

The EU with 41% of the total wine exports is the dominating wine export region, followed by Australia (16%), Chile (15%), South Africa and the US (each 8%). As far as imports are concerned, the world's major wine importing countries include the UK, Germany, the Russian Federation, France, the Netherlands, the Czech Republic,

Switzerland, Belgium, the US, Canada and China. In 2010/11 season, wine imports reached to 4.4 billion litres, showing 7% increase from the previous year. The demand particularly increased from Russia, China and Hong Kong. Also, European countries (31%) and the US (21%) represented more than half of the total wine imports in the world. Russia and Canada imported 12% and 8% of the total wine imports respectively. In Asia, China and Hong Kong collectively imported 7% of the total (USDA, 2011c).

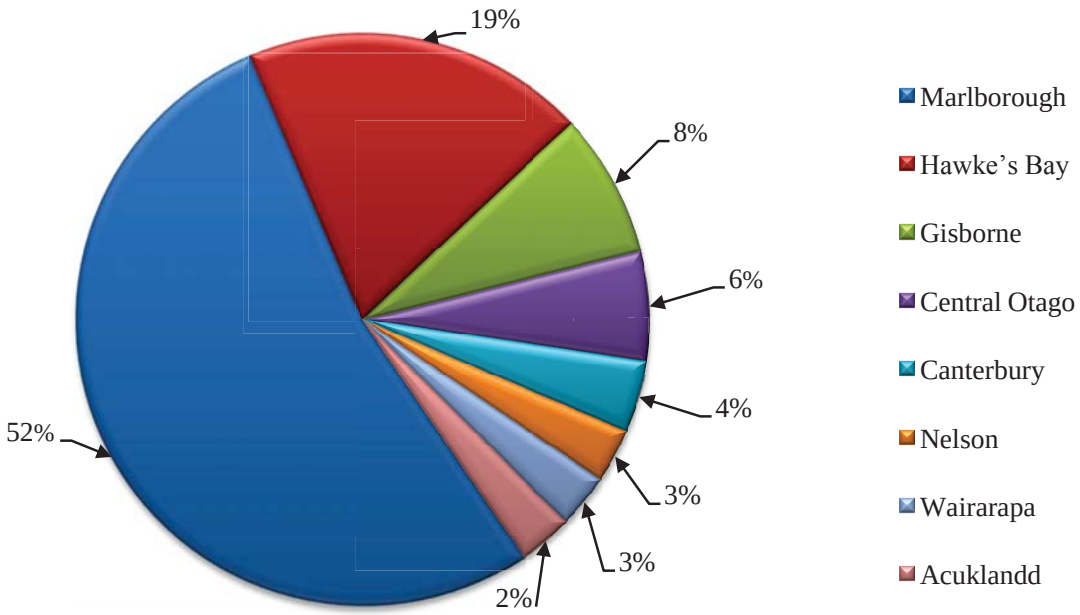
New Zealand and UK Wine Industry

The origin of recent development in the New Zealand wine industry is rooted back to the late 1950s. Before this, the industry was based on small-scale and family owned enterprises. It was also known for a complicated licensing system, poor quality and old technology (Barker et al., 2001).

The New Zealand wine industry has rapidly developed in the last three decades. The producers have established wine quality in global markets. There are certain factors which have contributed to this progression. For example, government policies of removing the tariff barriers and use of new technology are main driving forces. The major development steps taken by the government include Wine Industry Development Plan (1970s to 1986), Grapevine Extraction Scheme (1986 to 1990) and Committed Liberalizations (1990 to 2000s). These phases of development particularly contribute to export markets (Barker et al., 2001). Furthermore, investments from foreign companies such as Seagrams, Rothmans and Penfolds Australia have underpinned the industry. The contribution of these companies in new technology has improved wine quality. These moves were further supported by institutions like Auckland University and Roseworthy College which provided regular technical training to the workers involved in this industry (Barker et al., 2001; Thorpe, 2009).

Marlborough is the largest wine producing region in New Zealand. It accounts for more than half (52%) of the total vineyard area. The division of wine production regions is shown in Figure 2.21. Marlborough and Hawke's Bay both cover about 71% of the total vineyard area, followed by Gisborne (8%), Central Otago (6%), Canterbury (4%), Nelson and Wairarapa (each 3%) and Auckland (2%) (Hayward and Lewis, 2008).

Figure 2.21: Wine Producing Regions in New Zealand

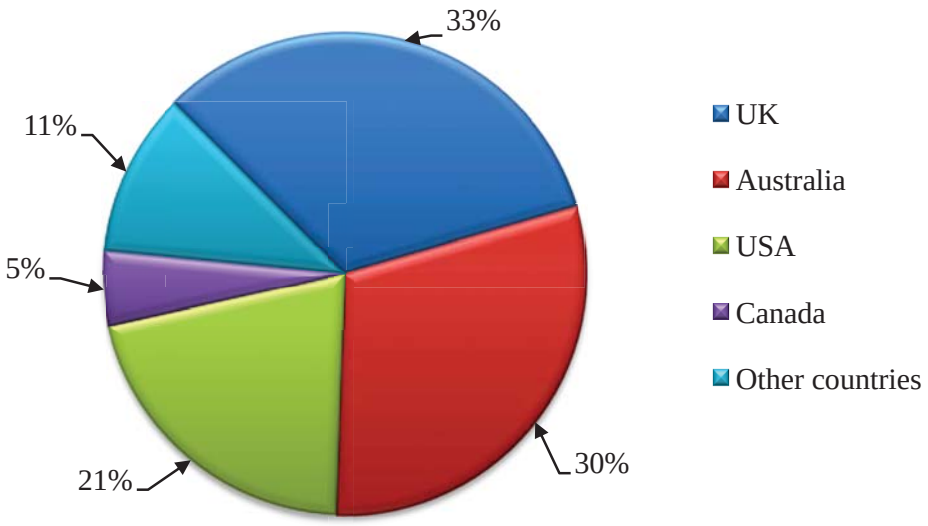


Source: (Hayward and Lewis, 2008)

In 2010, New Zealand with 189,800 tonnes of wine production held the 18th position in the world wine producing countries' list (FAO, 2012b). Wine significantly contributes in New Zealand's exports. The wine export achieved about 24% of growth in the last two decades. The exports value of wine in 1975 was only less than 0.1 million US dollars per year (1 USD = 1.22 NZD on 06 October 2011). However, the value of wine exports grew more than 17-fold by 2005, and the value reached about 740 million US dollars in 2010. Furthermore, the export share of the total production increased from 11% to 56% (Hayward and Lewis, 2008; Tripples, 2010; Statistics New Zealand, 2011).

The UK is the leading destination for Kiwi wine. As shown in Figure 2.22, the English market in 2010 accounted for 33% of the total wine exports, followed by Australia (30%), the US (21%) and Canada (5%). These four countries imported 89% of New Zealand's total wine exports. The Netherlands, Ireland, Singapore, China, Hong Kong and Denmark are included in the top ten New Zealand's wine export markets (Scandurra, 2011).

Figure 2.22: Wine Export Markets for New Zealand, 2010



Source: (Scandurra, 2011)

The domestic production of English wine represents only a fraction of the British wine market. In other words, it stands about 0.1% of the 12.1 million hectolitres of wine imported into the country. As a result, the UK is considered the world largest wine importer (Turner, 2010).

The UK wine industry has expanded in terms of the number of vineyards and the overall cultivated area. This development has come as a result of support provided by institutions. For instance, English Vineyards Association (EVA), which was established about five decades ago, provides a learning platform for wine producers. It also promotes the intelligent cultivation of vines and introduces quality marks. The organization was renamed as the UKVA. Moreover, funding from the regional agencies and education from colleges further have assisted the development in English wine industry (Turner, 2010).

Furthermore, competition among the major retailers, distributors and supermarkets has increased. These players have reduced their costs by focusing on fewer and larger suppliers. For instance, Tesco has only 100 suppliers for a different variety of 800 wines. It is further stated that 40% of wines come from only four to five big suppliers

who mainly supply to the UK markets. For example, Thierry's Wine Service is the fifth largest importer of wine in Britain. The company also supplies a large quantity of New Zealand wine into the UK markets (Tripples, 2010). The major import markets for the UK include the EU (particularly France, Germany, Italy, Portugal and Spain), Australia, Chile, South Africa, the US and New Zealand (Muhammad, 2011).

Export Issues:

The exports from New Zealand to the UK face a number of issues. First, New Zealand's export chains to the UK are one the longest supply chains in the world. Such long chains increase logistics costs and increase lead time. Additionally, the production cost in New Zealand is significantly high (40% to 45%), followed by barrels processes and bottles costs (Eddy, 2001). Second, the UK supermarkets sell 60% of wine to the consumers and 94% of these sales figures are below price point that means New Zealand producers get low profit. In other words, selling a wine bottle at below £5 (US$7.86) is not feasible and profitable for New Zealand producers (Mikic, 1998). Third, the entrance of new competitors (Argentina, Australia, Chile, South Africa, EU and US) into the UK markets creates challenges to provide high quality wine with a low price. Fourth, the level of New Zealand exchange rate against pound is also a main issue for exporters. In the last five years, the value of New Zealand dollar against pound went up about 75% (from 0.28 to 0.49). Therefore, sales/trade contracted in the past (in foreign currencies) has less value; consequently, New Zealand exporters get low profit (Tripples, 2010). For example, due to the fluctuation in foreign exchange rates, New Zealand (meat) exporters lost 492,976 US dollars (1 USD = 1.229 NZD on 06 October 2011) between 2009 and 2010 (New Zealand Meat Board, 2010).

Additionally, for New Zealand exporters, it is also crucial to recognise and understand importers' requirements in the UK. This enables exporters to develop more effective coordination and export strategies. UK importers generally consider a number of factors such as product quality, price, service, brand recognition, timely deliveries and long-term relationships. These factors have an enduring relationship with repurchase intentions. For example, a study of UK wine importers by Gill and Ramaseshan (2007) found that good relationships, product and service quality are significantly correlated

with repurchase intentions. Furthermore, they showed that price was the highest rated priority followed by, relationships and product quality. However, the variables (relationships, product and service quality) were not only factors for repurchase intentions because altogether the variables explained only 19% of the variance in repurchase decisions. Regarding the repurchase intentions, UK consumers are also sensitive to the country of origin, where products originally come from. For instance, in a recent survey, New Zealand wine in terms of UK consumers' preference was placed at number three after Australian and Chilean wines (Gill and Ramaseshan, 2007).

CHAPTER 3 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

3.1 Introduction

The purpose of this chapter is to review the literature that leads to develop a theoretical framework. Following the introduction, the concepts of supply chain management are presented in section two. Sections three and four discuss supply chain coordination and chain coordinators respectively. Section five examines the issues related to performance measurement and also defines the effectiveness of supply chain coordination, which consists of performance measurement constructs for this study. The developed hypotheses and the theoretical framework of the core competencies/skills that influence the effectiveness of supply chain coordination are discussed in section six. The links between the extant literature and this study are highlighted in section seven. The final section provides a summary the chapter.

3.2 Supply Chain Management

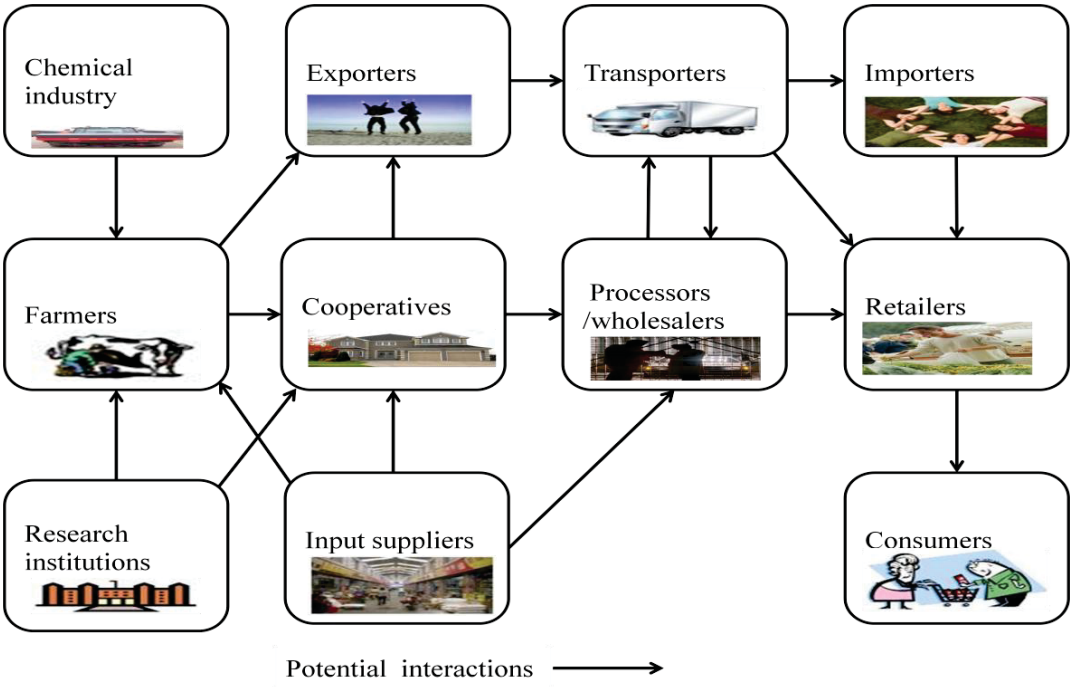
A supply chain is the combination of designing, developing, optimizing and managing different components. This includes material transformations, information and financial flows and the distribution of finished products. In other words, it is a way through which products or services are moved between upstream and downstream (Speckman et al., 1998). Arshinder et al. (2008) also stated that a supply chain is a synthesis of different activities such as logistics, inventory management, material, information and financial flows. Managing these flows is called supply chain management.

A supply chain is also defined as a network of chain partners (manufacturers, processors, importers, exporters and retailers) who work together to achieve certain objectives (Chan et al., 2011). Also, Chavez et al. (2012) defined supply chains as an integration of supply chain activities. These activities mainly include manufacturing, material, information and financial flows.

A graphical view of agri-food supply chains is given in Figure 3.1. The arrows depict the potential interactions which occur between all involved chain partners. The chain

normally consists of farmers, processors, wholesalers, retailers and consumers (Matopoulos et al., 2007).

Figure 3.1: A Graphical View of Agri-Food Supply Chains



Source: (Matopoulos et al., 2007)

Chemical dealers, input suppliers and other cooperatives that often support farmers and supply material are also parts of agri-food supply chains. Additionally, transport companies provide logistics support and research institutions bring novelty by developing new products or processes. Importers and exporters are also involved in international agri-food supply chains (Matopoulos et al., 2007).

Agri-food supply chains are often characterized with uncertainties such as weather effects, the lack of specific information or knowledge and difficulties in finding right partners and contracts. The uncertainties are controlled and reduced by managing supply chains that add value and ensure effective coordination among involved chain partners (Tavella and Hjortsø, 2012).

Agri-Food Supply Chain Development and Power Shifting Drivers

The development of agri-food chains can be categorised into the following phases (Wysocki, 2005):

- Retailers mainly performed multiple functions in the pre-development phase, before 1945.
- The development phase, 1945–1975, was consumer-segment-oriented. Retailers did not know intimated consumers, information technology and new logistics systems were introduced and manufacturers played a leading role.
- The main control of chains was held by retailers in the saturation phase, 1975–1990. Interest in and complexities of supply chain management particularly increased since 1980s and the point of sale information was introduced.
- In decline phase that is 1990–2000, manufacturers remained a critical source of information and the control of power resided with retailers and investors who diverted industrial trend towards globalization (Wysocki, 2005).

The power refers to "the capacity of a particular chain member to control or influence the behaviour of another chain member" (Rosenbloom, 2004 p. 127). Recently, Wagner et al. (2005) mentioned that five different types of powers (reward, coercive, legitimate, referent and expert) can be used in supply chains.

1. Reward power is the capacity of a chain partner to reward other chain partners.
2. Coercive power is opposite to the reward power, a chain member can penalize other chain partners if they do not fulfil certain objectives.
3. Legitimate power is related to legal rights of a chain partner.
4. Referent power occurs when allied goals of a chain are recognised by involved chain partners.
5. Expert power is based on knowledge. One supply chain partner might have superior knowledge than other chain partners (Wagner et al., 2005).

Using of these powers means to act against misleading behaviours rather than controlling ownerships. Three modes of control are summarised in the following points (Patzelt and Shepherd, 2008).

1. Output control includes setting of supply chain goals, establishing of rewards and formal monitoring systems.
2. Behavioural control deals with reporting of quality, costs and lawsuit provisions.
3. Social control shares beliefs and values which influence social performance of supply chain partners (Patzelt and Shepherd, 2008).

Output and behavioural controls (points 1 and 2) describe reward, coercive, legitimate and referent powers mentioned by Wagner et al. (2005). Expert power is related to social performance of a supply chain (point 3) (Wagner et al., 2005; Patzelt and Shepherd, 2008).

The key drivers of the powers shifting from manufacturers to retailers are continuous replenishment (CR), collaborative planning, forecasting and replenishment (CPFR), factory gate pricing (FGP), vendor managed inventory (VMI), quick response (QR), just in time (JIT), retailers closer interactions with consumers, information technology and point-of-sale data collection. These supply chain tools also build competitive advantages, increase revenues, reduce costs and fulfil orders on time which ultimately underpin supply chain performance (Hoppe, 2001; Miller et al., 1999; Smith, 2006).

In a CR system, chain partners work together to fill consumers' demand. For instance, Tesco (a UK based retailer) and its suppliers work together. Fresh food products from suppliers are directly supplied to Tesco local stores. This collaborative system reduces costs and gives customer satisfaction and also enhances product shelf life in the stores (Dorling et al., 2005; Smith, 2006). CPFR helps to control an inventory system. Supply chain partners jointly develop and monitor business plans and forecast for the reduction of extra inventories, out-of-stock and obsolescent scrap costs (Chung and Feung, 2005). In FGP, customers are responsible for arranging transportation of products from suppliers to delivery points. This system reduces lead time and separates production prices and transportation expenses. Internal control and coordination is particularly focused in FGP (Potter et al., 2007). VMI is a tool that is used by vendors and retailers. Retailers' inventory level is decided by vendors and they charge cost as per unit for their services (Yu, et al., 2008). QR is a popular system for retailers in which orders are adjusted based on additional information or if demand forecasts are changed. JIT

focuses on the efficiency of processes and parts-level smoothing. Manufacturers and retailers make agreements for order adjustments which handle seasonal and uncertain demands (Aigbedo, 2009).

3.3 Supply Chain Coordination

The literature (Wysocki et al., 2006; Cao et al., 2008; Akhtar et al., 2011) showed that there is no standard definition of supply chain coordination because of different perceptions and the nature of business systems. However, it can be defined as the recognition of interdependencies among chain partners, managing complexities and using of a coordination mechanism (Arshinder et al., 2008). The coordination mechanism consists of mutual adjustments and direct supervisions. It also includes standardization of certain factors such as work processes, outcomes, skills, knowledge and norms which help to achieve coordination success (Mintzberg and Sholom, 2001; Barki and Pinsonneault, 2005). The purpose of a coordination mechanism is to bring chain partners' contribution that accomplishes their joint tasks and satisfies mutual interests. Consequently, this mechanism creates a coordinated structure that enables chain partners to build the relationships across supply chain boundaries (Gulati et al., 2012; Soosay et al., 2012).

Reasons for Supply Chain Coordination and Difficulties

There are a number of reasons to get involved in supply chain coordination. In modern supply chains, companies rarely achieve competitive advantages by working individually. Thus, they are involved in supply chain coordination to create competitive advantages and build value by controlling factors such as knowledge, complementary resources, capabilities and governance structures (Dyer and Singh, 1998; Christopher, 1998). In support, Spriggs et al. (2000) believed that supply chain coordination also helps to meet food safety legislations, to improve quality and traceability. Moreover, organizations use supply chain coordination as a tool to achieve their economies of scale, efficiency, superior technology, greater customer value and control over environmental factors. The coordination among supply chain partners also provides research and development benefits (Zineldin and Bredenlöw, 2003; Wong et al., 2005). For example, from a sample of 22 coordinated organizations, Hoang and Rothaermel

(2005) found that approximately 60% of the organizations were engaged in research and development coordination which benefited all parties involved.

The development of more tightly aligned supply chains reduces contractual risks faced by buyers and suppliers. It further facilitates them to share the risks, to reduce transactional costs and to increase customers' satisfaction (Gray and Boehlje, 2005; Gordon et al., 2006). Perks and Jeffery (2006) also believed that it contributes in product innovation, shares skills, knowledge and information which help to approach new markets. These benefits are distributed among coordinated firms, mostly between food processors, importers, exporters, retailers and farmers (Goel and Kaur, 2008). Additionally, the sharing of costs and benefits through contracts resolve conflicts among chain partners. For example, based on agreed contracts, buyers and sellers adjust their inventory levels and share profits (Arshinder et al., 2008). Bititci et al. (2009) also supported the arguments and stated that coordinated firms work together to create new value and reduce uncertainties and transaction costs such as costs of writing and enforcing a contract.

However, a number of difficulties can also come in supply chain coordination. This includes different organizational cultures, a dominant decision making structure, lack of coherent contracts, lack of meetings, incompatible information systems and conflicting objectives. Furthermore, mismatches in production cycles and batch sizes can also create obstacles (Arshinder et al., 2008). In support, Akhtar et al. (2012; 2012a) and Tavella and Hjortsø (2012) found that cultural conflicts, contrasting leadership styles, coordination costs, a lack of cooperation from certain chain partners, limited resources and a lack of communication are common barriers in agri-supply chain coordination.

Types of Coordination

There are mainly two types of supply chain coordination, horizontal coordination and vertical coordination. The horizontal coordination occurs when two firms are merged at the same level of production (Balcik et al., 2010). A case of the horizontal coordination would be if a food company coordinates with another food company at the same level. The vertical coordination refers where organizations coordinate their upstream and downstream activities. For instance, if an organization coordinates with a third party

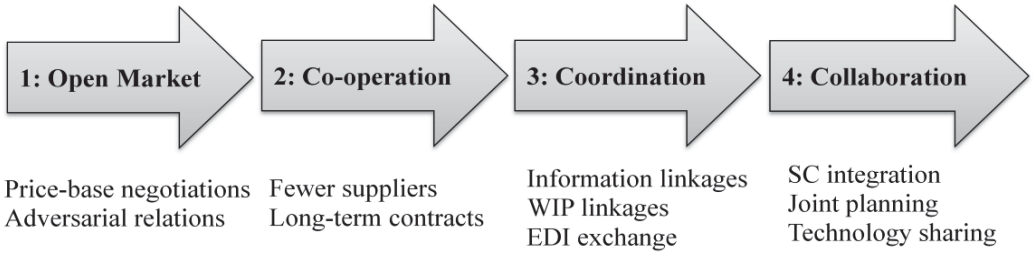
logistics provider to complete certain objectives, this would be an example of vertical coordination (Hawkes et al., 2012; Akhtar et al., 2012).

Vertical integration shares the characteristics of supply chain coordination (Brown, 2002; Childerhouse and Towill, 2003). Three types of vertical integration are explained by Brown (2002). First, quasi-vertical integration is based on long-term contractual commitments in which parties invest resources into relationships like joint ventures, franchises and licences. Second, tapered-vertical integration occurs when a firm obtains parts of its inputs through backward integration with suppliers. For instance, beef processors get some of their cattle from their own feedlots. Third, full integration takes place when a firm owns all of various stages of production, processing and distribution (Brown, 2002).

Four transitional supply chain practices including coordination are shown in Figure 3.2.

1. Open market is based on price-based negotiations and adversarial relationships
2. Co-operation involves fewer suppliers and long-term contracts.
3. Coordination shares information, processes and electronic data linkages.
4. Collaboration concentrates on integration, joint planning and technology sharing (Speckman et al., 1998; Petrick, 2007).

Figure 3.2: Key Transitional Practices in Supply Chains

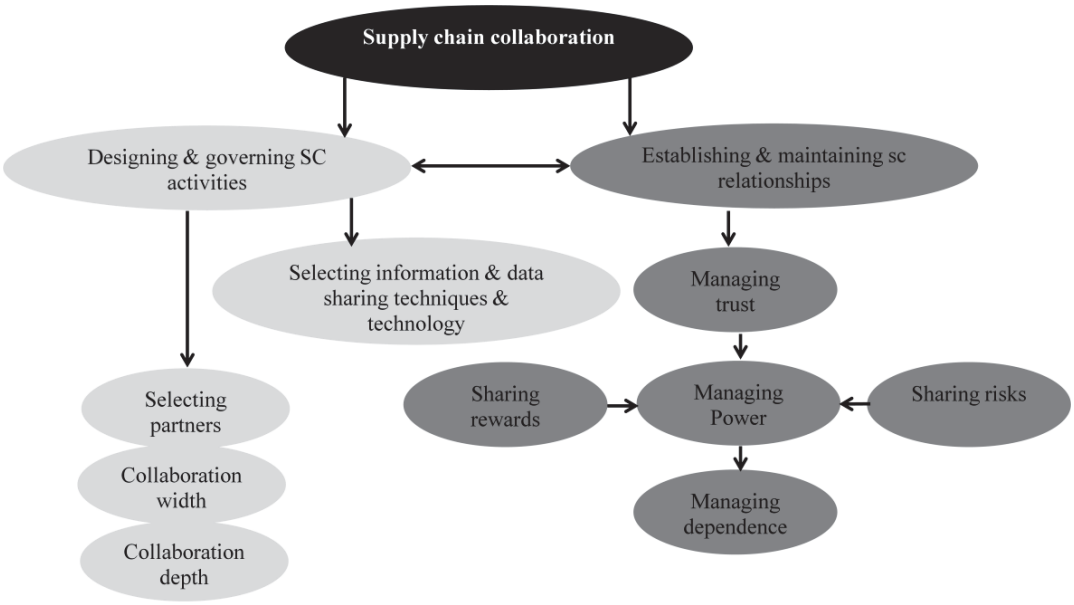


Source: (Speckman et al., 1998)

Collaboration and open market negotiations have high and low strategic importance respectively. Coordination has high strategic importance with low complexities whereas collaboration reflects the vice versa (Speckman et al., 1998; Petrick, 2007).

As shown in Figure 3.3, Matopoulos et al. (2007) classically summarised supply chain collaboration. This framework has two main components. The first component consists of designing and governing of supply chain activities which focus on selecting appropriate partners, specific activities and approaches at strategic, tactical and operational levels. Furthermore, techniques and technology for information sharing are vital parts of the first component. The second component is a synthesis of establishing and maintaining supply chain relationships which emphasise collaboration where companies share risks and benefits. Also, the sharing of risks and benefits depend on how trust, powers and dependencies are managed (Matopoulos et al., 2007).

Figure 3.3: A Framework of Supply Chain Collaboration



Source: (Matopoulos et al., 2007)

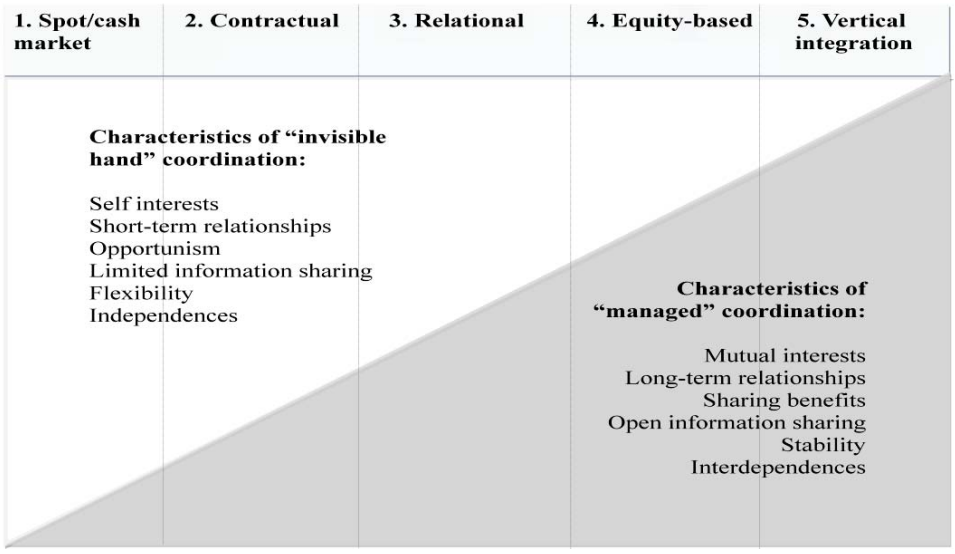
The conceptual model developed by Matopoulos et al. (2007) was based on the literature. However, the model could be more persuasive if it would have been empirically tested in multiple industries other than a single agriculture industry. Thus, the findings may not be generalised (Matopoulos et al., 2007).

In summing up, a coordination mechanism basically concentrates on inter- and extra-organisational collaboration or integration that holds material flows for smooth running of businesses (Childerhouse and Towill, 2003; Bititci et al., 2009). The first stage of collaboration is called coordination in which companies share information with little mutual adjustments. Resources are shared with moderate-mutual adjustments at the second stage called cooperation. The highest risk, benefits and mutual adjustments are managed at the final stage, collaboration (Bititci et al., 2009).

Strategic Options for Coordination and Coordination Requirements

In agri-food supply chains, a number of strategic options can be implemented. As can be seen in Figure 3.4, Peterson et al. (2001), Ritter and Genunden (2003) and Kirsten et al. (2009) described five strategic options; spot market, contractual, relational, equity-based and vertical integration.

Figure 3.4: Strategic Options for Coordination



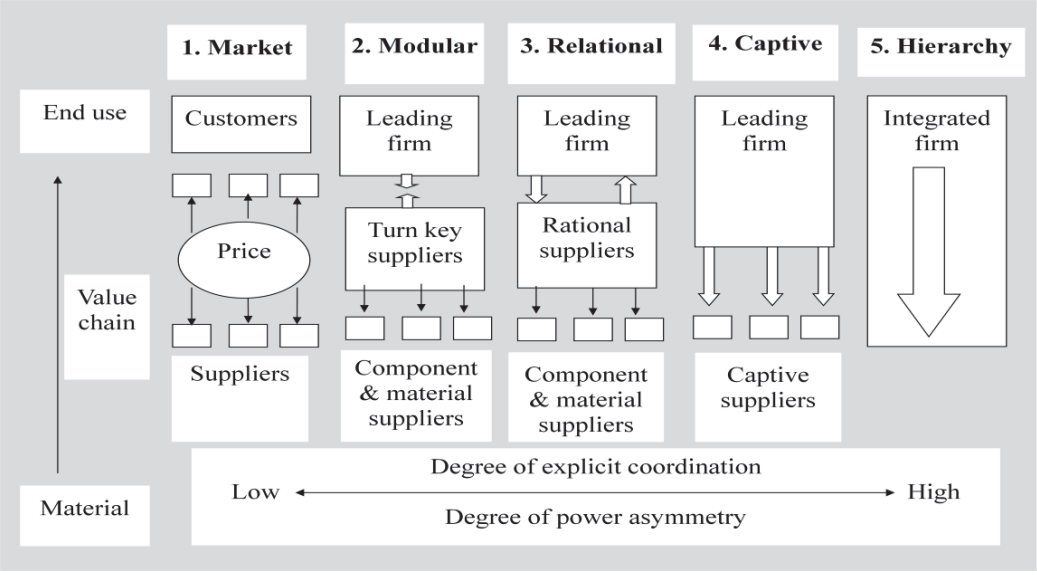
Source: (Peterson et al., 2001)

1. In spot markets, the intensity of coordination control is low and an individual determines prices and acceptable standards of performance.

2. Legally enforceable contracts are used in the second category of coordination strategy. The intensity of coordination in this contractual strategy is higher than spot markets but still the intensity is low compared to other coordination strategies such as equity-based and vertical integration.
3. In relation-based options, supply chain partners share benefits and risks to underpin their relationships. Degree of coordination is more focused than in the first two strategic options.
4. An equity-based option is a function of defining property rights of shareholders in an independent entity.
5. The final strategic option, vertical coordination, controls over all transactions (Peterson et al., 2001; Ritter and Genunden, 2003; Kirsten et al., 2009).

Similarly, five types of value chain governance explained by Gereffi et al. (2005), Kalantaridis and Vassilev (2009) and Loconto and Simbua (2012) are shown in Figure 3.5. These value chain structures are: market, modular, relational, captive and hierarchy, and each has different coordination requirements (Gereffi et al., 2005; Kalantaridis and Vassilev, 2009; Loconto and Simbua, 2012).

Figure 3.5: **Types of Value Chain Governance**



Source: (Gereffi et al., 2005)

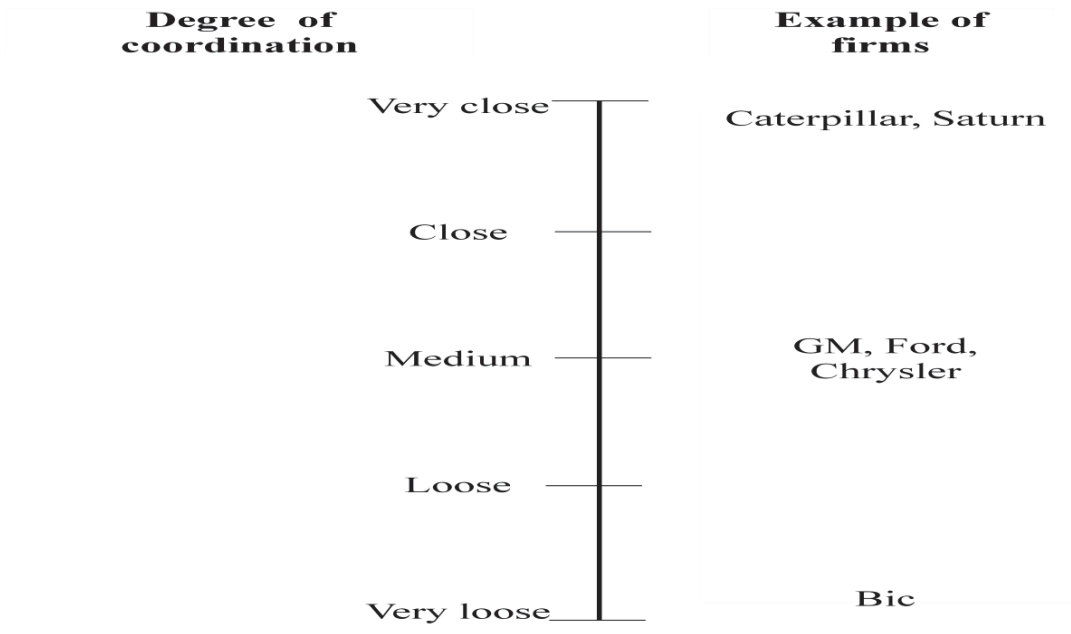
1. Market value chains are typical spot markets where sellers have control to set prices and make other major decisions. Furthermore, bi-directional information complexity is low and suppliers need little information from buyers. Consequently, little explicit coordination is practised in this category (Gereffi et al., 2005; Kalantaridis and Vassilev, 2009; Loconto and Simbua, 2012).
2. In modular value chains, products are made to customers' specifications. Suppliers take full responsibility of technology standardization and they also simplify product specifications, components and processes. Consequently, it reduces costs, increases speed and flexibility with arm's-length coordination linkages.
3. Relational value chains have complex interactions between buyers and sellers. Both parties focus on relationships and trust. Moreover, product specifications are higher. Thus, codification is not possible and complex information is often accomplished by face-to-face communication with a high level of explicit coordination.
4. In captive value chains, a focal firm with considerable power monitors and controls the system. The focal firm also leads in logistics, purchasing, designing and technology upgrading whereas suppliers are only engaged in assembly processes.
5. Control flow comes from managers to subordinates in hierarchy value chains. A manager makes major decisions and subordinate workers have to follow them. Furthermore, product specifications cannot be codified due to the nature of complexity. It is also difficult to find highly competent suppliers. Therefore, often a focal firm develops and manufactures products. Moreover, data and information are exchanged which emphasise internal coordination and input-output processes (Gereffi et al., 2005; Kalantaridis and Vassilev, 2009; Loconto and Simbua, 2012).

In short, the degree of coordination is low to high from market value chains to hierarchy networks. Gereffi et al. (2005) also found that coordination trend has changed towards explicit coordination in fresh vegetable supply chain between Kenya and the UK. The relational and captive governance structures are mostly used instead of market and modular structures. In other words, arm's-length relationships and little explicit

coordination practices, which were focused in 1980s, have been terminated (Gereffi et al., 2005; Kalantaridis and Vassilev, 2009; Akhtar et al., 2012a; Loconto and Simbua, 2012). Nowadays, supermarkets in the UK and Kenya focus on explicit coordination which helps them to bring fresh and quality products to their customers (Gereffi et al., 2005). Similarly, relationships in New Zealand agri-food chains have changed from adversarial towards closer and ongoing coordination. Chain partners share operational linkages and information. Moreover, buyers and suppliers work together to develop products and improve logistics (Dorling et al., 2005; Clements et al., 2007; Akhtar et al., 2012a; Loconto and Simbua, 2012). An earlier study by Ritter and Genunden (2003) also stated that relational and captive relationships are often practised.

Additionally, the levels of coordination practised by certain companies are illustrated in Figure 3.6. Bic trusts in very loose relationships with its chain partners whereas Caterpillar and Saturn believe that a closer coordination strategy is a critical factor for their success. GM, Ford and Chrysler keep medium level of relationships with their supply chain partners (Rosenbloom, 2004).

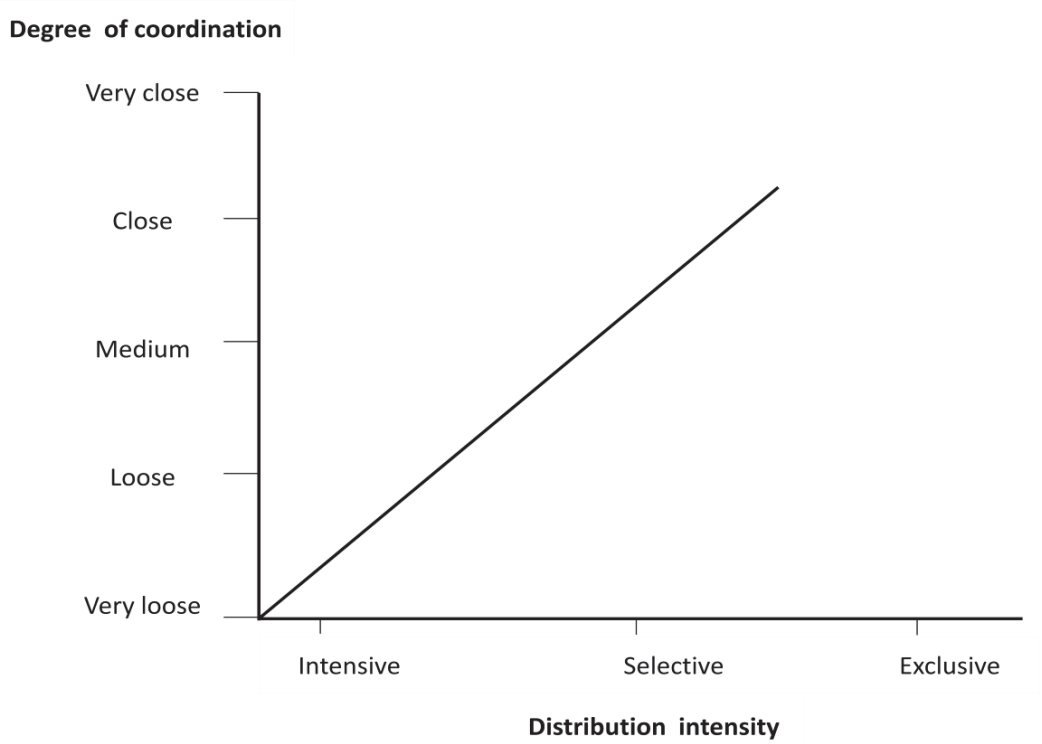
Figure 3.6: Coordination Examples



Source: (Rosenbloom, 2004)

As shown in Figure 3.7, the closeness of relationships depends on three types of distributions: intensive, exclusive and selective. The intensive distribution (many channel members) reflects very loose relationships with chain partners and exclusive distributors (one) have very close relationships. The selective distribution means an average degree of relationships exist (Rosenbloom, 2004; Wysocki, 2005).

Figure 3.7: Guidelines for Coordination



Source: (Rosenbloom, 2004)

The level of coordination also varies in different regions. For example, North American companies do not believe in closer coordination. However, Asian companies are the most comfortable with closer coordination and European companies like moderate levels of bonds (Kanter, 1994). In support, Bitici et al. (2009) also found a coordinating and cooperative trend in European companies situated in Ireland, the UK, Germany, Italy, Switzerland and Sweden. Akhtar et al. (2012a) also found that the selected agri-food chains in the UK and New Zealand practise closer coordination but companies in Pakistan believe on arm's-length relationships

In summing up, researchers (Peterson et al., 2001; Gereffi et al., 2005; Wysocki et al., 2006; Akhtar et al., 2012a; Loconto and Simbua, 2012) concluded that integrated supply chain practices are often applied in agri-food supply chains. However, higher integrated supply chains might not provide a natural trend for all supply chain partners. Perhaps some supply chain partners have opportunistic behaviour that can be detrimental for other supply chain partners (Speckman et al., 1998; Moura et al., 2003).

The opportunistic behaviour includes information that is incomplete, distorting, misleading and confusing. It is about moral decision making which occurs when a supply chain partner is getting benefits by harming another supply chain partner. In other words, the opportunistic behaviour is about seeking self interests by intentionally embezzling other business partners (Wathne and Heide, 2000; Grzeskowiak and Khatib, 2009).

3.4 Chain Coordinators

The term ‘chain coordinator’ or ‘channel captain’ was originally used for those manufacturers or suppliers who controlled the major part of a marketing mix strategy (product, price, place and promotion). The concept further developed later and chain coordinator term was also used for big retailers who dominated their suppliers (Baker, 2000; Smith, 2006).

Researchers recently (Bessant et al., 2003; Belaya et al., 2009) claimed that big powerful retailers, distributors, importers and exporters are either referred to as chain coordinators or ‘focal firms’. On the other hand, a number of studies (Mehta et al., 2003; Heggde, 2008; Cao et al., 2008, Akhtar et al., 2011; 2012) also consider a person as a chain coordinator – which is the focus of this study. The term chain coordinator also has a number of variants such as ‘chain captain’, ‘chain or channel champion’, ‘channel coordinator’, ‘chain master’, ‘chain leader’, ‘chief executive officer’, ‘managing director’, ‘marketing manager’ and ‘strategic coordinator’ which are, sometimes, used interchangeably. The variants used by a number of studies are given in Table 3.1 (Akhtar et al., 2011; 2012; 2012a).

Table 3.1: Variants used for Chain Coordinators

Variants	References
Channel champion	Wheeler and Hirsh, 2000; Miller, 2006
Marketing managers	Mehta et al., 2002; Akhtar et al., 2012
Managing directors/CEOs	Mehta et al., 2002; Rosenbloom, 2004; Akhtar et al., 2012
Channel/chain/captain/master	Sporleder and Peterson, 2003; Moura et al., 2003; Smith, 2006; Wysocki el al., 2006; Fischer et al., 2007
Channel coordinator	Moura et al., 2003; Cao et al., 2008
Focal company/chain captain	Baourakis, 2004
Focal firm/chain captain	Belaya et al., 2009
Chain coordinator	Akhtar et al., 2011; Akhtar et al., 2012a
Strategic coordinators	Akhtar et al., 2012
Alliance managers	Gulati et al., 2012

Table 3.2 shows company names and job titles that play the role of a chain coordinator. This role is particularly played by the people who work in various departments such as marketing, business development and supply chain (Rosenbloom, 2004).

Table 3.2: Job Titles used for Chain Coordinators

Job titles	Company names
Business development manager	American Cyanamid Co.
Team marketing manager	American Greeting Corp.
Director trade marketing	Bausch & Lomb Co.
Director of channel management	Compaq Computer Corp.
Director of business development	Coca-Cola Co.
Trade marketing manager	Duracell
Market team advisor	Ergo-dyne Corp.
Planning manager of channel marketing	Hewlett-Packard Co.
Trade marketing director	Johnson & Johnson
Vice president of trade marketing	Leaf Brands, Inc.
Manager of trade relations	Philip Morris, Inc.
Trade marketing manager	Polaroid Corp.
Director of national affairs	Sandoz Pharmaceutical Corp.
Vice president of customer marketing	Sara Lee Corp.
Sales development director	AOL Time Warner, Inc.

Source: (Rosenbloom, 2004)

A chain coordinator is a leading person who targets and controls markets and niches. He/she also communicates with chain partners and ensures effective information flows. Rawstron (a chain coordinator from New Zealand wine export chain) stated that effective chain coordinators supply exactly what customers want and they also build and maintain chain relationships (Tripples, 2008; 2010).

Chain coordinators play a pivotal role in national and international strategic operations. They lead and make all major decisions across their own chains. Their decisions, which are finalised with the collaboration of key chain partners, are final and often cannot be overruled. They also participate in hiring, directing and managing staff members (Akhtar et al., 2012).

Empirical evidence of sales managers' (chain coordinators) involvement in supply chain coordination was found by Mehta et al. (2002). Mehta et al. (2002) found that only 11% companies had job title of a chain coordinator in the selected manufacturing companies. Furthermore, the sales managers' involvement in coordinating supply chain strategy and evaluating performance was higher in larger organizations than smaller firms. The size of firms, however, did not have impact on chain activities (Mehta, et al., 2002). However, a study conducted by Mehta et al. (2003) considered general managers as chain coordinators rather than sales managers.

Thus, it seems that the job title of a chain coordinator varies in different industries. In large manufacturing companies, marketing executives, vice presidents of marketing, general marketing managers, product managers, brand managers and sales managers might be involved in chain coordination activities. Owners/managing directors lead and control coordination activities in small businesses (Kempaainen and Vepsalainen, 2003; Rosenbloom, 2004). Moreover, Miller (2006) believed that business development managers could be chain coordinators but no empirical evidence was provided. Generally, chain coordinators are companies' executives or anyone who makes major decisions and leads supply chain activities (Heggde, 2008). Chain coordinators also design organizational, communication and management structures (Gulati et al., 2012).

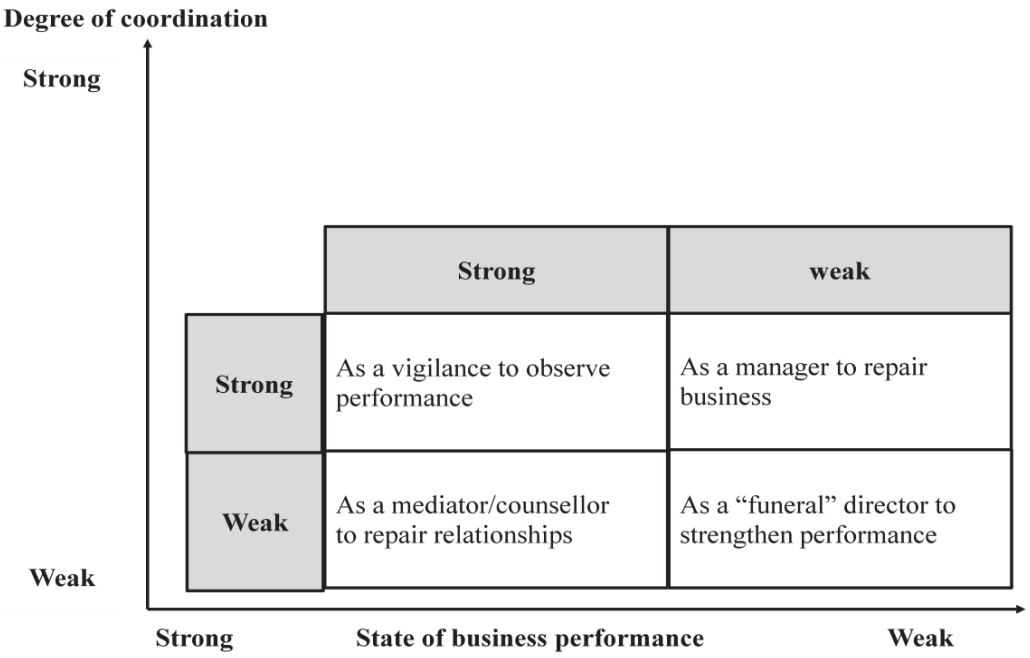
Additionally, chain coordination teams are formed in several companies where a middle or senior level executive leads them. More than 200 companies from the large multiple

industries were investigated and found that 37% of these companies had such formal or informal coordination teams (Kale et al., 2001). A chain coordinator needs such teams to tackle with different challenging chain structures and cultures. Such coordinators and their coordination teams act effectively and efficiently to achieve aligned objectives among supply chain partners, who in turn, contribute to better product and service quality. This coordinated approach also helps in joint decision making and improves supply chain performance (Bamford et al., 2004).

Chain Coordinators' Skills/Competencies, Functions and Leadership

Communication skills, personal relationship management, creating trust between chain partners, sharing vision, knowledge and mission are important aspects of chain coordinators' job (Speckman et al., 1996). As shown in Figure 3.8, the role of an effective chain coordinator can be described as a function of two dimensions; the degree of coordination and the state of business performance (Speckman et al., 1996).

Figure 3.8: A Two-Dimensional Role of an Effective Chain Coordinator



Source: (Speckman et al., 1996)

The strong state of business performance reflects a good operational, social and financial performance whereas the weak state of business performance is the other way around. Likewise, on vertical side of the Figure 3.8, the degree of coordination represents strong or weak relationships among chain partners (Speckman et al., 1996).

The rectangular roles (vigilance; mediator/counsellor; manager; director) are plotted in two dimensions. Chain coordinators act as observers (vigilance) if the degree of coordination and the state of business performance of coordinated organizations are strong, if both are weak, then they act as directors. If the degree of coordination is weak, then they need to repair it by mediating and counselling with other chain partners. Also, they have to concentrate on operational side of business if coordination among supply chain partners is well stable but performance is weak. These findings were drawn from a total of thirty one interviews conducted from the chain coordinators who represented 12 European and American companies from multiple industries; manufacturing, petro-chemical, aerospace, airline and telecommunication (Speckman et al., 1996). Thus, it can be concluded that coordinated firms need effective chain coordinators who can perform multiple roles and analyse internal and external business environments (Akhtar et al., 2012; 2012a).

The characteristics of chain coordinators' job found in the literature are summarised in Table 3.3. According to the summary, chain coordinators are the key players who lead and make major management related decisions. Also, chain coordinators with their leadership skills have ability to handle complex situations as well as the seven functions of management highlighted by Thomas (2004). These functions are planning, organizing, staffing, directing, coordinating, reporting and budgeting (POSDCORB). The functions describe Mintzberg's philosophy of management. Mintzberg (2009) and Sun and Firmin (2012) stated that planning, organizing, leading and controlling (POLC) are the basic principles of management. The planning deals with defining goals, making strategies and sub-plans. The organizing consists of questions such as: What resources are needed? How these resources can be achieved? And who will be responsible? The leading and controlling functions help to monitor according to initially defined plans and make corrections if necessary (George et al., 2008; Mintzberg, 2009; Sun and Firmin, 2012).

Table 3.3: Job Characteristics of Chain Coordinators

Job characteristics of chain coordinators	References
Chain coordinators:	
Have considerable power to make major decisions	Sporleder, 1994; Dyer and Singh, 1998; Sporleder and Peterson, 2003; Fischer el al., 2007; Liu and Cetinkaya, 2009
Coordinate chains and control sales	Hoppe, 2001
Retain ownership and control most of chain arrangements	Moura et al., 2003
Have leadership and relationship management skills	Mehta et al., 2003; Smith, 2006
Act as chain management decision makers	Rosenbloom, 2004; Heggde, 2008
Have contracting management skills	Gray and Boehlje, 2005
Have superior negotiation skills	Smith, 2006
Have relationship management and social skills	Goel and Kaur, 2008; Abdulai and Birachi, 2008
Have control over markets and niches	Tripples, 2008; 2010
Have tangible assets (experience, education, leadership and communication skills) and act as management system creators	Akhtar et al., 2011; 2012a
are involved in major strategic decision making	Akhtar et al., 2012
Have organizational, communication and process management skills	Gulati et al., 2012

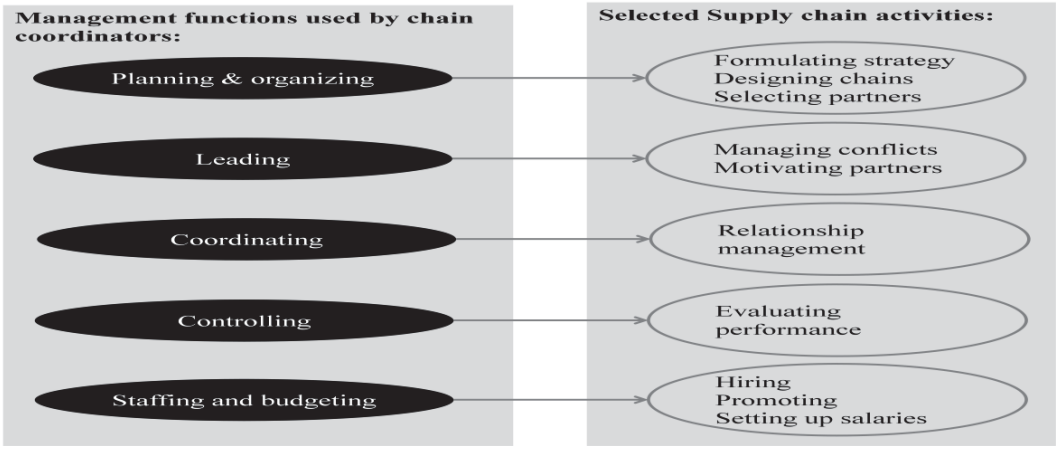
Leading is the major component identified from the job characteristics of chain coordinators. Sub-functions of the leading principle are directing, motivating and conflict resolving. These are also the parts of chain coordinators' job description. Chain

coordinators use these tools to perform their duties and increase supply chain performance (Speckman et al., 1996; Mehta et al., 2002; Akhtar et al., 2012).

Additionally, the seven critical activities of a chain are formulating marketing strategy, designing chains, selecting members, evaluating members' performance, managing conflicts, motivating members and coordinating chain strategy (Mehta et al., 2002). These activities are often performed by a chain coordinator. A senior chain coordinator is engaged in the first five activities and an intermediate-level chain coordinator participates in designing chains and formulating the marketing strategy (Mehta et al., 2002). Scholars (Harari, 1995; Imparato, 1995; Gray and Boehlji, 2005; Mehta et al., 2006; Moura et al., 2009) believed that motivating chain partners and coordinating chain strategy (the last two activities) are critical factors and a suitable leadership style of a chain coordination can achieve the effectiveness of these factors (Mehta et al., 2003).

Figure 3.9 provides the links between the management functions and the activities performed by chain coordinators. These functions were identified by Thomas (2004), Mintzberg (2009) and Sun and Firmin (2012). The involvement of a chain coordinator in the activities was identified by different researchers (Mehta et al. 2002; Rosenbloom, 2004; Akhtar et al., 2012; 2012b).

Figure 3.9: Links between Chain Coordinators, Functions and Activities



Main sources: (Mehta et al., 2002; Mintzberg, 2009; Sun and Firmin, 2012)

Chain coordinators use management functions (planning and organising) to formulate chain strategy, designing chains and selecting chain partners. In addition, chain coordinators lead other chain players by directing, motivating and conflict resolving. In this regard, chain coordinators employ particular leadership and negotiating styles to resolve conflicts and achieve coordination success. Evaluating chain performance is the part of controlling and chain coordinators monitor according to the initially defined plans and make corrections accordingly. Moreover, coordination strategy helps to build and maintain business relationships. Sometimes chain coordinators are also involved in hiring and promoting staff members (Mehta et al., 2002; Rosenbloom, 2004; Akhtar et al., 2012). Overall, the management functions are also used to build effective organisational designs, communication structures and management processes in which chain coordinators play an essential role (Gulati et al., 2012).

Additionally, the performance of the activities is influenced by chain coordinators' motivation which is related to incentives. Performance-based incentives for chain coordinators may help to increase supply chain performance. For example, profit-sharing arrangements, stock grants, saving plans, salary revisions and stock owned create motivation which increase value of a firm (Jensen and Murphy, 1990). An empirical study conducted by Mehta et al. (2003) also showed that the motivation is positively associated with performance which means incentives could positively affect performance. The paying percentage of profits rather than deducting shrinkage costs from chain coordinators' salaries can help to achieve coordinated objectives (Narayanan and Raman, 2004).

Paradoxically, an earlier study conducted by Kohn (1993) stated that performance-based pay fails to achieve their objectives because people's behaviour change and incentives cannot maintain consistency in participants' attitude. Thus, incentives only temporarily change job routines. Furthermore, no clear empirical evidence has been found between performance-based pay and organizations' value creation (Kohn, 1993). Similarly, Camara (2001) stated that market return-based reward may not be optimal because often chain coordinators are not rewarded for individual performance.

Undoubtedly, chain coordinators' leadership styles also play a crucial role in achieving the effectiveness of supply chain coordination (Akhtar et al., 2011). "Leadership is a complex social process rooted in values, skills, knowledge and way of thinking of leaders and followers (Gallos and Heifandetz, 2008, p.18)." A leadership style is a way that chain coordinators use to lead and direct their chain members. Sometimes the term 'management style' is also used instead of 'leadership style'. There are two reasons to use these terms interchangeably. The first reason is that leadership often uses management functions (leading, organizing, controlling and directing) and the second reason is the reflection of the same characteristics in leadership and management styles. For example, in a participative leadership style (also known as consultative leadership style), a chain coordinator shares decision power and consults with chain partners and the same characteristics are used in a participative management style as well (Larsen et al., 1999; Akhtar et al., 2011).

Management is a formal learning process through which people are guided. It is also defined as an integrated set of processes and tools that assist to develop strategy and take actions accordingly (Kaplan and Norton, 2008). The way a chain coordinator plans and takes actions is called a management style. The literature (Bititci et al., 2004; Menkhoff and Wah, 2011) mentioned a number of management styles – directive, consultative, negotiative, participative and delegative (laissez-faire). However, these styles explained below are not independent from each other.

- In a directive style, leaders tell team workers what to do and how to do it.
- In a consultative style, leaders consult with chain partners to get their inputs.
- A negotiative style focuses on political means and bargains.
- A participative style shares decision making power with chain partners.
- Team member are also authorised to make their own decisions in a delegative style (Bititci et al., 2004; Menkhoff and Wah, 2011).

Trask et al. (2009) and Randeree and Chaudhry (2012) used the following terminologies for leadership or management styles.

- Autocratic. Managers have control of decision making.

- Bureaucratic. Authority is derived from corporate management.
- Democratic. Decisions are made democratically.
- Authoritarian. Managers also involve other managers and make decisions
- Participative. Team members also participate in major decision making (Trask et al., 2009; Randeree and Chaudhry, 2012).

A chain coordinator often uses three management theories; contingency theory, trait theory and behaviour theory. The contingency theory states that an effective chain coordinator should adjust his/her leadership styles according to organizational contexts, situations and tasks. The trait theory focuses on personal qualities of a chain coordinator. The theory also differentiates leadership and non-leadership qualities which chain coordinators get by birth. The main qualities of the theory focus on intelligence, dominances, achievements, responsibilities, participations, self-confidence, honesty, stress tolerance and practicality. In contrast to the trait theory, the behaviour theory states that these qualities can be taught rather than having them by birth. It also focuses on the nature of managerial work and functions instead of individual traits (As-Sadeq and Khoury, 2006; Sims et al., 2009).

Leadership styles also can be named as a laissez-faire style, a transactional style and a transformational style. These leadership styles are derived from the leadership theory (As-Sadeq and Khoury, 2006). The laissez-faire style gives full authority to make major decisions (As-Sadeq and Khoury, 2006). In a transactional leadership style, also known as an authoritative leadership style, leaders concentrate on consistency of performance and use organizational powers and policies. This leadership style is suitable for a stable business environment. On the other end, the transformational (charismatic) chain coordinators focus on relationships, collective interests, vision for the future, motivation for changes, good policies, consistency, openness, frankness, carefully listening, effective communication and innovations (As-Sadeq and Khoury, 2006; Werder and Holtzhausen, 2009).

Chain coordinators who have less education and experience often use a laissez-faire leadership style. The most frequently used leadership styles in selected Palestinian organizations were transactional and transformational which affect performance factors

such as satisfaction, willingness to exert extra efforts and effectiveness among employees (As-Sadeq and Khoury, 2006). Also, Ling et al. (2008) concluded that the transformational leadership style positively affects firm-level outcomes. Both (transformation and transactional) leadership styles are employed, but the transformational leadership style is strongly related to marketing practices (Lindgreen et al., 2009; Gundersen et al., 2012). Given a shortcoming, an earlier study conducted by Bass et al. (2003) stated that followers can lose motivation when their transformational chain coordinators are absent. However, it has significant and positive relationships with organizational innovations and empowerment (Jung et al., 2003).

Focal Firms as a Chain Coordinator and Current Market Power

A focal firm is defined as an enterprise or a company which controls sales of product (Wachenheim and Singley, 1999). The firm has the authority to direct the behaviour of other business partners (Wachenheim and Singley, 1999). Examples of such firms include Home Depot, Federated and May, CompUSA, Sports Authority, Office Max and Toys which often direct and control a larger part of their chains. This is the main reason that these enterprises are called chain coordinators (Miller et al., 1999).

Additionally, Bessant et al. (2003) split a focal firm role into active or latent. The active role means bringing motivation, energy and being proactive. Latent firms are persistent and reactive. The study was conducted in computer, chemical and aerospace industries and it concluded that the focal firm did not exert control over second and third tiers suppliers except for the case of computer manufacturers (Bessant et al., 2003). Moura et al., (2003) defined that focal firms are those stock agents who are responsible for processing, chilling, warehousing and procurement activities. Depending on the nature of their businesses and activities, researchers (Johnsen, 2007; Smith, 2006; Akhtar et al., 2012a) found that big powerful retailers, distributors, suppliers, manufacturers, importers and exporters play the role of a focal firm. An example of such enterprise is Tesco that controls other chain partners and leads chain planning and manages conflicts among involved partners (Smith, 2006).

A focal firm also plays a pivotal role in the development of whole supply chains which enhances a company's strategic position. The firm also identifies and attracts other

firms which increase overall resources (Johnsen, 2007). This key player further retains the ownership of products including breeding and processing. Although no clear distinction has been made between ownership and control, however, ownership can be defined as the power to exercise control of resources and it facilitates firms to coordinate activities (Belaya et al., 2009).

In modern markets, the focal firms or big enterprises have gained the large market share. For example, big retailers and manufacturers gained 99% market shares in Sweden, 95% in New Zealand, 78% in Australia, 64% in the UK and 59% in the US (Dorling et al., 2005). Coles Myer and Woolworths together have more than 70% of the market share in Australia (Dunne, 2008). As a result of the large market share, these focal companies affect small and medium-sized retailers. For example, large chains have dominated main Brazilian retail industry which was previously represented by small stores (Ghisi et al., 2008). In Canada, the larger retailers and distributors such as Loblaws and Sobeys have dominated supply chains. The recent entry of Wal-Mart and Vinsor International Inc in Canadian markets has also affected local stores (Donald, 2009). In Hong Kong, China, and Pakistan local stores cover main markets rather than big retailers. However, international retailers such as Wal-Mart, Tesco and Metro are also growing in these regions (Hingley et al., 2009; Bougoure and Lee, 2009; Akhtar et al., 2012a).

3.5 Supply Chain Performance Measurement Issues

Supply chain performance is based on contributions of all involved supply chain partners. This is defined as the degree to which they engage in behaviour that adds value to overall supply chain performance. In other words, performance is a function of three factors; accuracy of role of perception, ability and motivation (Harari, 1995; Imparato, 1995). Firstly, the role of perception means an accurate idea of managers' true role. Secondly, the ability means a person or firm ability to handle multiple tasks. It has a variety of characteristics such as chain coordinators' abilities, internal capabilities of a firm as well as partner abilities. Finally, motivation is the driving force that motivates a person or a company to get required outcomes (Harari, 1995; Imparato, 1995).

To measure performance, Murphy et al. (1996) recommended efficiency, growth, profits and liquidity size.

- Efficiency in terms of return on investment (ROI), equity, assets and gross revenues per employees.
- Growth of sales and employees.
- Profits on sales.
- Sales and cash flows measure liquidity size.

For financial performance measurement, Kanji (1998) recommended three variables; change in sales, ROI and return on sales (Kanji, 1998). These variables emphasise only financial performance. However, some performance measurement models also focus on both financial and non-financial aspects of a supply chain. For example, Kanji's (1998) business performance measurement model includes total quality management, leadership, cooperative relationships, customers, management by facts, improvements and business excellence.

Unquestionably, performance also depends on supply chain partners' expectations. Supply chain partners expect higher outcomes and rewards if they put higher level of combined efforts. These outcomes such as better relationships, building and maintaining trust, increased market share, better productivity and growth in sales are the results of the combined efforts. This is called effort-performance linkage. An increase in these outcomes means that they can share higher profit and enjoy satisfactory and trusted relationships (i.e., performance-reward linkage). To what extent these rewards are important for a supply chain partner is defined as the attractiveness of the rewards. Therefore, performance is a function of triangular relationships; the effort-performance linkage, the performance-reward linkage and the attractiveness of the rewards. This triangular relationship is called motivation that influences supply chain performance. In short, supply chain motivation can be categorised as economic and behavioural motivations. The economic motivation is achieved through higher sales, profits, assets turnover and reduced costs. The behavioural motivation comes through implementation of appropriate leadership which creates trust and satisfaction, called social performance (Mehta et al., 2003).

Claro et al. (2003) used three variables, namely perceived satisfaction, trust and sales growth. The satisfaction was measured by the quality of communication, order filling frequency, quality of purchasing and problem resolution approaches. The trust was estimated by faith in contact persons, the company's trustworthiness, length of working relationships, confidence, honesty, credibility and future relationship expectations. The variables were used to measure the performance of potted flowers' production units (Claro et al., 2003).

The supply chain operations reference (SCOR) model has been often suggested for measuring supply chain performance. This model addresses cost as well as strategic aspects like delivery times, order fulfilment rates, cycle time, lead time, inventory levels and total-supply chain costs. The model compares performance of any two processes on the same scales and benchmarks against world-class performance. Effectiveness of the model is to emphasise process approaches (Dasgupta, 2003). In addition, Chen and Paulraj (2004) presented the buyer-supplier performance model. This model includes buyer-supplier operational and financial performance. The operational performance constructs include, volume flexibility, schedule flexibility, customers' satisfaction, on-time deliveries, reliability, consistency, quality, delivery speed, specific costs, rapid confirmation of customers' orders and handling of complaints. The model also measures financial performance using ROI, profits, net income and present value of a firm.

Three dependent variables, return on assets (net income divided by sales), sales growth (sales in current year minus sales in previous year, divided by sales in previous year) and market-to-book value (market value divided by book value of common equity) are suggested to measure performance (Crossland and Hambrick, 2007). Additionally, Aramyan et al. (2007) used five dimensions to measure the agri-food supply chain performance. These dimensions are:

- Efficiency includes costs of production, transactions, profits, ROI and inventory.
- Flexibility includes volume flexibility, delivery flexibility and back orders.
- Responsiveness means filling rates, lateness, response time, lead time and errors.
- Food quality comes through the quality of product and processes.

- Social performance highlights satisfaction and trust (Aramyan et al., 2007)

The choice of variables to measure performance depends on circumstances and uniqueness of a study (Badri and Davis, 2000). Kale et al. (2002) believed that chain coordinators' assessment of performance is used to measure coordination performance among supply chain partners. The levels of coordination performance is categorised as low (0–40%), average (41–60%) and high (61–100%). The effective and scientific manner to assess performance is to ask chain coordinators as to what extent stated objectives have been achieved (Heimeriks and Duysters, 2007). Moreover, Acquaah (2007) used variables such as growth of sales, revenues, net incomes, productivity, return on assets and sales to measure performance. Overall performance of a firm also includes environmental variables (Acquaah, 2007). Bigliardi and Bottani (2010) recommended a balanced scorecard approach which aligns business activities to the vision and strategy of a company. The balanced scorecard approach presents the following perspectives.

- Customer: customer focus and satisfaction
- Internal processes: effective and efficient processes for product and service quality
- Learning and Growth: Individual and corporate self-improvement
- Financial: Profit and costs

Performance measurement focuses on relationship, quality, safety, service, cost, return on assets, innovativeness and traceability (Joshi et al., 2012). The performance measurement is a function of three dimensions; operational (product and service quality), social (trust in and satisfaction with supply chain partners) and financial (profit, sales and market share) (Akhtar et al., 2012a). A summary of performance measurement variables is shown in Appendix A.

In summing up, it is not possible to use a single variable to measure supply chain performance. Both objective and subjective measures have to be used. It is noted that a subjective approach has been employed extensively in empirical studies. In addition, chain coordinators' perception of performance has been found consistent with objective

measures (Heimeriks and Duysters, 2007; Martin and Patterson, 2009; Demirbag et al., 2010; Akhtar et al., 2012a).

Thus, based on the literature review, the effectiveness of supply chain coordination (performance) for this study is measured by using three dimensions. These dimensions are operational performance (i.e., service and product quality), financial performance (i.e., profit, sales and market share) and social performance (i.e., satisfaction with and trust in supply chain partners). These dependent variables are also graphically illustrated as a part of a proposed theoretical framework presented in the next section.

3.6 Theoretical Framework and Hypotheses

The underlying theoretical framework consists of intangible and tangible resources affecting the effectiveness of supply chain coordination and supply chain performance. The intangible resources include chain coordinators' abilities (education, language skills, training and experience), leadership styles (participative and directive), effective communication (communication quality and frequency) and analytical skills (internal and external applications). The tangible resources consist of human (a number of people for coordination activities) and non-human (budget and technology for coordination activities) resources. In addition, the effectiveness of supply chain coordination, which is determined by the tangible and intangible resources, is a synthesis of three dimensions; operational, social and financial performance. Additionally, internal (ability of supply chain partners) and external parameters (types of value chains & business environments) also influence the effectiveness of supply chain coordination and supply chain performance; however, they are not empirically tested in this study. The following sub-sections discuss the logical development of the theoretical framework (models) and the proposed hypotheses.

Chain Coordinators' Abilities

Education and experience are inputs to coordinators' abilities and influence supply chain performance. For example, negotiation ability, which depends on education and experience, positively affects a contractual procedure that is an element of relationship management and it influences supply chain performance and value co-creation.

Furthermore, education and experience are associated with supply chain efficiency and help to understand contractual risks and opportunities (Neven et al., 2005; Akhtar et al., 2011).

Both formal and informal education systems give strengths to chain coordinators' abilities. The formal education is often achieved from institutions such as universities and colleges. The informal education consists of on-job training, seminars and workshops (Christos and Psomas, 2009; Lacy et al., 2012). Learning languages is also the part of education and foreign language skills are influencing antecedents of performance (Stoian et al., 2011). Chain coordinators who have multiple-foreign language skills (writing, speaking, listening and reading) are in a better position to negotiate with foreign supply chain partners who are fluent in different languages. Languages also help them to write effective proposals and contracts that affect supply chain performance or coordination among supply chain partners (Akhtar et al., 2012).

Thus, the firms which have more educated and experienced coordinators have achieved better performance than the firms without such coordinators (Nakos et al., 1998). For example, a positive correlation between coordinators' informal education (i.e., training) and performance was found by Nakos et al. (1998). Draulans et al. (2003) also believed that on job training increases performance. In support, Heimeriks and Duysters (2007) and Christos and Psomas (2009) stated that education and experience help to handle difficult situations and to adapt to different cultures. Therefore, relevant education and experience fill the gap between local and international practices. The practices are necessary and help to increase the success rate of supply chain coordination (Heimeriks and Duysters, 2007; Soriano and Castrogiovanni, 2012).

Specific experience of coordinators has a positive moderating effect on economic returns (Kor and Mahoney, 2005). In the same vein, Karami et al. (2006) and Eggers (2012) found that experienced coordinators are more strategically oriented and they ensure smooth functioning of operations. However, Herrmann and Datta (2005) suggested that younger coordinators with relatively shorter tenures are more active and passionate in seeking business opportunities which can have a positive effect on performance. They are more flexible and have greater processing capabilities. They are

also more willing to take risks and challenges. It means these younger managers may have less experience but still can perform better than older and more experienced coordinators. Based on the preceding discussion, the following hypotheses are suggested:

H1a: There is a significant positive relationship between chain coordinators' formal education (college or university degree) and the effectiveness of supply chain coordination.

H1b: There is a significant positive relationship between chain coordinators' informal education (on-job training including workshops and seminars) and the effectiveness of supply chain coordination.

H1c: There is a significant positive relationship between a number of languages chain coordinators are fluent in (know well) and the effectiveness of supply chain coordination.

H1d: There is a significant positive relationship between chain coordinators' experience (of working with chain partners) and the effectiveness of supply chain coordination.

Chain Coordinators' Leadership Styles

Three leadership styles (participative, supportive and directive) are discussed in the supply chain literature (Mehta et al., 2003; Kruglanski et al., 2007; Akhtar et al., 2011; Menkhoff and Wah, 2011).

(1) A participative (democratic; consultative) leadership style shares decision power with subordinates and it also focuses on consultation with chain partners.
(2) A supportive leadership style is related to mutual interests, needs, welfare and a team based approaches.
(3) A directive (authoritative; autocratic; transactional) leadership style gives specific directions, and chain coordinators consistently communicate with chain partners (Mehta et al., 2003; Kruglanski et al., 2007; Akhtar et al., 2011; Menkhoff and Wah, 2011).

From the US, Polish and Finnish automobile industry, Mehta et al. (2003) concluded that a participative leadership style is strongly associated with performance. This study was conducted in the USA, Finland and Poland (Mehta et al., 2003). To test leadership styles' impact on performance, Bititci et al. (2004) also conducted a study in the US multiple industries (rolling mill, bottled water producer, transport and distribution companies). The study concluded that an authoritative leadership style gives better performance than autocratic, participative and laissez-faire leadership styles (Bititci et al., 2004). Somech (2005) found that both participative and directive leadership styles are positively associated with performance. However, Smith (2006) and Oshagbemi and Ocholi (2006) suggested that a participative leadership style is mostly used in supply chain rather than an authoritative leadership style. Chain coordinators consult with business partners to organise and plan supply chain strategies. For example, joint leadership works well for Tesco, a dominating retailer in the UK. Tesco's leadership organises and motivates a number of associated supply chain partners to achieve aligned goals (Smith, 2006).

Both participative and directive leadership styles are commonly used and an application of a suitable leadership style depends on chain coordinators, situation and followers (Kruglanski et., 2007). A study of more than 400 managers conducted in multiple industries located in the UK showed that a participative leadership style is associated with age; older managers like to consult and participate with followers but younger managers are happy to take their own decisions. It is suggested that a directive style is suitable when circumstances are sensitive, goals are clear and a chain coordinator is more experienced than followers, otherwise a participative style is appropriate (Oshagbemi, 2008). Werder and Holtzhausen (2009) stated that both leadership styles (directive and participative) are used at moderate level in public-relationship organizations. This study showed that the participative style is negatively associated with performance (Werder and Holtzhausen, 2009). Hansen and Villandsen (2010) stated that the participative leadership style is often used by the managers who work in public sectors whereas the directive leadership style is mostly used in private companies. Randeree and Chaudhry (2012) believed that the participative leadership style has strong effects on employees' outcomes.

Additionally, it is suggested that a choice of leadership styles also depends on cultures where chain coordinators operate. The four dimensions of culture related to basic societal issues are identified (Hofstede and Bond, 1984; Mehta et al., 2003; Souchon and Durden, 2002).

(1) Power distance is related to unequal distribution of power in organizations.
(2) Uncertain avoidance concerns people ignoring unfavourable situations.
(3) Individualism and collectivism are interconnected with individual and collective thinking for a society.
(4) Masculinity and femininity emphasise money and quality of life respectively (Hofstede and Bond, 1984).

Culture can be described as everything that "people have, do and think" as a member of society (Ferraro, 1990, p.18). Culture is a set of values, beliefs, assumptions and ways of operating a business (Laroche, 2009). This study does not measure culture directly because culture or business environment are the parts of external parameters of the model. However, cultural values by country setting are discussed from past studies such as Hofstede and Bond (1984) and Souchon and Durden (2002). The cultural values of the countries involved in this study are shown in Appendix B.

The above discussion leads to the following hypotheses:

H2a: There is a significant positive relationship between chain coordinators' directive leadership style and the effectiveness of supply chain coordination.

H2b: There is a significant positive relationship between chain coordinators' participative leadership style and the effectiveness of supply chain coordination.

Chain Coordinators' Effective Communication Skills

Effective communication skills are pivotal aspects of chain coordinators' competencies. The effective communication refers to the quality of communication (i.e., timely, accurate, reliable, complete and consistent communication) and the frequency of communication (i.e., daily, weekly, monthly, quarterly, six-monthly and the percentage of time spent on communication) (Mohr and Speckman, 1994; Burkink, 2002). The

effective communication plays a crucial role to manage coordination that underpins relationships among supply chain partners (Miller, 2006; Hoek and Mitchell, 2006; Aramyan, 2007; Reynolds et al., 2009). It also impacts on coordination success and value adding (Rosenzweig and Roth, 2007; Khan and Khan, 2012).

During the communication process, chain coordinators often share appropriate information which comes from data (facts, figures and numbers) processing. The understanding of this processing and information assists chain coordinators to manage demand and supply planning and to control social and financial aspects of a supply chain (Peter, 1994; Shapiro, 2001). For example, enterprise resource planning (ERP) systems such as SAP processes information for chain coordinators who use the information and knowledge to control the above mentioned supply chain aspects, demand and supply planning, social contexts and financial performance (Shapiro, 2001).

Information is about facts and can be accessed at low cost. It is integrated from different sources like customers' information from retailers, consumers' information from market research and market information from third-party data providers (Shaw et al., 2001). Chain coordinators share a variety of information that comes from these resources. The information includes quality, delivery schedules, demand and supply planning, tracking and tracing and supply chain performance. The types of shared information are shown in Appendix B.

The sharing of timely and accurate information eliminates needless processes, reduces inventory and logistics costs (USDD, 2001). It is also a key to achieve the effectiveness of supply chain (Neven et al., 2005). For instance, Tesco has improved supply chain performance by sharing information and listening to suppliers' feedback. The capability of Tesco's chain coordinators creates and controls information that increases supply chain performance (Smith, 2006). Lakshman and Parente (2008) also found that performance is linked with timely and accurate information sharing. In support, Liu and Cetinkaya (2009) stated that accurate and timely sharing of cost and demand information is important to improve performance.

Additionally, the frequency of communication (using different forms of communication such as face-to-face meetings, telephone conversations, paper-based, letters and computer links) is important for coordination success (Mohr and Speckman, 1994; Burkink, 2002). An effective chain coordinator often spends more time on face-to-face communication which is particularly crucial to develop relationships and to achieve coordination success (Rocco, 1998). Meetings (a form of face-to-face communication) that discuss current and future state of coordination among supply chain partners are important parts of an effective chain coordinator's job. These meetings among chain partners are often organized. For example, internal performance review meetings take place daily, weekly and monthly depending on the nature of a business. Such meetings impact on supply chain performance (Ghisi et al., 2008). Tripples (2008; 2010) also believed that regular meetings are an important source of relationship development with supply chain partners. In meetings, coordinators exchange ideas and information which facilitate decision making processes. These meetings further provide essential feedback that help to avoid conflicts influencing coordination effectiveness (Tripples, 2008; 2010).

Although this form of communication (i.e., meetings) is time consuming, it helps to create social bonds among chain partners. Consequently, stronger relationships are developed among supply chain partners. Buyers and sellers who have strong social connections are more committed to maintain business relationships and ensure timely payments (Goel and Kaur, 2008). In support, Ghisi et al. (2008) and Reynolds et al. (2009) believed that meetings and effective communication assist chain coordinators to develop better relationships and build trust and satisfaction among supply chain partners. In an earlier study, Cook and Wall (1980) believed that trust is about expectations of supply chain partners' behaviour and social bonds. The trust has three dimensions. The first dimension is the willingness or confidence of a chain partner to get involved with other supply chain partners. The second category of trust occurs between or within groups. For example, team members' trust chain coordinators. The third classification of trust emphasises developing scales (i.e., items) for measuring trust (Cook and, Wall 1980). Bos et al. (2002), Reynolds et al. (2009), Khan and Khan (2012) and Lu et al. (2012) also concluded that the frequency and quality of communication such as regularly meetings, seminars, computer and telephone links

build trust and improve the effectiveness of supply chain coordination. From the above discussion, the following hypothesis is proposed:

H3a: There is a significant positive relationship between chain coordinators' effective communication skills and the effectiveness of supply chain coordination.

Chain Coordinators' Analytical Skills

Chain coordinators who have analytical skills can better visualise, identify and understand the gaps for supply chain improvements. The gaps can be detected from internal (within a company) and external (macro) business environments. For example, an analytical chain coordinator critically analyses (supply chain) reports created by ERP systems. Based on the reviewed reports, the chain coordinator makes decisions about inventory level which ultimately contributes to effective stock controlling, indirectly, supply chain performance. Also, such coordinators better understand competitors' strengths and weaknesses. They know market better than competitors and manage market changes effectively which positively affect supply chain performance (Analoui and Karami, 2002; Rosenzweig and Roth, 2007).

To identify internal and external gaps for the improvement in supply chains, a chain coordinator adopts an integrated approach that recognises, creates, manages and exploits opportunities. It also creates value and provides competitive advantages to strengthen coordination in supply chains (Sporleder and Peterson, 2003).

The internal opportunities provide an opportunity to generate and understand reports that assist in developing effective plans to improve the effectiveness of supply chain coordination. For example, a chain coordinator develops, extracts and analyses supply chain performance related reports and takes necessary actions to improve the performance. Based on the reports, chain coordinators also schedule demand and supply of products (Shiparo, 2001; Rosenzweig and Roth, 2007).

The external opportunities are related to chain coordinators' capability of utilizing or copying competitors' new products, processes and market research to improve supply chain performance (Bogner and Bansal, 2007; Rosenzweig and Roth, 2007). Such chain

coordinators see business differently than other managers and they manage external business changes effectively. They also make constant improvements by recognizing and understanding target markets better than competitors (Speckman et al., 1996; Analoui and Karami 2002; Rosenzweig and Roth, 2007). For instance, Bogner and Bansal (2007) and Joshi et al. (2012) found positive relationships between capabilities of finding opportunities and performance (growth and profitability). Based on the above discussion, the following hypothesis is postulated:

H3b: There is a significant positive relationship between chain coordinators' analytical skills and the effectiveness of supply chain coordination.

Human and Non-human Resources (Tangible Resources)

The tangible resources for supply chain coordination consist of human (number of skilled people) and non-human resources (budget and advanced technology) which enable companies to achieve the effectiveness of supply chain coordination. For example, chain coordinators need skilled people and financial budget to implement their plans. Coordinators particularly need team members who can maintain and build chain relationships (Nakos et al., 1998). Kale et al. (2001) also found that 37% of companies have such formal and informal teams to handle coordination activities effectively.

Furthermore, Wysocki et al. (2006) believe that chain coordinators need suitable budget for coordination success. This enables chain coordinators to arrange coordination meetings, to travel, to acquire office equipment, to employ qualified staff and to implement a suitable technology (Kaplan and Norton, 2008; Akhtar et al., 2012).

Successful companies often also use advanced technology to improve their performance in different sectors such as research and development. They also maintain and improve product and service quality by implementing new technology (Speckman et al., 1998; Greasley and Oxley, 2005; Rosenzweig and Roth, 2007). In support, Fonterra, (2011) stated that technology is correlated with the effectiveness of supply chain coordination, indirectly with overall supply chain outcomes. In fact, technology is a medium to share information and generate reports that chain coordinators use to improve the effectiveness of coordination. Moreover, Lao et al. (2012) believed that technology

helps to improve performance factors such as product and service quality, material and information flows. The following hypotheses are proposed based on the above discussion:

H4a: Human resources (a number of people for supply chain coordination) are significantly related to the effectiveness of supply chain coordination.

H4b: Non-human resources (budget and advance technology) are significantly related to the effectiveness of supply chain coordination.

Dimensions of Coordination Effectiveness

The dimensions of supply chain coordination effectiveness consist of operational performance (relative service and product quality), financial performance (relative profit, sales and market share) and social performance (satisfaction with and trust in supply chain partners). These dimensions are correlated and influence each other. For example, an empirical study of more than 200 US manufacturing firms stated a significant positive relationship between service quality and financial performance (Lado et al., 2011). Moreover, researchers (Chen and Paulraj, 2004; Aramyan et al., 2007) suggested that components of service and product quality such as deliveries on time, order flexibility, fulfilling 100% orders without defective products are important ingredients that contribute to financial performance of agri-food chains. In support, Sichtmann et al. (2011) believed that service quality has positive and significant effects on financial performance.

Additionally, social factors such as satisfaction with and trust in supply chain partners seem to be linked with financial performance. Satisfied chain partners continually add value by working together and the outcome is a high-performing company in which financial performance is increased (Chatteeuw et al., 2007). Similarly, Olsen et al. (2008) stated that trust influences financial performance of agri-food supply chains. Trust is a mechanism to coordinate processes and it is used as a tool to set up and run supply chains. It is also a key to find out solutions for supply chain coordination problems and helps to create long term business relationships which positively affect

financial performance (Batt, 2003; Ciliberti et al., 2009; Stuart et al., 2012). The above discussion leads to the following hypotheses:

H5a: Operational performance significantly influences financial performance.

H5b: Social performance significantly influences financial performance.

Internal and External Parameters of the Model

Internal and external parameters of the model are not empirically tested in this study; however, they also influence the overall supply chain performance. For example, the superior tangible (technology, financial strength and effective teams) and intangible (education and experience) assets of supply chain partners contribute to the overall supply chain performance (Nakos et al., 1998; Hoang and Rothaermel, 2005).

The external parameters mainly consist of value chains, business environments and culture. Business environments and culture include a variety of factors such as trade globalization, economic recession, demand and supply changes, natural disasters, availability of man-power and energy, political stability, local culture, laws and regulations, economic development and business competitors. These factors often impact upon buyer-seller relationships and create a competitive environment for involved chain partners. These factors also compel them to work in a coordinated business unit.

It is also believed that the complexity of government procedures and regulations, shortage of labour and competitive hostility influence flexibility, quality, costs and delivery services (Badri and Davis, 2000). Amoaka-Gyampah (2003) also found that competitive hostility significantly affects supply chain flexibility. The study was conducted in an emerging economy where the business environment is different than developed countries. Thus, the factors may have different effects in developed countries (Amoaka-Gyampah, 2003).

The business environment is categorised in terms of competitive strategy and manufacturing strategy. The competitive strategy refers to price and marketing differentiation and the manufacturing strategy emphasises priorities of low cost, product

and service quality (Ward and Duray, 2000). Also, the business environment is measured using technological uncertainty, supply and demand uncertainty. The technological uncertainty means rapid changing of technology related to production and distribution. It is a source of competitive advantage that provides real-time accurate information about product availability, inventory and shipment status. It also assists to perform rapid transactions between chain players. The supply uncertainty is concerned with the consistency of delivery requirements, material and defects. The demand uncertainty includes fluctuation of production and difficulties in volume prediction (Chen and Paulraj, 2004).

Additionally, external factors such as government subsidies can influence performance. For instance, a positive relationship was found between the subsidies and performance (Holm et al., 2005). The subsidies could be provided by governments or chain partners who have mutual interests. For example, governments attract multinational companies to increase employment and investments. Similarly, involved companies or chain partners can get better business opportunities and profits. Consequently, this improves relationships between involved parties (Holm et al., 2005).

In summary, the theoretical model shown in Figure 3.10 depicts the model components and their interrelationships which have been discussed. The theoretical model consists of two stages. The first stage (silver shaded) consists of 'intangible' (chain coordinators' abilities, leadership styles, effective communication and analytical skills) and 'tangible' (people, budget and technology for supply chain coordination) resources that influence the effectiveness of supply chain coordination and thus, indirectly, supply chain performance. The intangible resources are considered as the core competencies/skills of chain coordinators and together the competencies of chain coordinators with tangible recourse are called the determinants of the effectiveness of supply chain coordination. The second stage (black shaded) describes the larger context of supply chains that includes internal (abilities of supply chain partners) and external (types of supply chain and business environments) parameters affecting supply chain performance. However, second stage of the model is not empirically tested.

Figure 3.10: Supply Chain Performance Model

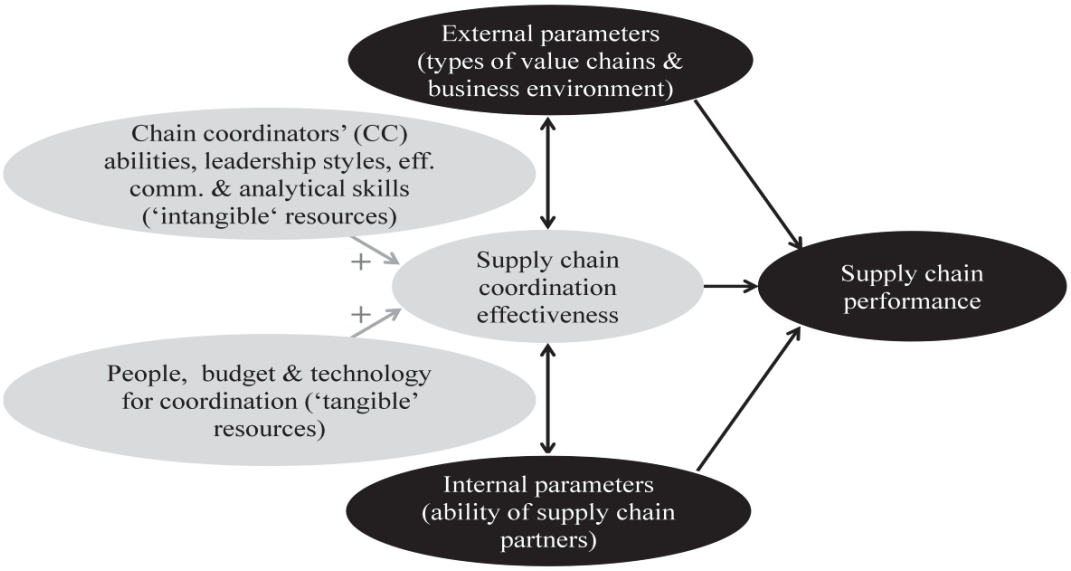
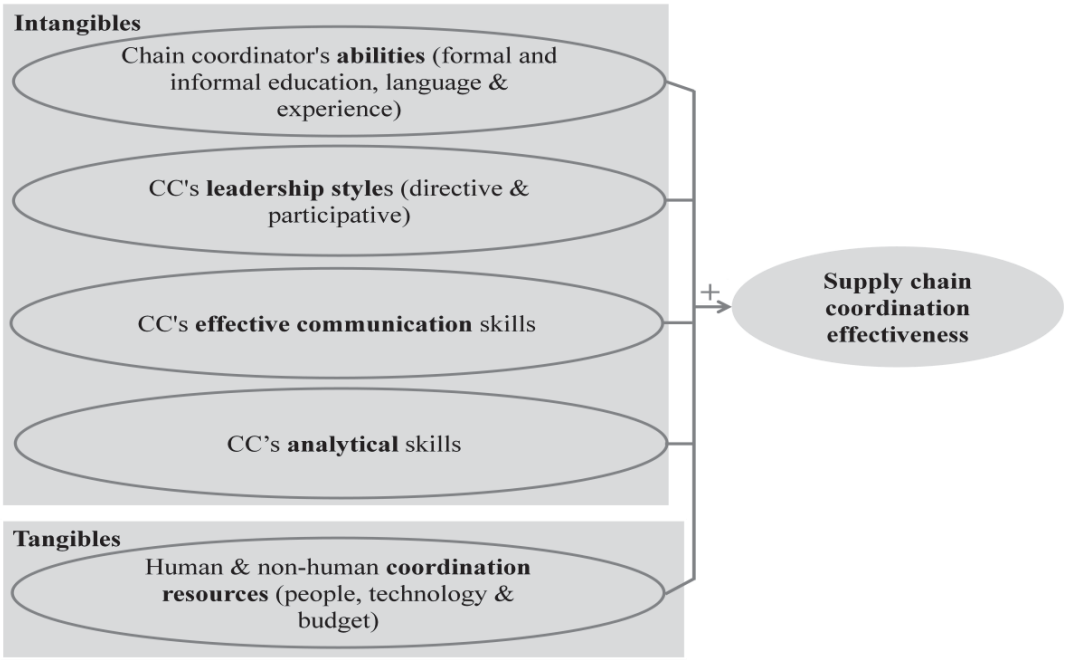


Figure 3.11 depicts the supply chain coordination effectiveness model (a sub-part of Figure 3.10) which is the main focus of this study and empirically tested. It consists of intangible and tangible resources (independent variables) which determine the effectiveness of supply chain coordination (dependent variable).

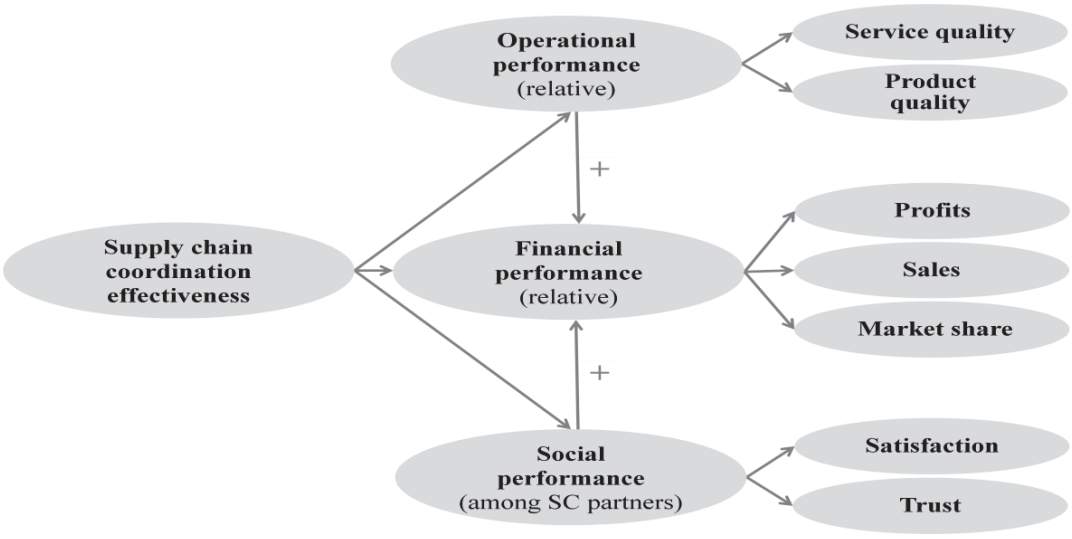
Figure 3.11: Supply Chain Coordination Effectiveness Model



Formal (university degrees and diplomas) and informal (on-job training, seminars, workshops and language skills) education and years of experience are considered as the abilities of chain coordinators. Effective communication skills include the quality of communication (i.e., timely, accurate, reliable, complete and consistent communication) and frequency of communication (i.e., daily, weekly, monthly, quarterly, six-monthly and the percentage of time chain coordinators spend on communication with main supply chain partners). Analytical skills are related to the ability of chain coordinators to visualise and understand internal (within a company) and external (macro level) business (improvement) opportunities. Based on the available information, they make logical plans and decisions which positively influence the effectiveness of supply chain coordination. The tangible resources comprise a number of people, budget and technology for supply chain coordination.

Figure 3.12 further illustrates the effectiveness of supply chain coordination, which is a synthesis of three dimensions operational performance (i.e., service and product quality), financial performance (i.e., profit, sales and market share) and social performance (i.e., satisfaction with and trust in supply chain partners). Also, the operational and social dimensions significantly and positively influence financial performance.

Figure 3.12: Supply Chain Coordination Effectiveness and Dimensions



3.7 Links between Extant Literature and This Study (Contribution Summary)

So far, not enough research has been conducted to identify the chain coordinators, particularly in selected agri-food supply chains (Mehta et al., 2002; Rosenbloom, 2004; Heggde, 2008; Akhtar et al., 2012a). Also, a number of studies (Shapiro, 2001; Mehta et al., 2003; Smith, 2006; Ness, 2009; Tripples, 2010; Soosay et al., 2012; Akhtar et al., 2012a) described some characteristics of chain coordinators that could lead to the success of chain coordination activities. However, it is evident that there is a lack of empirical studies that test the linkages between chain coordinators' characteristics and the performance outcomes (Mehta et al., 2003; Ness, 2009; Tripples, 2010; Akhtar et al., 2012a). In order to attempt to fulfil the above mentioned gap, this empirical study:

- Explores the nature of coordination and identifies chain coordinators
- Investigates key competencies of chain coordinators
- Qualitatively and quantitatively analyses the impact of chain coordinators' competencies on the effectiveness of supply chain coordination
- Scrutinises the linkages between the dimensions of coordination effectiveness
- Tests a two-stage theoretical model and provides implications
- Directs certain avenues for future research
- Produces papers for publications

3.8 Summary

Supply chain coordination deals with how coordinated organizations work together to achieve the effectiveness of supply chain coordination. The degree of supply chain coordination in which different organizations are engaged depends on the types of value chain governance and the number of distributors. Nowadays, particularly in agri-food supply chains, coordinated supply chain practices are often applied. Researchers also believe that the requirements of supply chain coordination vary across regions. This means, in different countries, chain coordinators need to apply different approaches to achieve the effectiveness of supply chain coordination.

A chain coordinator plays the key role in coordinated organizations. A chain coordinator is a leading company or a person. Depending on the industry and the size of

business, as a person, this role is played by CEOs, managing directors or head of the departments.

Chain coordinators' abilities, leadership styles, effective communication and analytical skills are the key intangible resources which significantly and positively influence the effectiveness of supply chain coordination. In addition, number of people, budget and technology for coordination activities can play a pivotal role in achieving coordination outcomes such as operational, social and financial performance. These connected dimensions (operational, social and financial) of coordination effectiveness further provide interesting predictions.

The relevant sections and the hypotheses that address the research objectives are given in Table 3.4. The first objective is addressed by the literature, particularly presented in chapter 3 (*supply chain coordination*) and chapter 5 (*pilot survey results*). The second objective is related to the results raised from the pilot survey (chapter 4–*pilot survey procedure;* 5.2–*chain coordinators' identification procedure*). To achieve the remaining objectives (3a, 3b and 4), a total of 12 hypotheses are investigated based on the quantitative data collected from New Zealand and the UK.

Table 3.4: Hypotheses and Addressing to the Research Objectives

Addressing the research objectives:
Objective 1: To investigate the nature of coordination in selected agri-food supply chains (dairy, meat, apples, onions and wine).
Relevant sections for objective 1: in chapter 3 (*supply chain coordination*) and chapter 5 (*pilot survey results*); plus development of the conceptual framework
Objective 2: To identify who are the chain coordinators in the selected agri-food supply chains.
Relevant sections for objective 2: (chapter 4–*pilot survey procedure;* 5.2–*chain coordinators' identification procedure*)
Objective 3a: To examine the intangible core competencies/skills required to be considered an effective chain coordinator.
Relevant hypotheses for objective 3a:
H1a: There is a significant positive relationship between chain coordinators' formal education (college or university) and the effectiveness of supply chain coordination.
H1b: There is a significant positive relationship between chain coordinators' informal education (on-job training including workshops and seminars) and the effectiveness of supply chain coordination.
H1c: There is a significant relationship between a number of languages chain coordinators know and the effectiveness of supply chain coordination
H1d: There is a significant positive relationship between chain coordinators' experience (of working with chain partners) and the effectiveness of supply chain coordination.
H2a: There is a significant positive relationship between chain coordinators' directive leadership style and the effectiveness of supply chain coordination.
H2b: There is a significant positive relationship between chain coordinators' participative leadership style and the effectiveness of supply chain coordination.
H3a: There is a significant positive relationship between chain coordinators' effective communication skills and the effectiveness of supply chain coordination.
H3b: There is a significant positive relationship between chain coordinators' analytical skills and the effectiveness of supply chain coordination.
Objective 3b: To scrutinise the relationships between tangible resources and the effectiveness of supply chain coordination.
Relevant hypotheses for objective 3b:
H4a: Human resources (number of people for supply chain coordination) are significantly related to the effectiveness of supply chain coordination.
H4b: Non-human resources (budget and advance technology) are significantly related to the effectiveness of supply chain coordination.
Objective 4: To investigate the relationships between the dimensions of coordination effectiveness.
Relevant hypotheses for objective 4:
H5a: Operational performance significantly influences financial performance.
H5b: Social performance significantly influences financial performance.

DRC 16

MASSEY UNIVERSITY
GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
TO DOCTORAL THESIS CONTAINING PUBLICATIONS

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: **Pervaiz Akhtar**

Name/Title of Principal Supervisor: **Dr. Norman Marr/Director –LSCM**

Name of Published Research Output and full reference:

A theoretical framework [Akhtar, P., Fischer, C., Marr, N., 2011. Improving the effectiveness of food chain coordinators: a conceptual model. *Acta Horticulturae.* 895, 15–21].

Exploring the nature of coordination in HRC and identification of chain coordinators [Akhtar, P., Marr, N.E., Garnevska, E., 2012. Coordination in humanitarian relief chains: chain coordinators. *Journal of Humanitarian Logistics and Supply Chain Management* 2 (1), 85–103].

Exploring the nature of coordination in agri-food chains and identification of chain coordinators [Akhtar, P., Marr, N.E., Garnevska, E., 2012a. Chain coordinators and their role in selected agri-food supply chains: lessons from Pakistan, New Zealand and United Kingdom. *Food Chain* 2 (1), 104–116]

In which Chapter is the Published Work: **Chapter 1**

Please indicate either:

- **The percentage of the Published Work that was contributed by the candidate:**
  App. 5% of Ch.3 / 0.91% of the thesis; **and / or**
- **Describe the contribution that the candidate has made to the Published Work:**

  Definition of SC coordination; types of coordination; existing coordination practices; barriers in agri-supply chain coordination; identification of chain coordinators, tangible and intangible resources; Chain coordinators' functions, leadership styles and competencies (a theoretical framework)

Candidate's Signature — 20 March 2013 (Date)

Principal Supervisor's signature — Date

CHAPTER 4 METHODOLOGY

4.1 Introduction

The purpose of this chapter is to describe the methodology. Following the introduction, section two narrates the research objectives and aim. Research philosophies, research approaches and data collection methods are presented in section three. Sampling and its techniques and reliability and validity are discussed in sections four and five. Section six presents the data analysis techniques, their advantages and limitations. The methodology and techniques used in this thesis are explained in section seven. The last section provides a summary of the methodology.

4.2 Research Objectives and Aim

The following objectives were set in order to achieve the research aim:

Objective 1: to investigate the nature of coordination of selected agri-food supply chains (dairy, meat, apples, onions and wine).

Objective 2: to identify who are the chain coordinators in the selected agri-food supply chains.

Objective 3a: to examine the intangible core competencies or skills required to be considered as an effective chain coordinator.

Objective 3b: to scrutinise the relationships between tangible resources and the effectiveness of supply chain coordination.

Objective 4: to investigate the relationships between the dimensions of coordination effectiveness.

The aim of this research is to investigate intangible (the core competencies or skills of chain coordinators) and tangible (a number of people, budget and technology for supply chain coordination) resources which determine the effectiveness of supply chain coordination (operational, financial and social performance). Moreover, this study

identifies chain coordinators and scrutinises the relationships between the dimensions of coordination effectiveness. The central assumption is that the determinants of the effectiveness are coordinators' innate or acquired abilities, leadership styles, effective communication, analytical skills and the existence of the tangible resources.

4.3 Research Philosophies, Approaches and Data Collection Methods

Research philosophies are mainly classified into four major paradigms, namely, advocacy/participatory, constructivism, post-positivism and pragmatism. Table 4.1 summarises the characteristics of these four research paradigms (Crotty, 2003; Creswell, 2009).

Table 4.1: Research Philosophies

Advocacy/Participatory:	**Constructivism:**
Political empowerment issue-oriented Collaborative Change-oriented	Understanding Multiple participant meanings Social and historical construction Theory generation
Post-positivism:	**Pragmatism:**
Determination Reductionism Empirical observations and measurements Theory verification	Consequences of actions Problem-centred Real-world practice oriented

Source: (Creswell, 2009)

Researchers in an advocacy/participatory approach focus on social and collaborative issues. The example of social issues includes empowerment, alienation, oppression, inequality, suppression and domination. This approach assumes that participants are useful resources to design questions, to collect and analyse data. A constructivist approach seeks an understanding of participants. Researchers explore multiple subjective meaning of experiences and this leads them towards the views' complexity. Moreover, open-ended questions are considered and meanings are formed based on

historical and social perspectives. Thus, constructivists often develop a theory by constructing meanings rather than creating meanings (Crotty, 2003; Creswell, 2009).

Post-positivism reflects the philosophy of thinking behind positivism. It states that the claim can be positive or negative. In post-positivism, the problem identifies a need to scrutinize causes that affect outcomes. It is also called reductionism which means to test the variables that construct hypotheses and questions. Thus, it involves confirmatory tests which refine extant theories. The pragmatism philosophy of research emphasises on commonsense, reactions and practicality. Research outcomes come from actions, situations and consequences. Furthermore, researchers believe that a problem can be resolved by choosing different methods, techniques and procedures. Thus, this brings the concept of a mixed method approach that reflects a combination of qualitative and quantitative research approaches (Crotty, 2003; Creswell, 2009; Taber, 2012).

The major differences between the qualitative and quantitative research approaches are shown in Table 4.2 (Hair et al., 2000; Neuman, 2000; Taber, 2012). Qualitative research is a systematic method of investigation that focuses on descriptive and exploratory aspects, inductive approaches, theories, ad-hoc manners, identifications of meanings and themes.

Table 4.2: Research Approaches

Qualitative	**Mixed** ⟷	**Quantitative**
This approach:		This approach:
Often uses inductive approaches		Often uses deductive approaches
Consists of themes and motifs		Consists of distinct variables
Measures based on ad hoc manners		Measures systematically
Has data in the form of words and images		Has data in the form of numbers
Uses casual or non-casual theories		Often uses causal theories
Captures and discovers meanings		Tests hypotheses
Rarely replicates procedures		Replicates procedures
Proceeds by extracting themes		Proceeds by using numbers
Rarely uses statistical tools		Depends on statistical tools

Source: (Hair et al., 2000; Neuman, 2000; Taber, 2012)

Additionally, a qualitative approach deals with narratives, phenomenology, ethnography, grounded theories and case studies (Creswell, 2009; Taber, 2012):

- Narrative research focuses on participants' views and narrates stories about experiences.
- Phenomenology research emphasises the core of human experiences about a phenomenon.
- Ethnography studies an integral group for a long period of time.
- Grounded theories drive a general theory rooted with participants' views.
- Case studies explore cases in details (Creswell, 2009; Taber, 2012).

On the other hand, quantitative research is related to statistical facts and the estimation of relationships of interests. It starts from hypothesised relationships called a deductive approach (Neuman, 2000). The deductive approach involves a process of hypothesising, theory formulations, preliminary data gathering, observations, data analysing and deducting results (Sekaran, 2000). Thus, the measures become more systematic when statistical tools are used; consequently, results are often replicable (Neuman, 2000).

Quantitative research also focuses on experimental and non-experimental designs. The experimental designs are related to the randomly assigning of subjects whereas the non-experimental designs are the other way around (Creswell, 2009; Taber, 2012).

Additionally, a mixed method strategy consists of sequential, concurrent and transformative processes (Creswell, 2009; Taber, 2012):

- Sequential processes expand the research findings by using multiple research strategies. For example, researchers can explore a problem using qualitative approaches followed by quantitative approaches or vice versa.
- Concurrent processes use both qualitative and quantitative research approaches at the same time.
- Transformative processes employ theoretical lenses which provide a specific framework (Creswell, 2009; Taber, 2012).

An integration of qualitative and quantitative research approaches (mixed method approach) has become common (Hair et al., 2000; Neuman, 2000; Crotty, 2003; Creswell, 2009; Taber, 2012). The purpose of a mixed method approach is to form specific research questions, identify sample members and obtain particular information (Taber, 2012).

Table 4.3 shows a summary of data collection methods. It includes qualitative (emerging, predetermined, open-ended questions, interviews, observations, documented and audio-visual data), quantitative (pre-determined, instrument based questions, performance, attitude, observational and census data) and mixed methods. In addition to this, the advantages and disadvantages of various data collection modes (face-to-face interviews, telephone interviews, electronic and mail questionnaires) are shown in Appendix C.

Table 4.3: Data Collection Methods

Qualitative Method	Quantitative Method	Mixed Method
Emerging methods	Pre-determined	Both pre-determined and emerging methods
Open-ended questions	Instrument based questions	Both open- and closed-ended questions
Interviews, observations, documented and audio-visual data	Performance, attitude, observational and census data	Multiple forms of data drawing on all possibilities

Source: (Creswell, 2009)

The questionnaires are mainly classified into four types, namely structured-non-disguised (direct questionnaire), structured-disguised (indirect questionnaire), non-structured-non-disguised and non-structured-disguised. The structured questionnaire consists of formal-framed questions. The structured-non-disguised questionnaire is based on a list of questions that is pre-arranged. In this type of questionnaires, the objectives are revealed to the respondents. It is particularly suitable for descriptive research and large samples. The structured-disguised contains an investigative nature;

researchers do not disclose the research objectives. These types of questionnaires are utilised to reveal sensitive issues. The questionnaires also consist of an unstructured list of questions. Such questionnaires are flexible and appropriate for exploratory research where researchers ask questions according to the situations (Beri, 2008).

Questionnaires can also be semi-structured, a mixture of open-ended and closed-ended questions. The types of questions also categorize the interviews (structured, semi-structured or unstructured interviews) (Robson, 2011). A summary of the research philosophies, approaches, strategies and data collection methods is shown in Table 4.4.

Table 4.4: A Summary of Research Options

Philosophies	Approaches	Strategies	Data collection Methods
Advocacy or Participatory assumptions	Qualitative	Narrative designs	Open-ended interviews and audio visual data
Constructivist assumptions	Qualitative	Ethnographic designs	Emerging methods Open-ended questions Field observations, documented data
Post-positivist assumptions	Quantitative	Experimental designs Quasi- experimental designs	Predetermined Closed-ended questions Performances, attitudes, observations and censuses data
Pragmatic assumptions	Mixed Methods	Mixed methods designs	Both pre-determined and emerging methods Both open- and closed - ended questions Multiple forms of data drawing on all possibilities

Source: (Creswell, 2009)

Additionally, ethics such as maintaining the confidentiality of involved respondents and organizations are essential the parts of a research project. A researcher should understand important aspects of an ethical research approach because this may affect the study under investigation (Polonsky and Waller, 2005). Ethically, interview and mail

survey methods are often considered in a low risk category because informants have less risk and problems (Sikweyiya and Jewkes, 2011).

4.4 Sampling and Sampling Techniques

Sampling is the process of selecting samples from a targeted population. For instance, this would be an example of sampling if a researcher systematically selects a group of supply chain graduates from New Zealand universities. The selected samples as a subset of the population are assumed to represent the properties of the population (Gupta and Gupta, 2011; Vogt et al., 2012). The systematic sampling process involves defining target populations, identifying sample frames, specifying sampling units and methods, determining sample sizes, stating sampling plans and selecting the final samples (Gupta and Gupta, 2011; Manjunath et al., 2012).

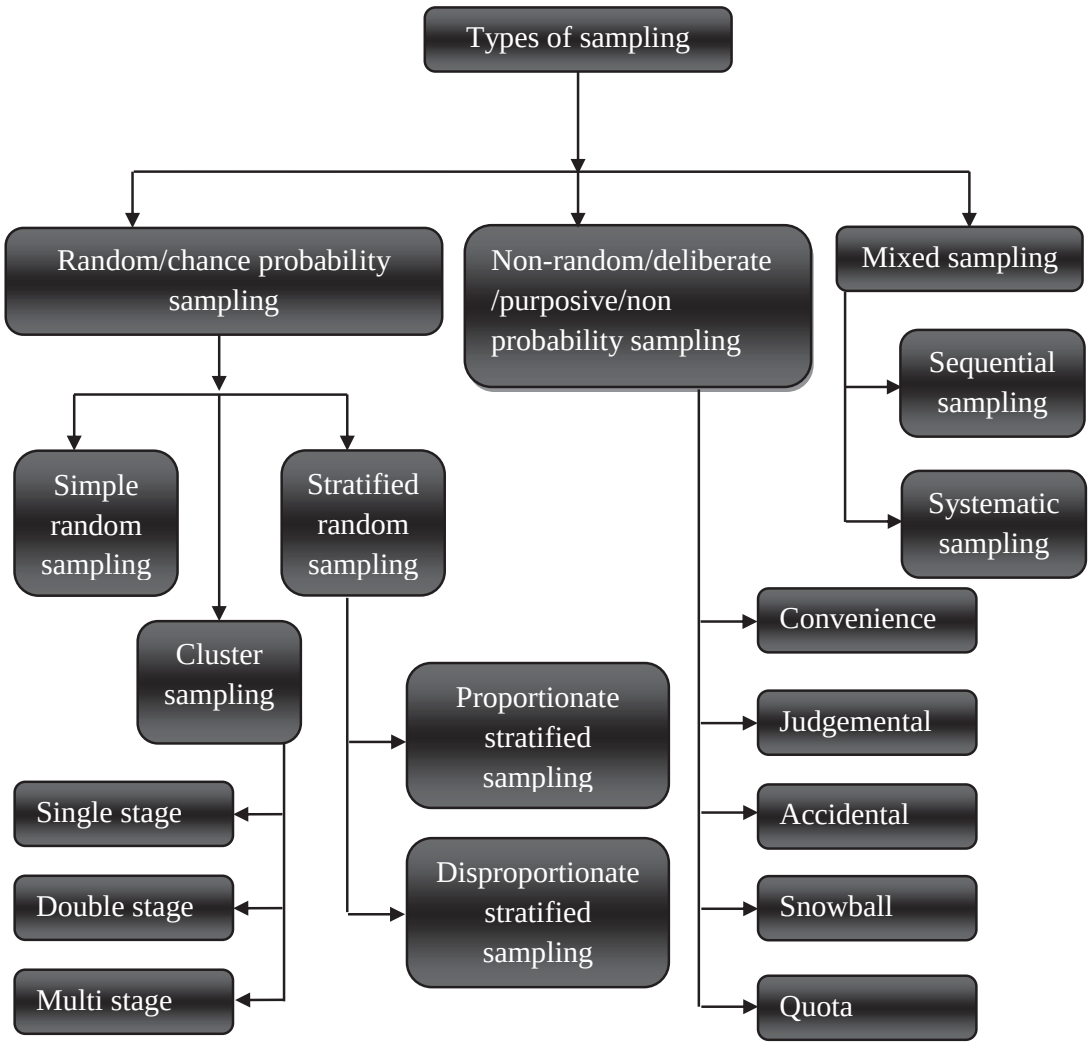
- Defining population means to include the targeted individuals, sampling units, areas of samples and timeframes.
- Identifying a sample frame provides a complete list of population units (e.g., list of professional bodies and census reports).
- Specifying sampling units deals with basic units of the targeted population
- Sampling methods determine the choice of using probability or non-probability sampling.
- Sample sizes, plans and final selection are related to the decisions about the number of observations from the targeted population, plans for implementation and final sample selections (Gupta and Gupta, 2011; Manjunath et al., 2012).

The types of sampling include random sampling, non-random sampling and mixed sampling (Figure 4.1) (Gupta and Gupta, 2011). The random sampling technique is based on the theory of probability and it is divided into three groups; simple random sampling, stratified sampling and cluster sampling (Gupta and Gupta, 2011; Manjunath et al., 2012).

- Simple random sampling: to sample based on an equal chance of selection
- Stratified sampling: to select samples from non-over lapping populations

- Cluster sampling: to draw samples from a grouped population. It can either be done at a single stage (e.g., state level sample) or multi-stages (e.g., developing primary and secondary groups and then choosing samples from the sub-groups) (Gupta and Gupta, 2011; Manjunath et al., 2012).

Figure 4.1: Types of Sampling



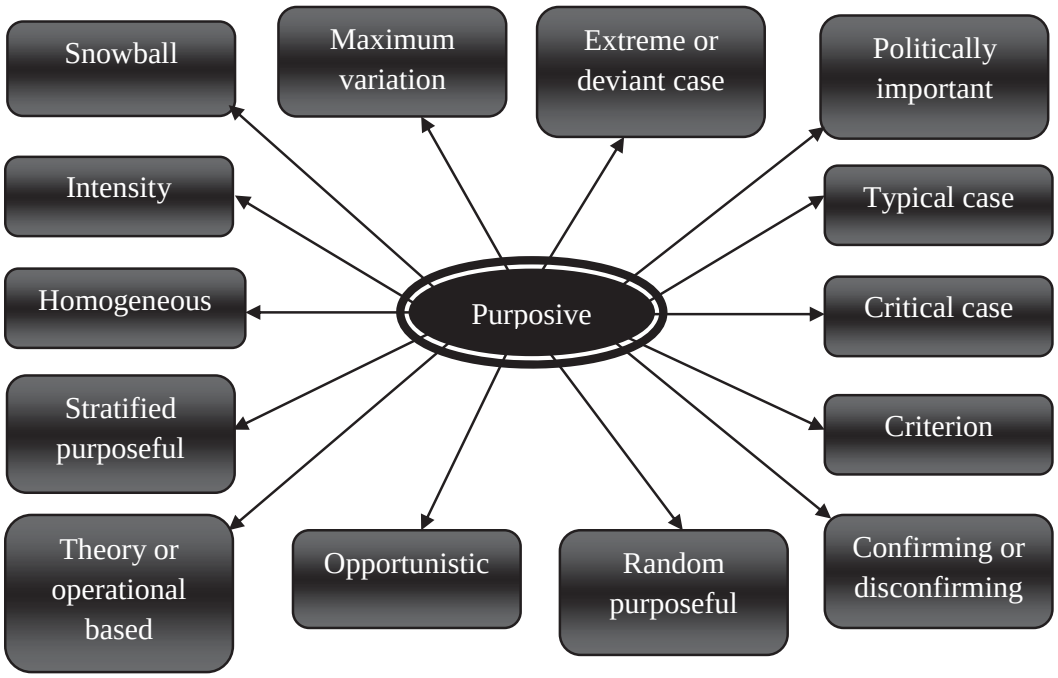
Source: (Gupta and Gupta, 2011)

The non-random sampling, also called purposive sampling, represents a purposive selection of particular groups of the population. Thus, it does not follow the probability

theory (Gupta and Gupta, 2011; Manjunath et al., 2012). However, the purposive sampling approach focuses on a particular population of interest thus it ensures that the population group is represented as effectively as possible (Mammen and Sano, 2012). The purposive sampling technique is further categorised into convenience sampling, judgement sampling, accidental sampling, snowball sampling and quota sampling (Gupta and Gupta, 2011; Manjunath et al., 2012; Vogt et al., 2012).

- Convenience sampling: to select samples based on ease of access.
- Judgement sampling: to draw samples based on own judgements.
- Accidental sampling: is also based on convenience sampling.
- Snowball sampling: to choose samples based on referrals.
- Quota sampling: to select samples based on quota (e.g., sex, age and gender). It is an extension of judgemental sampling (Gupta and Gupta, 2011; Manjunath et al., 2012). As shown in Figure 4.2, Siegle (2012) provides detailed classification of purposive sampling.

Figure 4.2: Types of Purposive Sampling



Source: (Siegle, 2012)

The mixed methods of sampling have the characteristics of both random and non-random sampling. It can be further grouped as sequential and systematic sampling (Gupta and Gupta, 2011; Manjunath et al., 2012). The sequential sampling process is determined based on the survey progress and researchers keep collecting samples until they reach their desired numbers. The systematic sampling technique utilises the sampling process that uses a systematic random points from the targeted population and then every n^{th} unit is selected (Gupta and Gupta, 2011; Manjunath et al., 2012). The advantages and disadvantages of the sampling techniques (purposive, quota, snowball, volunteer, accidental, convenience, simple random, stratified random, cluster and stage) are shown in Appendix C.

4.5 Reliability and Validity

Reliability assesses the degree to which measures are free from errors. Thus, primary objective of the reliability is to reduce errors and produce consistent results (Zikmund, 2003). The reliability is measured by employing three commonly used methods – Cronbach's alpha, construct reliability (CR), average variance extracted (AVE) (Sekaran, 2000; Barbara, 2010; Kline, 2011).

Cronbach alpha measures the dimensions of items. It is particularly important when a study uses multiple-item scale such as five-point Likert scale (Sekaran, 2000). It basically estimates the internal consistency of items and its value should exceed 0.70 (Barbara, 2010; Kline, 2011).

Alpha values alone are not sufficient to measure unidimensionality. It is also important to assess the reliability using confirmatory factor analysis (Barbara, 2010). CR may be more appropriate because it does not presume that all indicators are equally weighted and it measures the construct reliability. It is also suggested to be larger than 0.70 (Barbara, 2010; Kline, 2011; Chiang et al., 2012). Additionally, AVE represents the amount of variance extracted by a construct from its items. The variance occurs because of measurement errors. Thus, it is important to use the AVE approach for the reliability confirmation. The recommended value for AVE is 0.50 or greater (Hu et al., 2004; Kline, 2011; Chiang et al., 2012).

Validity refers to "the ability of a scale to measure what is intended to be measured" (Zikmund, 2003, p.331). It is a crucial requirement to validate the underlying constructs. Neuman (2000) also believed that the better the validity the superior the theoretical frameworks. The commonly used validity types are content validity and construct validity (i.e., convergent and discriminant) (Zikmund, 2003; Chiang et al., 2012).

The concept of content validity is subjective and it assesses the content of a scale and clarifies the concepts (Zikmund, 2003). The construct validity refers to the ability of items how valid the results are achieved by them. It consists of convergent validity and discriminant validity. The convergent validity is assessed by scrutinizing loadings for each set of items. The loadings should be greater than 0.50 and significant which means the items share more variance with their respective underlying constructs (Sekaran, 2000; Chiang et al., 2012). In addition to the loadings, AVE is also used to support the convergent validity. The discriminant validity measures how strong the construct are correlated. The correlation between two factors should not exceed 0.85 (Kline, 2011). This value is used as a guideline. The second method used to assess the discriminant validity is to check whether the average variance explained by each pair of constructs is greater than the square of the correction between the constructs (Sekaran, 2000; Chiang et al., 2012).

4.6 Data Analysis Techniques, Advantages and Limitations

Checking Data Characteristics

A wide range of data analysis techniques such as exploratory/descriptive (e.g., mean, median, variance, kurtosis, skweness and techniques for missing data), regression, factor analysis and structural equation modelling are utilized in social research to scrutinise data (Barbara, 2010; Kline, 2011). The descriptive/exploratory techniques are mainly used to check the characteristics of collected data. For example, the mean similar/close to median, skewness less than 2 and kurtosis less than 5 represent the quality of data distribution (Barbara, 2010).

In literature, three types of missing data are often discussed, namely missing completely at random (MCAR), missing at random (MAR) and missing not at random (MNAR).

MCAR occurs if a missing datum does not depend on either the observed or unobserved outcomes. This means that there are no systematic processes to detect why individuals are missing for the given variables. MAR occurs if a missing datum depends on the observed outcomes, but it does not depend on the unobserved outcomes. In this case, the probability of missing data is predictable. MNAR occurs if a missing datum depends on the unobserved outcomes as well as individual choice. For example, often people do not want to report on an income variable (Myer, 2011; Liu and Entsuah, 2012).

Handling Missing Data

The mostly commonly used methods of handling missing data are listwise and pairwise deletion, mean substitution, maximum likelihood (ML), multiple imputations and expectation maximization (EM) algorithm (Myer, 2011; Sterner, 2011; Morris et al., 2012). The deleting of any observations or cases that have missing data is called listwise deletion. This approach assumes that the missing data are MCAR. In pairwise deletion, for each pair of variable, covariance can be estimated from all cases with complete observations and it provides more information. Mean substitute method simply replaces missing values with average scores. The ML approach models the missing data based on the data investigated and it optimises the probability of relationships in the data. The multiple imputations need a number of imputations that are necessary to produce complete data sets. The EM algorithm method uses an iterative process and the variables relevant to the construct are employed to predict the missing values (Mayer, 2011; Sterner, 2011; Morris et al., 2012).

Additionally, depending on the patterns of missing data and validity of the assumptions, listwise deletion can cause biased parameters and pairwise deletion can create zero or negative matrixes. These approaches are only suitable if MCAR assumption is met. The EM algorithm method is more suitable and it should produce unbiased estimates under MCAR and MAR assumptions. The EM and ML methods yields more efficient estimates than, mean, listwise or pairwise approaches. Furthermore, imputation method is suggested if a data set has a large number of missing values (Enders, 2001; Myers, 2011).

Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) has received considerable attention because of its extensive applications in research (Suki, 2011; Kline, 2011; Pandey and Jha, 2012). For instance, it has been applied in a number of disciplines, including logistics and transport (Garver and Mentzer, 1999; Golob, 2003), strategic alliances (Nielsen and Nielsen, 2009), leadership and management (Laohavichien et al., 2011)

SEM is a combination of statistical techniques that estimate a set of relationships between variables. The relationships can be examined between different group of variables such as independent, dependent, continuous, discrete and a group of mixed. These variables constitute constructs which are based on a theory. In other words, SEM is used to develop and test a theory (Barbara, 2010). The SEM method basically consists of a set of measurement and structural models. First, the measurement models estimate relationships between measured or observed variables. The models are further distinguished as reflective and formative models. The reflective models are mostly commonly used and these models draw arrows from the latent variables to the indicators. The formative models are vice versa; the direction of arrows head towards the latent variables. Second, the structural models estimate relationships between latent constructs. Overall, the models can be further specified as independent and dependent variables (Barbara, 2010; Kline, 2011; Allen et al., 2012).

The main purpose of SEM is to test and develop a theory that consists of a series of interconnected relationships between variables. The relationships between the variables change if a change occurs in relevant variables. For example, if an independent variable (i1) changes, then the results of the relevant dependent variable (d1) also change. This means the independent variable (i1) affects the dependent variable (d1) (Kline, 2011).

SEM is an efficient statistical tool that is used for a number of analyses, including causal links between constructs, test hypotheses, path analysis, factor analysis, estimating variance, covariance and conventional linear regressions. It is particularly a suitable technique for confirmatory analysis with the ability to assess unidimensionality, reliability and validity. Moreover, it tests an overall fit of a model with individual tests simultaneously. Moreover, certain SEM software (e.g., AMOS) provides a graphical

representation of the relationships among variables. Consequently, it provides a very good representation of data sets (Barbara, 2010; Kline, 2011).

A multiple regression (MR) method is also used to estimate the relationships among variables; however, SEM is preferred because of the above mentioned advantages. The MR method has a number of sub-groups such as linear and non-linear regressions, logistic regression and stepwise regression. Moreover, factor analysis methods are used to examine the dimensionality of a group of variables (Barbara, 2010; Kline, 2011).

SEM Limitations (Sample Size, Reliability, Validity and Identification)

In SEM, it is crucial to consider an appropriate sample size (Hoe, 2008; Kline, 2011). Anderson and Gerbing (1984) believed that SEM could also be applied to small sample size (i.e., 50). To achieve consistent and reliable results, Bentler and Chou, (1987) recommended 5:1 ratio of sample size to the number of free parameters. Hair et al. (1998) believed that a sample should have at least 100 observations and the ratio of the sample size should be 5 to 20 times the number of parameters. As a rule of thumb or an acceptable level, any number above 200 is understood to supply sufficient statistical power and reliable results (Hoe, 2008; Kline, 2011).

The issue of sample size also depends on the complexity of a model. A number of studies (Chin et al., 2003; Marsh et al., 2004; Goodhue et al., 2007) used a sample size of 100 or less. It is also considered that fitting a model based on a small sample size is better than establishing a model based on large samples. Basically, the small sample size influences chi-square statistic and measures of goodness of fits. In addition to sample size, it is also vital to consider the approximate normality of data – reliability and validity scores explained in section 4.5 (Chin et al., 2003; Marsh et al., 2004; Goodhue et al., 2007).

SEM can handle a variety of models; however, not all models can be identified. The basic rule is that the number of unknown parameters should not be more than known parameters. Another fundamental principle of identification is that underlying latent variables must be scaled. Moreover, complex non-recursive models (i.e., models with

feedback loops) can also bring the issue of model identifications (Barbara, 2010; Kline, 2011).

Complexity – Single Indicator Latent Variable and Parcelling strategies

The single indicator latent variable and parcelling strategies in SEM are used to reduce the complexity of a model. In other words, they reduce the number of parameters and accommodate small sample sizes (Donna and MacCallum, 2005; Kline, 2011). In single indicator latent (variable) approach, the structural coefficients remain unchanged to those achieved with the individual items (Sass and Smith, 2006). Additionally, the single indicator latent approach involves estimating fewer parameters and it can be particularly useful for a small sample size (Kline, 2011).

The process of single indicator approach involves estimation of factor loadings and measurement of errors using mean, standard deviation and alpha. The values of mean and standard deviation are based on the items parcelled. Moreover, the factor loadings and measurement errors are used to fix the parameters of a model. The process of calculating the required loadings and errors is mentioned by Munck (1979), Booth et al. (1995) and Rujipak (2009). The formulae for measuring factor loadings (λ) and measurement errors (ε) are:

Factor loadings (λ) = *SD* (items parcelled, i.e., X)*√α; Where *SD* (X) = the standard deviation of the items parcelled for relevant constructs and √α is the square root of alpha, i.e., internal consistency/reliability of the relative items.

Measurement errors (ε) = Var (X)*(1- α); Where Var (X) is the variance of the items parcelled for a relevant construct. After calculating the factor loadings and measurement error variances, the values are used to fix the respective paths and variances of the model (Rujipak, 2009).

The parcelling method is a process of summing or averaging item scores of two or more items (Bandalos and Finney, 2001). Researchers (Yuan, et al., 1997; Marsh et al., 1998; Bandalos and Finney, 2001) proved that the results from parcels rather than the original items are more likely to give an appropriate solution. They suggested that the method is

particularly suitable when the research emphasises the structural parts of a model. Donna and MacCallum (2005) believed that the results obtained from the parcelling method are similar to the population values and they are considered as a good option for applied researchers. Parcels can be created in various ways depending on the model under investigation. It is recommended to use parcels as indicators of latent variables because it provide higher reliability and reduces the number of measured variables, consequently, reduces the complexity of a model and accommodate small samples (Donna and MacCallum, 2005).

Restrictions of Fit Indices in SEM

Although there is no consensus to which goodness-of-fit indices should be used in SEM, Holmes-Smith (2006) and Kline (2011) recommended the reporting of at least three to four fit indices, including goodness of fit index (GFI), root mean square error of approximation (RMSEA), comparative fit index (CFI), normed fit index (NFI), incremental fit index (IFI), Tucker Lewis fit index (TLI), parsimony comparative of fit Index (PCFI) and normed chi-square (χ^2/df). The most commonly used indices are shown in Table 4.5 (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012).

Table 4.5: Fit Indices and Recommended Values

Fit indices	Recommended values
Absolute fit indices:	
p-value	> 0.05
Root mean square error of approximation (RMSEA)	< 0.08 or 0.06
Goodness of fit index (GFI)	> 0.90 or 0.95
Incremental fit indices:	
Comparative fit index (CFI)	> 0.90 or 0.95
Normed fit index (NFI)	> 0.90 or 0.95
Incremental fit index (IFI)	> 0.90 or 0.95
Tucker Lewis fit index (TLI)	> 0.90 or 0.95
Parsimonious fit indices:	
Normed chi-square (χ^2/df)	< 5 or 3
Parsimony comparative fit index (PCFI)	≥ 0.50

Source: (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012)

The main purpose of the indices is to see whether models fit the data or need some adjustments. The indices are divided into three categories – absolute, incremental and parsimonious (Hair et al., 1998; Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012).

Absolute fit indices:

Absolute fit indices tell how well a model fits the data by testing the difference between the matrixes of implied variance and covariance and sample variance and covariance. The probability value (p-value) is the primary measure of an overall fit. The difference is considered small if the p-value is greater than 0.05. It means that the difference between actual and predicted input matrices is not significant (as desired), consequently, the model accepted. This index is sensitive to sample size; however, it is used in conjunction with other indices (Hair et al., 1998; Kline, 2011).

The RMSEA measures the error of approximation. It is sensitive to the number of parameters estimated and its value less than 0.08 or 0.06 indicates a good fit (Hair et al., 1998; Nielsen and Nielsen, 2009).

The GFI considers the respective amount of variance and covariance simultaneously; however, it does not adjust the degree of freedom. GFI ranges between 0 and 1, and the suggested level of a good fit is 0.90 or better (Hair et al., 1998; Nielsen and Nielsen, 2009; Giovanni, 2012). Some researchers such as Pandey and Jha (2012) suggested that ideally it should be 0.95 or greater. Pandey and Jha (2012) suggested the same values (0.95 or greater) for other indices such as CFI, NFI, IFI and TLI.

Incremental fit indices:

Incremental fit indices do a comparison between the underlying model and baseline model. These measures (CFI, NFI, IFI and TLI) range between 0 and 1, and the value greater than 0.90 or better shows that the model fits the data adequately (Hair et al., 1998; Nielsen and Nielsen, 2009; Giovanni, 2012).

Parsimonious fit indices:

Parsimonious fit indices measure the complex of a model, a model with fewer parameters is better. Two parsimonious fit indices, PCFI and normed chi-square, are commonly used to check the parsimony of a model. The suggested value for normed chi-square is lower than 5 or 3 (Hair et al., 1998; Giovanni, 2012) whereas the recommended value for PCFI is 0.50 or greater (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012).

4.7 Thesis Methodology and Techniques

Pilot Survey

Pilot survey objectives

The objectives of the pilot survey were:

Objective 1: to identify the key organizations from the selected agri-food supply chains of New Zealand, the UK and Pakistan.

Objective 2: to identify who are the chain coordinators in the key organizations.

Objective 3: to investigate the chain coordinators' activities and skills/competencies.

Objective 4: to obtain certain information (e.g., variables used for performance measurement) to develop the questionnaire and select countries for main (quantitative) data collection.

Questionnaire Development for the Pilot Survey and Targeted Industries

A questionnaire for the pilot survey was developed in order to achieve the objectives. The open-ended questions included in the questionnaire were based on an extensive review of the literature. The questionnaire was developed in English because business people in the selected countries fully understand the language. It consisted of two sections. The first section asked general information about the respondents and

industries. The second section was further divided into three parts; chain coordinators' identification and activities, suitable dependent variables to measure the effectiveness of supply chain coordination, competencies/skills required for the effectiveness of supply chain coordination. Certain questions in the questionnaire were repeated to ensure the consistency of respondents' answers. The questionnaire was also pre-tested on three managers in three selected countries (New Zealand, UK and Pakistan). The questionnaire used for the pilot survey is given in Appendix E.

The targeted sample members were from small and medium sized-enterprises (SMEs) of dairy, meat, apples, onions and wine – Wine chain was excluded from Pakistan because it is hardly consumed in Pakistan. A number of companies located in Auckland, London and Islamabad were selected from the KOMPASS database. The cities were chosen because the majority of the targeted companies are located in these regions. The KOMPASS database is updated monthly and contains contact details of more than 2.3 million companies (KOMPASS, 2012).

Because of the varying definitions of SMEs across countries, it is not easy to define them, particularly, when multiple countries are involved in a study. However, according to the countries' SMEs definitions, most of the enterprises in the selected countries are SMEs; 99.9% for the UK, 94.4% for New Zealand and more than 90% for Pakistan. The definition of New Zealand SMEs is based on a number of employees only, but the definition used in the UK and Pakistan includes a number of employees and turnover. It makes sense to use one definition which gives more information and is widely used. Thus, the UK definition seems more appropriate and internationally acceptable. According to the definition, SMEs are ones that have less than 250 employees and turnover not more than £25.9 million ($40.62 million US) (Brown and Lockett, 2004; Ministry of Economic Development, 2007; UK Statistics, 2011).

This study particularly focuses on New Zealand's selected agri-food exports to the UK. The selected agri-food chains/products are dairy, meat, apples, onions and wine. These chains and countries were selected for a number of reasons. In terms of the dollar values, these are the major agri-food products which are exported to the UK (Statistics New Zealand, 2011). The agri-food products contribute more than half of merchandise

exports of the country and the top export products (dairy, meat, wine, wool, fruit and vegetables) produce about 16% of New Zealand's GDP and also employ approximately 15% of the workforce (New Zealand Ministry of Foreign Affairs, 2011).

New Zealand is one of the world's leading dairy exporters (MAF, 2011). The dairy contributes about 35% to the global trade. Almost 95% of the entire dairy produce is exported (Schewe, 2011), and the UK is the main market for New Zealand's dairy products, particularly for butter and cheese (DairyCo Datum, 2012).

New Zealand was recently ranked third in the world for producing mutton and lamb and thirteenth for beef production (Tanaka, 2005). For lamb, the country is also considered as the world's largest exporter and contributes more than 40% of the global exports (Ledgard et al., 2011). Also, the New Zealand economy makes about 3 billion US dollars (1 USD = 1.24869 NZD 20 October 2011) from meat exports (Statistics New Zealand, 2011). In 2012 (July to April), 41% of sheepmeat exports were supplied to the EU, of this, the UK alone accounted for 47%.

New Zealand exports more than 64% of its total apple production to over 65 countries (MAF, 2011a), and the UK is the major New Zealand's apple export market with 15% of the total exports (USDA, 2012c). Additionally, New Zealand is the world largest green onion exporter and the country exports 66% (129,461 tonnes) of the global green onion exports (FAO, 2012b), and the UK is leading importer of New Zealand grown onions (FAO, 2011b). As for as wine is concerned, the UK imports 33% of the Kiwi produced wine exports (Scandurra, 2011). An extensive literature review which further justifies why these targeted samples/products/chains were selected is presented in chapter two (sub-sections – New Zealand and UK dairy, meat, apple, onion and wine industries). In addition to this, in the selected chains, there is a lack of empirical investigations that scrutinize the linkages developed in the theoretical framework. The detail for this knowledge gap is given in section 1.3.

Pilot Survey Procedure, Respondents and Justifications for the used Method

A covering letter attached with the questionnaire was emailed or delivered in-person, and interview dates were requested. The copy of the covering letter is given in

Appendix E. Telephone calls were also made to invite respondents to participate in the research. Table 4.6 summaries the number of respondents and their job titles.

Table 4.6: Characteristics of the Respondents

Countries	Job title
12 (PK)	MD or CEO (6), ASM (2) , SM (2), SC and RM
6 (NZ)	MD or CEO (4), SCM and SC
6 (UK)	MD or CEO (4), SCM and BDM

Key: MD-Managing Director, CEO-Chief Executive Officer, ASM-Area Sales Managers, RM-Relationships Manager, SM-Store Managers, SCM-Supply Chain Manager, SC-Stock Controller, BDM-Business Development Manager

A total of 24 semi-structured interviews (12 from Islamabad, PK; 6 from Auckland, NZ; and 6 from London, the UK) were conducted from 14 managing directors/CEOs, 2 supply chain managers, 2 area sales managers, 2 stock controllers, 2 store managers, one business development manager and one relationship manager.

Each interview took 60–90 minutes and the interviews were tape-recorded and transcribed. During the interviews, detailed notes were also written. The reliability of respondents' answers was checked by repeating the questions during the conversations and interviews. Furthermore, the notes from the observations were also utilised to compare the respondents' answers. The literature was further used to support the arguments wherever possible. These multiple resources were utilised to ensure the reliability and validity of the data (Ellram, 1996).

There were two reasons that the interviews took a great amount of time. First, (high profile) sample members were busy, and it was not easy to get appointments for the interviews. Second, the footwork in travelling around Auckland and Islamabad consumed most of the time. However, good quality data, which achieved the research objectives, was collected.

The qualitative research method, semi-structured interviews (face-to-face and telephone), was found to be suitable to conduct the pilot survey. The data from New

Zealand and the UK was collected through face-to-face and telephone interviews using open-ended questions. The face-to-face interviews were also conducted in Pakistan.

The interviews with the questionnaire helped to identify chain coordinators and to explore required information for the questionnaire development. Also, the interviews produced better response rate and valid results. Furthermore, the pilot survey showed that there is a general distrust of other data collection techniques and lack of understanding of modern research methods and chain concepts, particularly in Pakistan. In such circumstances, the interviews were more suitable. For the similar reasons mentioned above, a number of studies in the past (Osman-Gani and Tan, 2002; Korneliussen and Grønhaug, 2003; Mehta et al., 2003; As-Sadeq and Khoury, 2005; Karami et al., 2006; Heimerriks and Duysters, 2007; Patzelt and Shepherd, 2008) used the method, interview. A detail can be seen in Appendix D.

Main Quantitative Data

Questionnaire Development for the Quantitative Data Collection

The close-ended questionnaire (i.e., questions limit respondents for answer choices) for quantitative data collection was developed by using a three-stage process as suggested by researchers (Oppenheim, 1992; Denscombe, 2003; Churchill et al., 2006). This development process consists of an extensive review of the literature, in-depth interviews based on the open-ended questionnaire (the pilot survey) and pre-tests. The questionnaire was developed in English language because business people/businessmen in the selected countries fully understand the English language.

Most of the selected measures/items (questions) were adopted from the previous studies. However, the studies were conducted in different countries thus their research perspectives may have been different. Therefore, in order to fit the research objectives, necessary modifications were made to certain measures. The measures were also modified based on the information obtained from the pilot survey.

There were two different versions of the questionnaire, one for New Zealand exporters and another for UK importers. Both versions of the questionnaire were identical except

for a few adjustments (i.e., education system and currency). The questionnaire was also reviewed and proofread several times to make it clear and object oriented.

As earlier mentioned, so far, not enough research has been conducted in the selected area. Thus, it was essential to conduct the pilot survey which provided appropriate information to develop the questionnaire for main quantitative data collection. The pilot survey which also identified chain coordinators (sample members) was the second stage to develop the questionnaire. The pilot survey explored chain coordinators' activities and prerequisite competencies. It also identified appropriate dependent variables which were the measures for the effectiveness of supply chain coordination.

The findings were further important to select the countries for quantitative data collection. The information was also used to compare the relevant measurement variables or items from the reviewed literature. The detailed results of the pilot survey are given in the next chapter. However, the relevant results which helped to develop the questionnaire are presented in this section.

At organizational level, importers and exporters (also called wholesalers) act as chain coordinators. Within these organizations, chain coordinators (as person) are managing directors or owners in small companies, < 50 employees and annual turnover < £6.5 million (10.20 million USD). CEOs and head of departments (supply chain/marketing managers) are chain coordinators in medium-sized companies, < 250 employee and annual turnover £25.9 million (40.62 million USD).

Chain coordinators are involved in a variety of activities such as stock controlling, relationship management, training, contracting, supply of products, analysing reports, measuring performance, marketing, exploring opportunities, business research, auctions' management and preparing performance-reports. This shows respondents' in-depth knowledge which produced quality information. A summary of the results obtained from the pilot survey is shown in Table 4.7.

Table 4.7: Findings for the Questionnaire Development

Characteristics	**All countries' Findings**	
Similarities		
Chain coordinators	Managing directors or owners (in small companies), CEOs, head of supply chain or marketing departments (in medium-sized companies)	
Activities	Stock controlling, relationship management, contracting, supply of products, analysing reports, measuring performance, marketing, business research, auctions management and preparing performance reports	
Competencies/skills	Effective communication, checking product quality, resolving conflicts, purchasing, staff management, relationship management with chain partners, time management, personal relationship management with main chain partners, marketing, research, exploring opportunities, training, promotions and performance measurement of relevant areas	
Differences		
	Pakistan	**UK and New Zealand**
Chains	Disintegrated	Integrated
Management style	Mostly directive	Mostly participative
Coordination level	Low-medium	Medium
Coordination resources	Private/company cars, phones, business cards, credit cards, computers, fax machine, internet, coordination budget, public transport and motor cycles	Except for motor cycles and public transport, all coordination resources are the same like found in Pakistani selected chains
Education and experience	Education level basic school to masters degree and experience 3-20 years	Education level bachelor to masters degree and experience 3-12 years

The efficiency of the activities depends on effective communication (accurate, complete, consistent, reliable, timely and appropriate frequency), inspecting products quality, resolving conflicts, purchasing skills (e.g., knowledge of product prices and transportation costs), staff management, relationship management with chain partners, time management (e.g., deliveries on time), personal relationship management with main chain partners, marketing (e.g., advertising for products promotion through local media), research (e.g., research about selecting new partners or open a new branch) and

exploring opportunities (e.g., finding performance gaps and looking for new attractive markets), training (how to deal with people from different cultures and quality checking), promotions (e.g., how to demonstrate/present products to customers), performance measurement, relevant education and experience. In addition to this, different leadership styles, tangible resources and levels of coordination are applied in developed (New Zealand and the UK) and developing (Pakistan) countries.

Based on the literature and the survey findings, a draft of the questionnaire was prepared for a pre-test. Before the pre-test, the questionnaire was proofread and reviewed a number of times to make it clear and object oriented. Mainly five-point Likert scale (strongly disagree: 1 and strongly agree: 5) was used to allow chain coordinators to express their degree of agreement or disagreement. The construct, frequency of communication, was measured by using time scales (1 = 6–monthly, 2 = quarterly, 3 = monthly, 4 = weekly, 5 = daily and the percentage of time, i.e., 1 = 0–20%, 2 = 21–40%, 3 = 41–60%, 4 = 61–80%, 5 = 81–100%). Moreover, the constructs of finding gaps for improvements (analytical skills) were assessed using important and unimportant scale (1 = very unimportant, 2 = unimportant, 3 = neither important nor unimportant, 4 =Important, 5 = very important). Additionally, training and language skills were coded using yes or no options.

The questionnaire was tested on five chain coordinators from the selected chains (3 from NZ and 2 from the UK – the UK version was emailed). The minor clarity issues (layout, wording and instructions) were identified and resolved. The revised questionnaire (final version) then was again tested with 10 chain coordinators (5 from each selected country) from the selected chains. No issues were found in the questionnaire. The pilot test showed that the developed questionnaire was a suitable instrument to obtain the required data. The questionnaire was also more appropriate and time efficient. The questionnaire was divided into two parts. The first part of the questionnaire consisted of general information about the respondents and companies. However, four items/questions (the highest education, language skills, training and years of professional experience) from the first part were used as the measures of competencies. The second part included four main questions, and each question consisted of a number of statements/items. These statements measured the different

constructs or variables. The questions one to three measured independent variables and the question four assessed dependent variables. The complete questionnaire is included in Appendix F.

Development of Questionnaire Measures (variables/items/constructs)

The developed questionnaire helped to test the hypotheses and the proposed models, which were built based on the extensive literature review and the pilot survey. The items or constructs measured intangible resources (chain coordinators' abilities, leadership styles, effective communication and analytical skills), tangible resources (human and non-human resources) and the effectiveness of supply chain coordination (operational, social and financial performance).

Each construct consisted of three or more measures (statements/items). However, a few variables such as environmental impact, language fluency and human resources were based on a single item. The developed models with the constructs are repeated in Figure 4.3 and Figure 4.4. The following sub-sections explain how the measures for the constructs were derived from the literature or the pilot survey.

Figure 4.3: Supply Chain Coordination Effectiveness Model

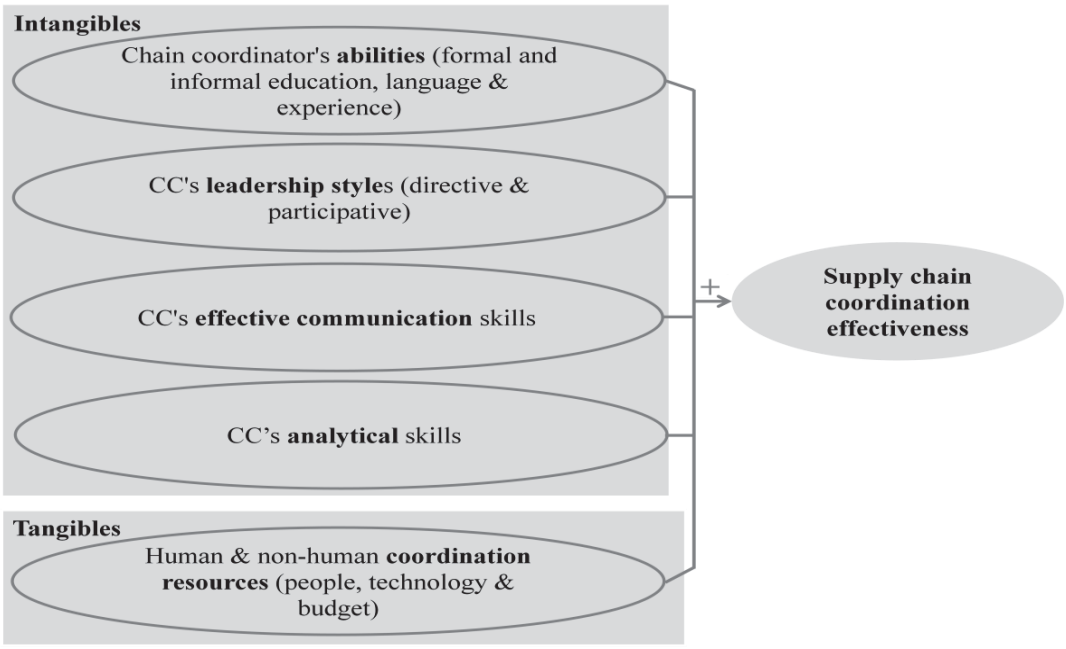
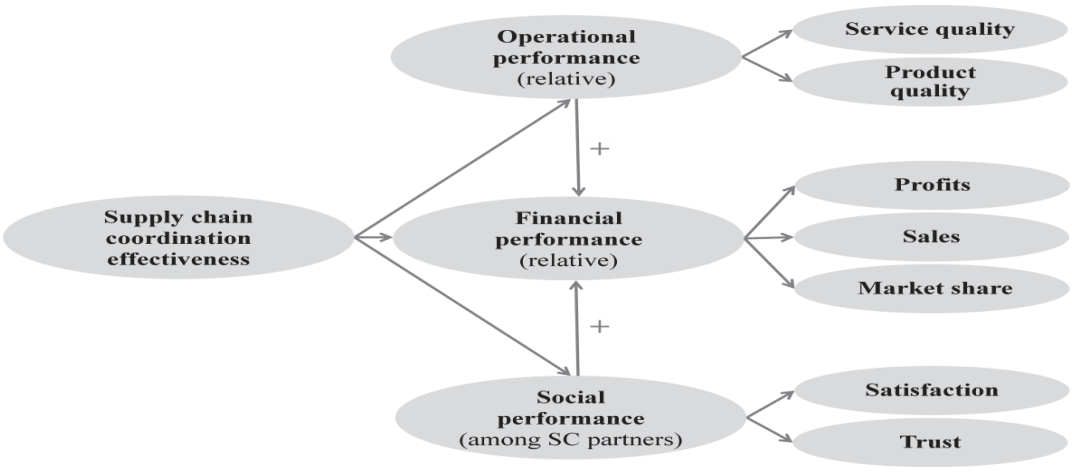


Figure 4.4: Supply Chain Coordination Effectiveness and Dimensions



Chain Coordinators' Abilities:

Chain Coordinators' abilities consisted of education, language skills, training and experience. The measures of highest education and language were adopted from Nakos, et al. (1998). It was asked to indicate the highest education (for New Zealand – primary/secondary/high school, undergraduate, postgraduate and PhD; for the UK – less than O-level, O-level, A level, undergraduate, masters and PhD). To assess training and professional experience, the scales used by Sun et al. (2007) and Kor and Mahhoney (2005) were employed respectively. Training also included seminars, workshops and short courses. Regarding experience, the total (number of) years of professional experiences of working with main supply chain partners were requested.

Chain Coordinators' Leadership Styles:

The constructs of two commonly used leadership styles in supply chain (i.e., directive leadership style and participative leadership style) were measured by employing scales used by Mehta et al. (2003). Three items (i.e., encouraging uniform procedure, spelling out rights and obligations and providing sufficient guidelines and instructions) reflected directive leadership style. Similarly, participation leadership style was assessed by asking to what extent lower/ middle management influences policies and standards.

Effective Communication Skills:

The effective communication skills were based on two constructs, quality and frequency of communication. The construct of quality measured the quality of communication practised by chain coordinators. Five items assessed whether communication is timely, accurate, reliable, complete and consistent (Mohr and Speckman, 1994). Following Mohr and Speckman, (1994) and Burkink, (2002), the frequency of communication was measured with seven items based on how frequently chain coordinators communicate and what percentage of time they spend with primary chain partners.

Analytical Skills:

Chain coordinators' analytical skills represented two related but distinct constructs: applications of analytical skills in internal (within supply chains) and external (macro level) environments. The applications of analytical skills in internal and external environments were measured by four and five items respectively. The constructs measured how important was it to analyse the gaps for improvements. The construct items used for internal analysis assessed how significant was it for chain coordinators to analyse performance, to make constant improvements and to forecast accurate supply and demand (Speckman et al., 1996; Analoui and Karami, 2002; Akhtar et al., 2012a). Similarly, the construct for external analysis reflected how important was it for chain coordinators to consider external environment such as competitors' strengths, knowing target markets or customer requirements better than competitors and managing market changes effectively (Analoui and Karami, 2002; Rosenzweig and Roth, 2007; Akhtar et al., 2012a).

Tangible Resources for Supply Chain Coordination:

Tangible Resources consisted of human and non-human resources. The human resources' construct reflected the number of specified people for supply chain coordination activities. It was a single-item measure (Nakos et al., 1998; Akhtar et al., 2012a). The measures of non-human resources consisted of financial and technological resources, a total of six items. The financial resource measured whether a company had separate budget for supply chain coordination activities (Akhtar et al., 2012a, the paper

is based on the pilot findings). Moreover, measures of using advanced technology at work were adopted from Rosenzweig and Roth (2007). The items measured sufficient use of technology for coordination activities; temperature control in vehicles, stock controlling and general communication.

Effectiveness of Supply Chain Coordination:

The effectiveness of supply chain coordination (a dependent variable) was measured by five constructs – service quality, product quality, financial performance, trust in and satisfaction with supply chain partners. The first two constructs represented operational performance. The trust and satisfaction reflected social performance.

Each of these constructs was measured with three items except for satisfaction and product quality which were assessed with four items. The items (delivery on time, 100% order fulfilment rate and order flexibility) measured service quality were adopted from Chen and Paulraj, (2004), Aramyan et al. (2007) and Akhtar et al., (2012a). By employing items used in previous studies (Badri and Davis, 2000; Amoaka-Gyampah, 2003) and the pilot survey, product quality was assessed using scales of: product defective rate, products safety, products reliability and impact on environment. Adopted from Nakos, et al. (1998), Acquaaah, (2007) and the pilot survey, the measures of financial performance were profitability, sales and market growth.

The construct trust assessed the levels of trust that chain coordinators have in their main supply chain partners. The individual items of this construct measured chain coordinators' confidence with main partners, the best interest being considered and how often promises were fulfilled (Batt, 2003). Using measures from Cullen et al. (1995), the construct, satisfaction, measured the levels of satisfaction with main supply chain partners. The construct items were based on relationships satisfaction; how good are chain partners, performance satisfaction and successful coordination.

Quantitative Data Collection

The KOMPASS database was used to select the targeted exporters and importers. From the selected chains (i.e., dairy, meat, apples, onions and wine), a total of 675 chain

coordinators from the UK importers and 600 chain coordinators from the New Zealand exporter were elected. To select the sample, the purposive sampling was used due to the following reasons:

- To select only those sample members who meet the study requirements.
- To obtain quality information only from the targeted samples that the research was seeking to achieve the research objectives.
- To obtain a suitable sample size to apply SEM.
- Geographical, time and financial constraints.

A covering letter enclosed with the questionnaire and pre-paid postage envelope was sent to the selected chain coordinators. The covering letter introduced the researcher, explained the purpose of the research and the significance of the respondents' contribution. It was also narrated that the participation is completely voluntary and the respondents may refuse to participate at any time. For maintaining confidentiality, only the aggregated data were used, no individuals/companies were identified. A copy of the covering letters and the questionnaire are given in Appendix F.

As shown in Table 4.8, both North Island and South Island (New Zealand) represented about 57% (344) and 43% (256) of the total 600 samples respectively. The ration of the selected chains was as follows: wine = 200; meat = 200; butter and cheese = 100; apples and onions =100. In the North Island, the questionnaire was delivered and collected through in-person visits. However, a mail survey was used to cover the South Island due to research limitations (financial, geographical and 2010/11 earthquake in the South Island).

Table 4.8: Selected Country Samples and Data Collection Methods

North Island	South Island	NZ sample	Products or chains	UK samples	UK in-person or mail questionnaire
57% (344)	43% (256)	200	Wine	200	In-person 127 (19%) and the rest 548 (81%) mail questionnaire
		200	Meat	200	
		100	Butter & cheese	165	
In-person	Mail questio-nnaire	100	Apples & onions	110	
		600	Total	675	

In the UK, a total of 127 out of 675 (meat= 200; wine = 200; butter and cheese = 165; apples and onions =110) copies of the questionnaire were delivered and collected through in-person visits. Certainly, in-person visits increased the response rate but because of the research limitations it was not possible to visits all the areas in the country.

A combination of qualitative data generated by interviews (the pilot survey) and quantitative data collected by a mail questionnaire survey produced valid results. This process also produced a complete, practical and an appropriate representation of the topic and data. For the same reasons, a number of studies in the past (Osman-Gani and Tan, 2002; Korneliussen and Grønhaug, 2003; Mehta et al., 2003; As-Sadeq and Khoury, 2005; Karami et al., 2006; Heimerriks and Duysters, 2007; Patzelt and Shepherd, 2008) used the same mixed method (i.e., interview and mail questionnaire methods). The detail is presented in Appendix D (methodology summary identified from the key studies). Moreover, the mail survey was used (for quantitative data collection) due to the requirements of the research objectives (i.e., finding relationships between the constructs or variables), geographical, financial and time constraints. Additionally, the pilot survey showed that the targeted sample members are very busy people and preferable data collection method is the mail questionnaire.

Additionally, as mentioned by researchers (Philips, 1981; John and Reve, 1982; Oppenheim, 1992), it is important to reduce the key informant bias. In this study, the identification of sample members (chain coordinators) through the pilot survey reduced the key informant bias.

Techniques Used to Increase Response Rate

As suggested by researchers (Mehta et al., 2003; Denscombe, 2003; Bryman, 2006), a number of techniques were used to improve the response rate.

- The letterhead of the Institute of Food Nutrition and Human Health, Massey University, was used for covering letter. It explained the research objectives and gave assurance for the confidentiality of the respondents.

- The University of Massey is a well known University and generally respondents pay more attention to people from highly regarded universities.
- Possible deliveries and collections were made in-person. This technique showed a very positive impact on obtained response rates.
- The wording of the questionnaires was carefully written. The short and concise statements obtained the required information which fulfilled the study objectives. Furthermore, the questionnaires were tested on a number of targeted samples and the minor changes were made to further clear the statements (questions/items).
- The respondents were given enough time to fill in the questionnaire and busy periods of the year were also consciously avoided.
- The respondents were offered incentives, namely, a summary of the findings!

Additionally, the ethical approval from Massey University was also obtained as the part of the requirements. The approval from the University was obtained prior to commence the research project. A copy of the ethical approval is shown in Appendix G.

This research project was evaluated by the peer review and judged to be low risk. The researcher was fully aware of all the relevant ethical codes. The relevant ethical codes or information from the guidelines approved by the University were applied. It was ensured that none of the respondents were affected. The procedure and the nature of the research was explained which showed that there were no potential risks involved. Furthermore, it was explained that the participation is completely voluntary and informants may refuse to participate at any time. For maintaining confidentiality, only the aggregated data were used and no individuals or companies were identified. In addition to this, the data was secured for analysis purpose and was not used for any other purposes.

Data Analysis Methods

The first step to analysis the collected data was to ensure the accuracy of the data entries. The second step was to check the samples for missing data, normality and to conduct exploratory factor analysis.

For descriptive statistics, Statistical Package for Social Sciences (SPSS) version 18 was used. SEM was conducted by employing commonly used software, Analysis of Moment Structures (AMOS) version 18. This software uses the variance-covariance matrix of the variables to estimate parameters. Maximum likelihood optimization and critical ratios are normally required to test the statistical significance of estimated parameters. The value of critical ratio greater than 1.96 indicates statistical significance at $p < 0.05$ (Barbara, 2010).

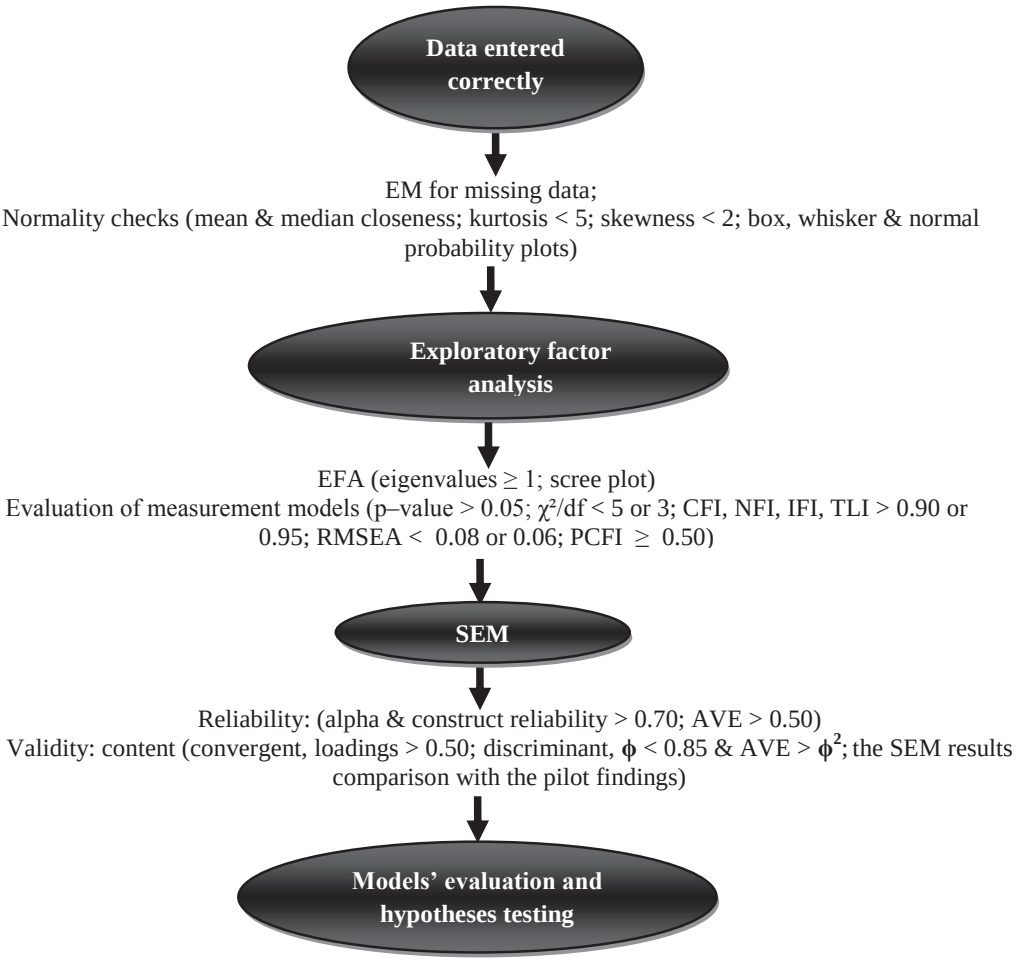
The most recommended (Enders, 2001; Myer, 2011; Sterner, 2011; Morris et al., 2012) method, EM, was used to deal with the missing values. Based on the recommendations by researchers (Barbara, 2010; Tabachnick and Fidell, 2001; Kline, 2011), box, whisker and normal probability plots were used to check outliers. It was also ensured that the used samples meet certain quality criteria such as mean and median comparisons, skewness and kurtosis being close to recommended values (kurtosis < 5; skewness < 2). Although most of the items had appeared in the previous research, exploratory factor analyses using eigenvalues ≥ 1 and scree plot observations were used to develop the constructs. Moreover, the evaluation of measurement models using recommended fit indices further refined the constructs (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012).

As recommended by researchers (Chin et al., 2003; Marsh et al., 2004; Goodhue et al., 2007) the total numbers (New Zealand sample = 225 and UK sample size =112) were found to be enough to apply SEM. Additionally, to reduce the complexity of the models and to achieve the main aim of this research (i.e., analysing the structural linkages between the constructs rather than items), the recommended single indicator latent approach (Munck 1979; Booth et al., 1995; Rujipak, 2009) and the parcelling strategy (Yuan, et al., 1997; Marsh et al., 1998; Bandalos and Finney, 2001; Donna and MacCallum, 2005) were used.

A recommended two-stage SEM approach was used to conduct SEM. The first stage was to assess the measurement models and the second stage was to estimate structural relationships (Barbara, 2010; Allen et al., 2012).

The first stage specified the causal relationships between the items or parcels (average of items) and the relevant constructs. The purpose of this stage was to estimate the reliability (unidimentionality) which offered the tests for convergent validity and discriminant validity. In other words, this process ensured that the items for a specific construct measured a single dimension, after removing items that loaded weakly. The recommended cut-off value of 0.50 was used (Kline, 2011; Allen et al., 2012). Following the first stage, in the second stage, recommended confirmatory factor analysis was conducted to assess the relationships between the constructs (Kline, 2011). This process avoided any undesired interactions between the measurement and structural models. It is generally a widely accepted approach when well grounded theory based on the previous literature is presented (Barbara, 2010; Allen et al., 2012). A summary of the data analysis techniques and tests used in this thesis is shown in Figure 4.5.

Figure 4.5: Data Analysis Techniques and Tests



In addition to the loadings, AVE was also used to support the convergent validity. Discriminant validity was measured by checking the correlation between two factors (less than 0.85) (Kline, 2011; Zikmund, 2003). The second method used to assess discriminant validity was to check whether the average variance explained by each pair of constructs is greater than the square of the correlation between the constructs (AVE > ϕ^2) (Sekaran, 2000; Chiang et al., 2012). To assess content validity, relevant literature, the pilot results and SEM findings were compared (Kline, 2011; Zikmund, 2003).

The applied statistical tools assisted to establish the plausibility of the theoretical model. In other words, the statistical procedure was useful to estimate how a set of independent variables (tangible and intangible resources) influences the effectiveness of supply chain coordination. The models were finally evaluated by using recommended fit indices (p–value > 0.05; CFI, NFI, IFI, TLI > 0.90 or 0.95; RMSEA < 0.08 or 0.06; χ^2/df < 5 or 3 PCFI ≥ 0.50) (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012). Additionally analysing of the theory/models using multiple data sets (i.e., New Zealand and UK) helped to reduce the bias (Oppenheim, 1992).

From the pilot survey (qualitative results), it was found that chain coordinators are involved in a variety of activities; stock controlling, relationship management, training, contracting, supply of products, analysing reports, measuring performance, marketing, analysing internal and external business environment, business research, auctions' management and preparing performance reports. The efficiency of these activities depends on relevant education, experience, training (how to deal with people from different cultures and quality checking), communication quality (accurate, complete, consistent, reliable, timely and appropriate frequency), analytical skills (internal applications, supply chain performance measurement and taking necessary actions; external applications, analysing external environment and looking for new attractive markets) and participative leadership style. The results were also confirmed by quantitative findings. Thus, the similarities between the pilot findings and the quantitative estimates showed the external validity of the results.

4.8 Conclusion and Methodology Summary

Who are chain coordinators and what core competencies do they require to achieve the effectiveness of supply chain coordination have become central questions for this research. It is believed that the effectiveness of supply chain coordination depends on coordinators' innate or acquired abilities, adopted leadership styles, effective communication skills, analytical skills and the existence of tangible resources (i.e., a number of people, budget and technology).

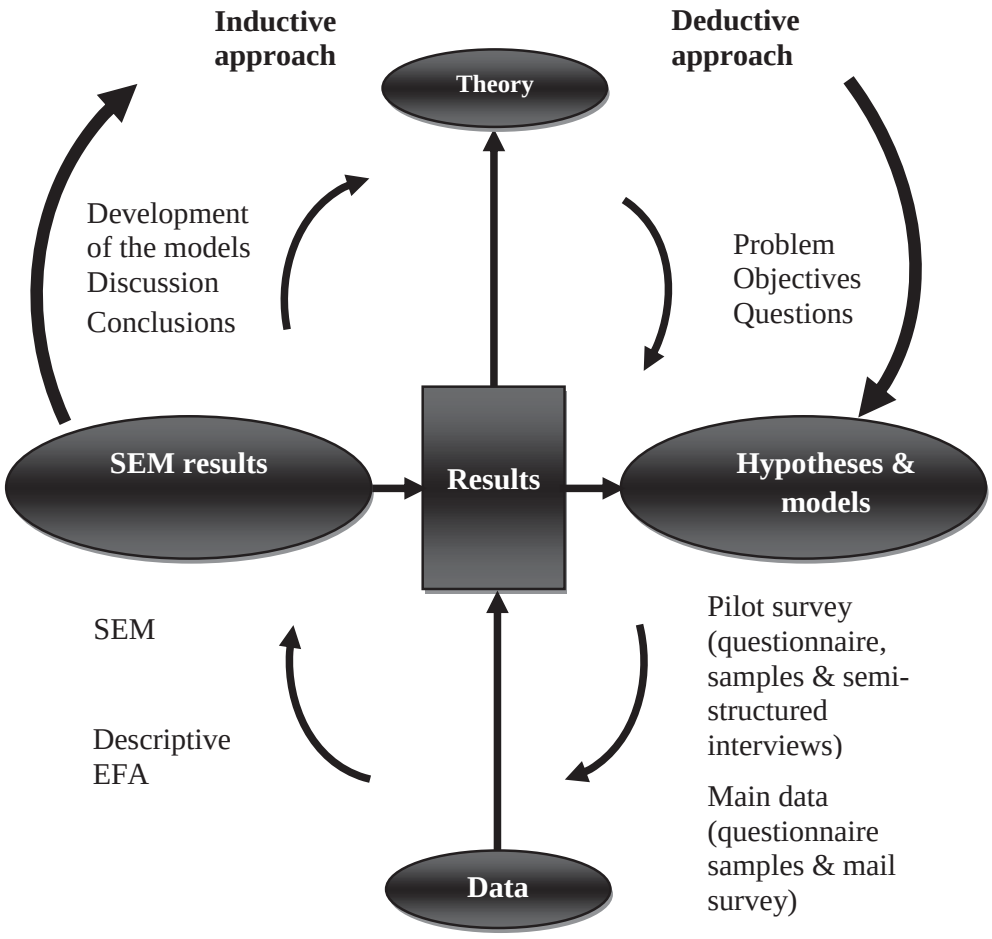
However, little is known which competencies or skills are significantly correlated with the effectiveness of supply chain coordination. A few studies conducted in certain industries described certain characteristics of chain coordinators. For example, in automobile industry, it was empirically analyzed that participative leadership skills of chain coordinators can have positive impact on performance, but the study results also showed that the skills could be ineffective in some circumstances. Additionally, how globally-scattered chains can be coordinated successfully has become a vital question. Finding an answer to this question also involves investigating so far unknown characteristics of chain coordinators and certain tangible resources that contribute to the effectiveness of supply chain coordination.

After the development of theory (problem identification, setting objectives and questions, hypotheses and models), a justified data collection approaches were used. In-depth interviews were conducted using an open-ended questionnaire. The interviews identified the sample members (chain coordinators) and also assisted to develop the questionnaire and to select the countries for quantitative data collection. A mail questionnaire approach was used to collect the data from New Zealand (NZ) and the UK. Also, a number of techniques were used to increase the response rate. In short, the combination of qualitative and quantitative approach (mixed method approach) produced the quality data and valid results.

The collected data was screened and scrutinised using, descriptive analysis, exploratory analysis and structural equation modelling (SEM). SEM was found to be an appropriate technique to test the hypotheses and to establish the plausibility of the developed framework. Moreover, it produced valid results from the data sets. Consequently, used

techniques offered complete and practical solutions. A summary of use methodology is shown in Figure 4.6.

Figure 4.6: A Summary of the Research Procedure



DRC 16

MASSEY UNIVERSITY
GRADUATE RESEARCH SCHOOL

STATEMENT OF CONTRIBUTION
TO DOCTORAL THESIS CONTAINING PUBLICATIONS

We, the candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated below in the *Statement of Originality*.

Name of Candidate: **Pervaiz Akhtar**

Name/Title of Principal Supervisor: **Dr. Norman Marr/Director –LSCM**

Name of Published Research Output and full reference:

Exploring the nature of coordination in agri-food chains and identification of chain coordinators
[Akhtar, P., Marr, N.E., Garnevska, E., 2012a. Chain coordinators and their role in selected agri-food supply chains: lessons from Pakistan, New Zealand and United Kingdom. *Food Chain* 2 (1), 104–116]

In which Chapter is the Published Work: **Chapter 4**

Please indicate either:

- **The percentage of the Published Work that was contributed by the candidate:**
  App. 1% of Ch.4 / 0.20% of the thesis; **and / or**
- **Describe the contribution that the candidate has made to the Published Work:**

  Required information explored for the development of constructs and questionnaires

Candidate's Signature — 20 March 2013 (Date)

Principal Supervisor's signature — Date

CHAPTER 5 EXPLORATORY AND DESCRIPTIVE ANALYSIS

5.1 Introduction

The purpose of this chapter is to present the results of the pilot survey and to provide a comprehensive descriptive analysis of the quantitative data collected from New Zealand and the UK. The results of the pilot survey are discussed in section two. Section three includes data screening, justifications for obtained response rates, analysis of the general questions, evaluation of the items, data normality tests, exploratory factor analysis and reliability checks. The chapter is concluded by section four which presents the summary and conclusion.

5.2 Pilot Survey

Chain Coordinators' Identification Procedure

Retailers were visited and the contacted persons (CEOs/directors/managers) were asked which chain player makes major decisions in their chains and why. They identified importers and exporters (also known as wholesalers, processors, manufacturers or distributors) acted as chain coordinators. In the same chains, then the pre-harvest contractors and farmers were interviewed and asked their opinions about the role of chain coordinators. They also showed consistency with retailers' suggestions. The pre-harvest contractors and farmers were interviewed on phone because of the geographical distance.

Moreover, the contacted persons (CEOs/directors/managers) within the key identified organizations (importers and exporters) were asked about the existence of chain coordinators' position(s) in their organizational charts. They were also asked; if they do not have chain coordinator(s) then who is (are) responsible for chain coordination activities. Finally, the responsible persons for coordination activities (chain coordinators) were chosen for final interviews. After explaining relevant details to them, they were then asked whether they would be willing to participate in this research.

Pilot Survey Results

Pakistan

In Pakistan, meat and dairy chains generally consist of farmers, suppliers, importers or exporters (wholesalers/manufacturers/processors), retailers and consumers. Fruit and vegetable chains consist of farmers, forward contractors (pre-harvest contractors/processors), wholesalers (locally are called arhtis or commission agents), retailers and consumers. Farmers retain raw material (seed) from the previous production year or purchase it from wholesalers or other farmers for the next production season. Sometimes small farmers cannot manage land and produce due to the lack of financial resources. Therefore, they make agreements with pre-harvest contractors who look after their land and produce, however; this is not always the case.

The wholesalers (importers/exporters) play the role of communication-hub. They also support the farmers by providing credits on regular bases. They purchase produce from farmers but often products are sold in auctions. These auctions are managed by wholesalers and they charge 6–7% commission for selling of the products to retailers. The farmers or pre-harvest contractors cannot sell the products directly in the auction markets due to the lack of financial resources or infrastructure. Additionally, the retailers get products from the wholesalers as well as from the auctions. This trade is often based on credit terms. The amount of credit is given based on financial conditions of the retailers, long-term personal relationships and coordination. Furthermore, the process of an effective inventory management is based on the foundation of supply chain coordination and collaboration where the chain partners have strong linkages regarding two-way information sharing, electronic data interchange, joint planning, sharing of technology and other resources.

The coordination pattern in Pakistani selected agri-food chains is low-to-medium. In other words, there is a limited coordination (less integrated chains), particularly, in fruit and vegetable chains. As one of the chain coordinators said:

"We feel there is a lack of coordination, particularly, with smaller suppliers as they do not have a standardised system or they cannot afford modern technology."

Another chain coordinator expressed:

"Suppliers do not share processes and enough information which create invisibility of the products… As a result, we face problems like shortages of stock, longer lead times and late deliveries."

In addition to this, in fruit and vegetable chains, they do not have a proper system for forecasting supply and demand of the products which could be a reason for a limited scale of contract farming and low coordination among supply chain partners. The supply of products depends on different seasons and condition of products. The farmers push products to the wholesalers and this pushing system continually creates problems of under or over supplying of products. Also, the small suppliers lack essential infrastructure such as a storage system for highly perishable products – mangoes and fresh milk.

"Often we face a shortage of milk or quality problem because we cannot store it (milk) for longer time as we do not have a good storage system," says one chain coordinator from a dairy chain.

Similarly, often suppliers cannot store mangoes for longer time due to the lack of technical knowledge and resources. This also impacts on exporting of mangoes to countries which have longer chains like NZ. However, Agriculture Corner (2010) stated that Australia imported mangoes from Pakistan in 2010 which means mangoes can be stored for longer time. The nature of Pakistan-Australia chain and Pakistan-New Zealand chain is not much different and mangoes can be imported to NZ along with other agri-food products. Regarding exporting and farmers' support, one chain coordinator expresses:

"Foreign exporters or governments do not prefer small farmers and the exporters only get products from bigger suppliers and they ignore us…we (small farmers/growers) do not have enough subsidies from the government…we are (also) not able to get loans from the banks as we cannot show big assets/guarantee what the big farmers can do."

Additionally, in Pakistan, chain coordinators often rely on local experience rather than on education. The experience and innate leadership style (mostly directive) are the most important factors for chain coordinators. For example, experience of checking the quality of products. A chain coordinator said:

"We judge the quality of animals (live stock) by examining healthy condition of udder and teats of animals, and it depends on our past experience."

Similarly, according to another chain coordinator, based on experience, they check the quality of milk by its physical appearance. If they have doubt about quality, they check it by using "Mahwa" process (boiling milk until it changes into condensed form). By boiling 1KG of milk, if the condensed form weight is between 230–250g, then the quality is considered very good. The quality of milk is unacceptable if the remaining weight is less than 150g. Furthermore, the chain coordinators believe that experience in certain fields like personal relationship management for trust creation, customer service (e.g., deliveries on time and handle complaints), handling seasonal products, health and safety of products, performance measurement, marketing and research area is also vital for their job.

On the other hand, chain coordinators also believe that they can perform better if they have technical and supply chain management or business related education. A chain coordinator from the fruit and vegetable chain said:

"I want to expand my business internationally but I cannot understand the process of importing and exporting of products (e.g., documentation requirements and international food and safety standards) due to the lack of education."

The chain coordinators' education varies from basic school level to bachelor degree. It was also noticed that supply chain management concepts have not been fully developed in Pakistan. Furthermore, the chain coordinators also feel language barriers, mainly in export chains.

Regarding tangible resources for coordination activities, chain coordinators use personal or company cars, phones, business cards, credit cards, computers, fax machines,

internet, public transport, motor cycles and budget. In-person visits and telephones are commonly used for communication and supply chain coordination activities.

New Zealand and UK

The selected agri-food chains in New Zealand and the UK normally consist of farmers (growers), importers and exporters (processors/manufactures/wholesalers), retailers and consumers. Chemical dealers and other cooperatives are also the part of these chains. The coordination activities or stages of these chains are the same like as found in Pakistani selected chains. The chains are integrated through cooperation; retailers with processors and processors with farmers.

In New Zealand and the UK, generally, big supermarkets also play a major role in coordination activities because they are closer to consumers and they know what market demand is and how to fulfil it. They are also financially stronger than other involved parties. These supermarkets have the choice of selecting suppliers for a variety of innovative products; chopped, washed, bar-coded, labelled and combined in different packing with longer expiry dates.

However, in SMEs, chain coordinators (wholesalers/importers/exporters) with the medium level of coordination play a major role. They concentrate on closer coordination rather than arm's-length relationships. They are also practising to reduce numbers of suppliers and working with fewer and larger suppliers who can provide stock regularly. Moreover, there is little coordination among chain players for forecasting the demand of products. Farmers/growers/processors, particularly, are not connected with consumers' demand (what end users want). The chain players make independent forecasts; consequently, sometimes, they have short stock, longer lead times and late deliveries. Thus, a limited contract-ordering and partnership exist. The wholesalers order quantity of products according to contracts but often they alter their orders. One of the chain coordinators from the New Zealand meat-chain said:

"We often change our orders but we have to tell our suppliers at least a day in advance and we use both oral and written contracts."

A participative leadership style (sharing decision power) is often practised. Moreover, experience and education are equally focused by chain coordinators in New Zealand and the UK. Most of the chain coordinators believed that a master degree in business or supply chain management is important for their job. They stated that it helps them to understand strengths, weaknesses, opportunities and threats in micro and macro environments. It was also noticed that the concepts of supply chain management are more developed in the UK than in New Zealand.

The chain coordinators use the same tangible resource as coordinators employ in Pakistan, however, public transport and motor cycles (for coordination activities) are not used. One of the reasons could be that cars are less expensive and easy to afford in developed countries. Therefore, chain coordinators prefer to visit by cars rather than public transport. Telephones and emails are considered vital sources for communication or coordination activities. This is perhaps one of the reasons that written and oral communication skills are considered essentials for coordinators.

5.3 Quantitative Data Analysis

Data Screening and Response Rate

The probability of missing data was low because of in-person deliveries and collection of the questionnaire. The samples were checked for missing data as suggested by researchers (Tabachnick and Fidell, 2001; Enders, 2001; Myers, 2011). The process conducted in SPSS found that there were some missing values (less than 2.75%). The pattern of missing data is given in Appendix H. The Little's MCAR test showed that the data was missing randomly. The significant values for the New Zealand and UK data sets were 0.51 and 0.84 respectively. The missing values were found in general/demographic questions, except for one item (FNP1, only 1.8% missing) from the UK data set. Thus, the missing data did not affect the variables used for the framework development. It is also suggested that less than 5% missing data is acceptable. In this study, the missing values were replaced by using expectation maximization algorithm (Kline, 2011; Sterner, 2011).

The table in Appendix D depicts that face-to-face and telephone interviews produced better response rates than other research methods. Particularly, a response rate from online surveys is very low (6%). It also shows that generally an average response rate from the UK is especially low as compared to other countries such as the US, Poland, Germany, Singapore and Canada. In addition to this, a survey response rate is low if high profile respondents (i.e., CEOs, managing directors and head of departments) are involved in a study. For example, Draulans et al. (2003) obtained 6–11% response rates from the UK and other European countries. Similarly, by using a mail survey method, Spriggs et al. (2000) received a response rate of 16% from the UK beef producers. Moreover, Mehta, et al. (2003) believed that generally an international survey response rate is low.

After excluding the unusable responses, this study yielded response rates of 37.5% and 16.59% from New Zealand and the UK respectively. Considering the above all justifications (international survey from the UK and involvement of high profile respondents) and research limitations (financial, time and geographical constraints), obtained response rates were more than satisfactory.

A total of 242 and 120 questionnaires from New Zealand and the UK were returned respectively. Eight questionnaires from the UK and 17 questionnaires from New Zealand were unusable because of incomplete responses or did not fulfil the research criteria. These criteria included the definition of SMEs, a number of chain partners' consultations with main chain coordinators for major decision making and the number of activities chain coordinators handle (each ≥ 3). The variables detecting these criteria are presented in the questionnaire (Appendix F).

The main reason for the above criteria was to distinguish this research from other studies (such as Moura, et al., 2003; 2009; Nielsen and Nielsen, 2009) which focused only on dyadic relationships. This study emphasised chain coordinators who were involved in a network of supply chains rather than only in dyadic relationships. In other words, those chain coordinators were included who were responsible for coordination with three or more than three chain partners and also dealt with three or more than three activities. The activities included stock controlling, supply of products, contracting,

pricing, auctions management, business research, marketing, relationships management, preparing relevant reports and improving performance based on the reports.

Characteristics of respondents (NZ)

A number of variables were used to collect general information about chain coordinators and export companies. This includes job title, education, field of education, training, languages, age, experience, field of experience, main product, type of business, company age, number of employees and annual turnover. Additionally, two variables (number of activities in which chain coordinators were involved and number of main partners consult with chain coordinators for major decisions) were also used as criteria to select final samples.

(1) Job Titles (NZ)

The exploratory results in Table 5.1 show the job titles for chain coordinators. The job titles could be mainly separated into two groups, top management (CEO/directors/managing directors) and head of departments (marketing managers, supply chain managers, channel or chain managers). The top management represented 53% of the sample members (72 directors/managing directors and 47 CEOs) and the rest of 47% responses came from the head of departments (59 from supply chain managers, 29 from marketing managers and 18 from channel/chain managers). The results also showed that officially only 8% (18) companies had channel/chain managers' job title in their organizational charts.

Table 5.1: Job Titles for Chain Coordinators, NZ

Job titles	Frequency	Percent
Directors/Managing directors	72	32.00
Supply chain managers	59	26.20
CEOs	47	20.90
Marketing managers	29	12.90
Channel/chain managers	18	8.00
Total	225	100.00

(2) **Special Field of Education and Years of Formal Education (NZ)**

As shown in Table 5.2, finance was the most dominating field of education (28%), followed by supply chain management (20%), marketing (18%) and business administration (14 %). The other fields of education represented 14% of the respondents and 6% of chain coordinators did not have any special field of education and perhaps they were dependent on experience and other training programmes.

Table 5.2: Special Field of Education, NZ

Special field of education	Frequency	Percent
Finance	62	27.60
Supply chain management	45	20.00
Marketing	41	18.20
Business administration	32	14.20
Others (farm management & information system, chemistry, horticulture science, hospitability, production, political science, environmental studies, engineering, and	31	13.80
None	14	6.20
Total	225	100.00

Table 5.3 depicts that just over 50% of the chain coordinators had postgraduate education and 41% completed their undergraduate degree. The rest of the sample members did not have tertiary education.

Table 5.3: Years of Education, NZ

Education	Frequency	Percent
Postgraduate	118	52.40
Undergraduate	92	40.90
A-level/secondary/high	13	5.80
Primary School	2	0.80
Total	225	100.00

(3) Informal Education and Languages (NZ)

A total of 37% (83) chain coordinators were involved in some sort of informal education. This includes training or short courses about staff personal development, internal product knowledge, marketing and sales, quality and standards, leadership development, lean production, food safety, logistics and computing.

Regarding language skills, English is commonly used language in New Zealand. However, nearly 18% (40) of respondents were also fluent in one or two other languages: African, Arabic, Dutch, French, German, Hindi, Italian, Japanese, Portuguese, Swedish and Urdu.

(4) Age Group, Years and Main Field of Experience (NZ)

Table 5.4 shows that the majority (71%) of the respondents' age ranged between 40 and 60 years and nearly18% were over 60 years old. The youngest group (< 40) represented about 11% of the total respondents.

Table 5.4: Age Group, NZ

Age group	Frequency	Percent
< 30	2	0.89
30–39	22	9.78
40–49	89	39.56
50–59	72	32.00
> 60	40	17.78
Total	225	100.00

As depicted in

Table **5.5**, of total 225 chain coordinators, almost 34% of them had 9–16 years of professional experience of working with main supply chain partners and nearly 54% had been in the network for seventeen to thirty two years. Nine percent of chain coordinators had been in the business with chain partners for over thirty two years and only 3% had eight or less than eight years of experience.

Table 5.5: Years of Experience, NZ

Years of experience	Frequency	Percent
1–8 years of experience	6	2.70
9–16 years of experience	76	33.80
17–24 years of experience	60	26.70
25–32 years of experience	62	27.60
33–40 years of experience	21	9.30
Total	225	100.00

Table 5.6 demonstrates that nearly half (48%) of chain coordinators' main field of experience was in supply chain management, followed by finance (28%), marketing (10%) and other subjects (14%).

Table 5.6: Major Field of Experience, NZ

Major field of experience		Percent
SC management	107	47.60
Finance	64	28.40
Marketing	23	10.20
Others (import and export, production, business management, relationship management and quality control)	31	13.80
Total	225	100.00

(5) Number of Activities and Consultations (NZ)

The activities were stock controlling, supply of products, contracting, pricing, analysing reports, measuring relevant performance, auctions management, business research, marketing, preparing performance reports and relationship management. Nearly 60% of 225 chain coordinators were involved in 3–6 activities and 40% were handling more than six activities. Moreover, the numbers of chain partners (or their employees) consult with chain coordinators for major decision making ranged 3 and 50.

(6) Main Products, Company Age, Turnover and Employees (NZ)Table 5.7 shows that meat and wine each represented nearly 31% of the total. Apples and onions together accounted for about 25% while dairy stand for 14%.

Table 5.7: Main Products, NZ

Products	Frequency	Percent
Meat	70	31.10
Wine	69	30.70
Apples	42	18.70
Dairy	31	13.80
Onions	13	5.80
Total	225	100.00

Additionally, the majority of exporters (76%) had been in the business for eleven to fifty years. Only 9% (21) of the companies were 10 or less years old whereas 15% (33 companies) had over fifty years of experience.

Also, 83% of the respondents reported that their annual turnover was between 15 and 52 million NZ dollars, and the rest of 17% indicated that their turnover was less than 14 million NZ dollars. As shown in Table 5.8, nearly 38% of the total export companies (225) hired 20 to100 numbers of employees whereas 35% of them had employed less than twenty employees. The number of employees in the rest of firms (27%) varied from 101–200. According to the definition used in this study, the sample represented SMEs (Brown and Lockett, 2004; Ministry of Economic Development, 2007; UK Statistics, 2011).

Table 5.8: Number of Employees, NZ

Number of employees	Frequency	Percent
< 20	79	35.10
20–100	85	37.80
101–200	61	27.10
> 200	–	–
Total	225	100.00

Evaluation of Items and Data Normality (NZ)

The summary statistics of the New Zealand data set is given in Table, Appendix I. The statistics include means, standard deviations, skewness and kurtosis values for each items used to assess certain assumptions. Overall, the means of the constructs, leadership styles, communication skills (quality and frequency), human and non-human resources and analytical skills, showed that the export sector is competent oriented. The applications of analytical skills (ASI1- ASI4 and ASE1-ASE4) were considered pivotal competencies. The results also suggested that communication factors are important, however, fax is hardly utilised for communication. Moreover, the items such as encouraging uniform procedure, providing guidelines and using advanced technology for communication were rated higher than other relative items.

The means for the effectiveness of supply chain coordination revealed that overall operational performance (service quality and product quality) was rated higher than financial performance (profits, sales and market shares) and social performance (satisfaction and trust). However, with regard to operational performance, one item (impact of practices on natural environment is reducing) was relatively rated low.

As suggested (Tabachnick and Fidell, 2001; Kline, 2011), skewness and kurtosis values were used in order to check the normality of the data. This assesses that skewness and kurtosis values should not be greater than three and ten respectively. The values shown in Table, Appendix I, suggested that there were no normality issues in the data set. Thus, the data met the distributional assumptions. In addition to this, box, whisker and normal probability plots supported the assumptions.

Exploratory Factor Analysis and Reliability (NZ)

The significance of Bartlett test of sphericity supported the suitability of exploratory factor analysis **(**EFA). The EFA with varimax rotations and principal component analysis were conducted for the relevant set of items. As shown in Table, Appendix J, the factors were extracted by using recommended eigenvalues ≥ 1 (Hair et al., 1998; Kline, 2011). The eigenvalues for the constructs ranged from 1.09–3.01 and were greater than recommended value of one. The scree plots were also observed to select the

factors. Moreover, some relevant constructs (leadership styles, human and non-human resources) were paired on theoretical grounds (Hair et al., 1998; Kline, 2011).

Table, Appendix J, also shows that the variance explained by the factors. The amount of variance explained by the constructs (ranging 56.27–73.98) is greater than the suggested average variance extracted (> 0.5). Furthermore, the factor loadings were higher and indicated acceptable validity (Hair et al., 1998; Kline, 2011). Four items (CMF6, ASI1, ASE5, PRQ4) were deleted because of low loadings. Additionally, the reliability of each construct was also measured using Cronbach α. All the values of α were greater than suggested value of 0.70 (the values varied between 0.72 and 0.83). Thus, this confirms the reliability of the measurements (Kline, 2011).

Characteristics of respondents (UK)

The same variables (as for New Zealand) were used to collect information from targeted respondents in the UK. The following sections describe the descriptive characteristics of the respondents.

(1) Job titles (UK)

Table 5.9 shows the job titles of chain coordinators. The job titles were mainly divided into two groups, top management (CEO/directors/managing directors) and head of the departments (marketing/supply chain manger).

Table 5.9: Job Titles for Chain Coordinators, UK

Job titles	Frequency	Percent
Directors/Managing	34	30.40
Supply chain managers	27	24.10
CEOs	22	19.60
Marketing managers	18	16.10
Channel/chain managers	11	9.80
Total	110	100.00

Fifty percent of the responses were received from the top management (34 Directors/Managing directors and 22 CEOs) and the rest half came from head of the

departments (24% from supply chain managers, 16% marketing managers, and 10% from channel/chain managers).

(2) Years and Special Field of Education (UK)

Table 5.10 depicts that nearly 60% of the chain coordinators completed their postgraduate education and about 37% had an undergraduate degree. The rest of the respondents did not have tertiary education.

Table 5.10: Years of Education, UK

Education	Frequency	Percent
Postgraduate	67	59.80
Undergraduate	41	36.60
A-level/secondary/high	4	3.60
Total	112	100.00

Table 5.11 shows that finance was the most attractive field of education (28%), followed by supply chain management (24%), business administration (23%) and marketing (7%). The other fields of education together represented roughly 14% of the respondents and about 4% of chain coordinators did not have any special field of education and probably they had more experience and were involved in other informal education.

Table 5.11: Field of Education, UK

Special field of education	Frequency	Percent
Finance	31	27.70
Supply chain management	27	24.01
Business administration	26	23.20
Others (HR, IT, language learning, statistics)	16	14.30
Marketing	8	7.10
None	4	3.60

(3) Informal Education and Languages (UK)

The total of 35% chain coordinators were involved in some sort of informal education such as training or short courses including staff personal development, internal product knowledge, marketing and sales, quality and standards, leadership development, lean production, food safety, transport and computing. With regard to language skills, English is an official language in the UK; however, nearly 12% of the respondents were also fluent in one of the languages; French, German, Polish, Swedish and Urdu.

(4) Major Field of Experience and Age Group (UK)

Table 5.12 shows that almost 55% of the total (112) chain coordinators had 25 to 32 years of professional experience of working with main supply chain partners, and 25% of the total had been in the network for over thirty two years. Twelve percent chain coordinators had been in the business with chain partners for 17 to 24 years and 8% had 9 to 16 years of experience. As shown in Table 5.13, the vast majority (80%) of the respondents' age was 50 or over 50 years and nearly 20% were less than 50 years old.

Table 5.12: Years of Experience, UK

Years of experience	Frequency	Percent
1–8 years of experience	–	–
9–16 years of experience	9	8.00
17–24 years of experience	13	11.60
25–32 years of experience	62	55.40
33–40 years of experience	28	25.00
Total	112	100.00

Table 5.13: Age Group, UK

Age group (years)	Frequency	Percent
<30	6.00	5.40
30–39	3.00	2.70
40–49	13.00	11.60
50–59	63.00	56.30
>60	27.00	24.10
Total	112.00	100.00

Table 5.14 shows that about 66% of the total chain coordinators were mainly involved in supply chain management, followed by finance (23%), marketing (8%) and production (3%).

Table 5.14: Major Field of Experience, UK

Major field of experience	Frequency	Percent
SC management	74	66.10
Finance	26	23.20
Marketing	9	8.00
Production	3	2.70
Total	112	100.00

(5) Number of Activities and Consultations (UK)

Nearly 65% of the total (112) chain coordinators were involved into three to six activities and 35% handled more than six activities. Moreover, the numbers of chain partners' (or their employees) consults with chain coordinators for major decision making varied from 3 to 47.

(6) Main Products, Company Age, Employees and Turnover (UK)

As depicted in Table 5.15, wine and meat each respectively represented 30% and 28% of the total selected UK exporters. Dairy accounted for 27% while apples and onions together stand for about 15%. The majority of the targeted importers (72%) had been in business from eleven to fifty years. Nearly 25% of the total companies had over fifty years of experience and only 3% of the companies were in the business for ≤ 10 years.

Table 5.15: Main Products, UK

Products	Frequency	Percent
Wine	34	30.36
Meat	31	27.68
Dairy	30	26.79
Onions	10	8.93
Apples	7	6.25
Total	112	100.00

Table 5.16 shows that approximately half (49%) of the total importers hired fewer than 20 employees and 26% had employed between 101 and 200 employees. The number of employees in the rest of firms (25%) varied from 20 to 100. Additionally, 68.5% of the respondents reported that their annual turnover was between 8 and 26 million pounds, and the rest of the respondents indicated that their turnover was less than 7 million pounds. According to the definition employed in this study, the sample represented SMEs (Ministry of Economic Development, 2007; UK Statistics, 2011).

Table 5.16: Number of Employees, UK

No of employees	Frequency	Percent
< 20	55	49.10
20–100	28	25.00
101–200	29	25.90
> 200	–	–
Total	112	100.00

Evaluation of Items and Data Normality (UK)

The summary statistics of the UK data sample is shown in Table, Appendix K. The same statistics (as for the New Zealand data set) were used to assess the distribution assumptions. Overall, the means of competencies constructs, leadership styles, communication skills (quality and frequency), human and non-human resources, and analytical skills, showed that the targeted import sector is proficient. The applications of analytical skills and participative leadership were considered pivotal competencies. The results also suggested that computer links are important regarding the frequency of communication, but fax is hardly used for communication activities.

The means for the effectiveness of supply chain coordination revealed that overall operational performance (service quality and product quality) and social performance (satisfaction and trust) were rated higher than financial performance (profits, sales and market share). It seems social performance is higher in the UK selected chains than the New Zealand chains. However, regarding operational performance, one item (impact of practices on natural environment is reducing) was comparatively rated low. The same result was found from the New Zealand sample.

In order to check the normality of the UK data, skewness and kurtosis values were employed. The values given in Table, Appendix K recommended that there were no normality issues with the data sample; thus, the UK data sample also met the distributional assumptions. Moreover, box, whisker and normal probability plots supported the assumptions (Tabachnick and Fidell, 2001; Kline, 2011).

Exploratory Factor Analysis and Reliability (UK)

The significance of Bartlett test of sphericity supported EFA for the UK sample as well. The EFA with varimax rotations and principal component analysis were performed for the relevant set of items. The factors were extracted by using eigenvalues (≥ 1) and scree-plot criteria. The eigenvalues for the constructs ranged from 1.29 to 4.17 and were greater than suggested value (Hair et al., 1998; Kline, 2011).

The variance explained by the factors was also estimated. The amount of variance explained by the constructs (ranging 66.10–88.46) was greater than the recommended average variance extracted (> 0.5). Furthermore, the factor loadings were higher and showed adequate validity (Hair et al., 1998; Kline, 2011). However, three items (CMF5, CMF6, PRQ4) were deleted because of low loadings.

Additionally, the reliability of each construct was measured using Cronbach' coefficient α (reliability). The α values were greater than the suggested value of 0.70 (the values varied between 0.72 and 0.93) which confirmed the reliability of the measurements. The detail of these figures is shown in Table, Appendix L. It summarised the final results of factor analysis and other relevant statistics such as loadings, eigenvalues, percentage of variance explained and reliability. These statistics provided fundamentals to conduct measurement models and confirmatory factor analysing using structural equation modelling which are presented in the next chapter (Kline, 2011).

5.4 Summary and Conclusion

In short, importers and exporters act as a communication-hub and play the role of chain coordinators in the selected chains. The nature of supply chain coordination and preferences of chain coordinators are different in developed (NZ and the UK) and

developing (PK) countries. Furthermore, the job requirements of chain coordinators also vary from chain-to-chain.

The chain coordinators' (CEOs/directors/head of departments) innate or acquired abilities (leadership styles, relevant education and experiences), communication skills and effort they put into coordination functions are the key elements which affect coordination outcomes. The competency of a chain coordinator also depends on other certain factors such as ability to judge product quality, knowledge of product prices and transportation costs, finding opportunities, effective promotion of products, resolving day-to-day conflicts and maintaining good relationships with chain partners and internal staff members. Additionally, informal education plays a pivotal role to strengthen the skills of chain coordinators. In short, a combination of tangible resources such as sufficient communication technology, transportation, financial resources and intangible assets like chain coordinators' leadership are the key determinants of the effectiveness of chain coordination. Moreover, a proper integrated chain system that supports small farmers and suppliers is essential to achieve the success of coordination. The system should be able to connect all involved parties especially farmers to consumers' demand. The timely and accurate sharing of two-way information and advance payments to the farmers also assist to achieve coordination objectives and effective production.

Besides the pilot survey results, this chapter also provided the descriptive analysis of the collected data. This includes data screening, frequency checks, items evolution, assessing normality, conducting exploratory factor analysis and measuring reliability. The probability of missing data was pretty low because of in-person data collection, thus, missing data was not an issue. Moreover, the received response rates were enough to apply SEM.

Overall, the descriptive statistics showed that the targeted sectors are competent oriented in terms of the competencies. Furthermore, normality and reliability were ranged within the recommended limits. However, some of the items were deleted during the construct development process. Given the satisfactory results (normality of data, reliability and high loadings), the data sets were suitable for confirmatory factor analysis.

CHAPTER 6 STRUCTURAL EQUATION MODELLING (MAIN FINDINGS)

6.1 Introduction

The previous chapter presented descriptive statistics and exploratory analysis which provided a foundation to conduct structural equation modelling (SEM). The purpose of this chapter is to test the proposed framework using SEM. The chapter is arranged in four sections. The second section presents SEM results produced from the New Zealand data. The third section provides SEM results obtained from the UK data. A number of analyses include; the evaluation of the measurement models, testing of unidimensionality, reliability and validity checks, the results of the main model and the linkages between the dimensions of coordination effectiveness. The final section sums up the results computed from the data sets.

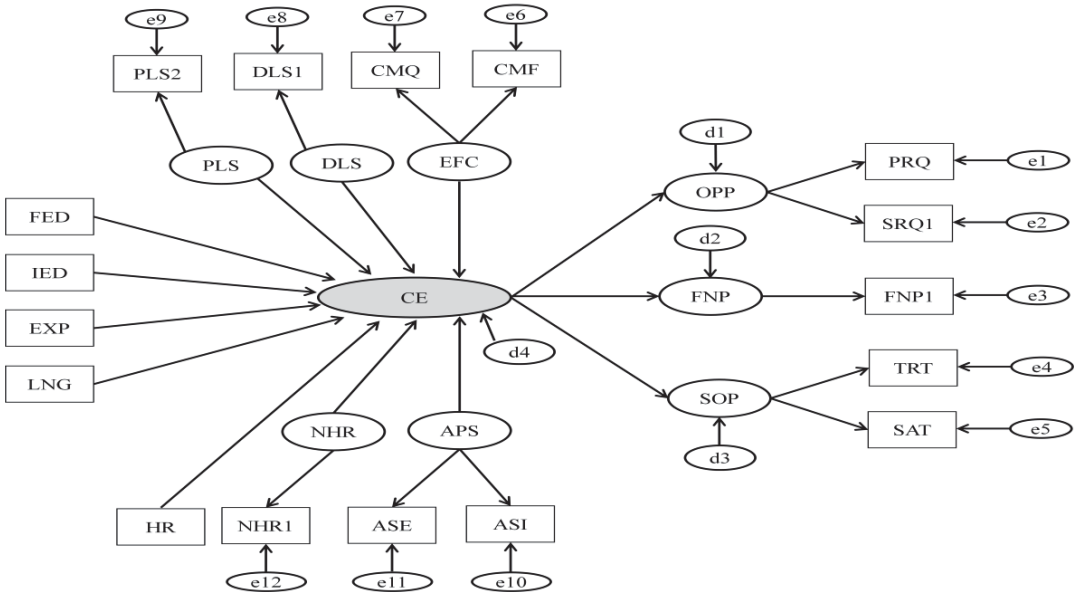
6.2 Structural Equation Modelling – New Zealand

Structural equation modelling consisted of a two-step approach – assessments of the measurement models and fitting of the main model. The models are based on causal relationships and a number of regression equations.

Models and Equations (New Zealand)

The theoretical framework consisted of the measurement and structural parts is presented in Figure 6.1. It conceptualises that the effectiveness of supply chain coordination (CE) depends on chain coordinators' abilities (formal education, FED; informal education, IED; experience, EXP; language skills, LNG), their leadership styles (a directive leadership style, DLS; a participative leadership style, PLS), effective communication (communication accuracy and frequency, EFC), analytical skills (APS, internal and external applications) and human and non-human resources (number of people for coordination activities, HR; technology and budget, NHR).

Figure 6.1: Proposed Theoretical Model



Key: FED (formal education); IED (informal education); EXP (experience); LNG (language skills); HR (human resources); NHR (non-human resources); PLS (a participative leadership style); DLS (a directive leadership style); CMQ (communication quality); CMF (communication frequency); EFC (effective communication); ASE (analytical skills, external applications); ASI (analytical skills, internal applications); APS (application of analytical skills); CE (coordination effectiveness); OPP (operational performance); FNP (financial performance); SOP (social performance); PRQ (product quality); SRQ (service quality); TRT (trust); SAT (satisfaction)

SEM simultaneously tests a number of multiple regression equations. The below equations represent the remaining items after the exploratory factor analysis (EFA). For example, the construct of a directive leadership style had three items and none of them has been deleted during the construct development procedure (EFA). Thus, it has three equations ($x_1 = \lambda^x_{1,1}\xi_1 + \delta_1$; $x_2 = \lambda^x_{2,1}\xi_1 + \delta_2$; $x_3 = \lambda^x_{3,1}\xi_1 + \delta_3$).

Where λ = factor loadings; ξ_1 = vector; δ_1 = measurement errors

Similarly, the equations for the other constructs are drawn. The equation for the main model or framework is based on the number of independent variables and it is the same for both data sets, however, the equations for measurement models vary depending on the remaining number of items after the EFA.

(1) Equations for the measurement models (x_i independent variables)

Directive (DLS1-DLS3) and Participative (PLS1-PLS3) Leadership Styles

$x_1 = \lambda^x_{1,1}\xi_1 + \delta_1$ $x_2 = \lambda^x_{2,1}\xi_1 + \delta_2$ $x_3 = \lambda^x_{3,1}\xi_1 + \delta_3$

$x_4 = \lambda^x_{4,2}\xi_2 + \delta_4$ $x_5 = \lambda^x_{5,2}\xi_2 + \delta_5$ $x_6 = \lambda^x_{6,2}\xi_2 + \delta_6$

Communication Quality (CMQ1- CMQ5) and Frequency (CMF1- CMF5)

$x_8 = \lambda^x_{8,3}\xi_3 + \delta_8$ $x_9 = \lambda^x_{9,3}\xi_3 + \delta_9$ $x_{10} = \lambda^x_{10,3}\xi_3 + \delta_{10}$

$x_{11} = \lambda^x_{11,3}\xi_3 + \delta_{11}$ $x_{12} = \lambda^x_{12,3}\xi_3 + \delta_{12}$

$x_{13} = \lambda^x_{13,4}\xi_4 + \delta_{13}$ $x_{14} = \lambda^x_{14,4}\xi_4 + \delta_{14}$ $x_{15} = \lambda^x_{15,4}\xi_4 + \delta_{15}$

$x_{16} = \lambda^x_{16,4}\xi_4 + \delta_{16}$ $x_{17} = \lambda^x_{17,4}\xi_4 + \delta_{17}$

Human (HR) and Non-human Resources (NHR1-NHR6)

$x_{18} = \lambda^x_{18,5}\xi_5 + \delta_{18}$

$x_{19} = \lambda^x_{19,6}\xi_6 + \delta_{19}$ $x_{20} = \lambda^x_{20,6}\xi_6 + \delta_{20}$ $x_{21} = \lambda^x_{21,6}\xi_6 + \delta_{21}$

$x_{22} = \lambda^x_{22,6}\xi_6 + \delta_{22}$ $x_{23} = \lambda^x_{23,6}\xi_6 + \delta_{23}$ $x_{24} = \lambda^x_{24,6}\xi_6 + \delta_{24}$

Analytical skills, Internal (ASI2-ASI4) and External Applications (ASE1- ASE4)

$x_{25} = \lambda^x_{25,7}\xi_7 + \delta_{25}$ $x_{26} = \lambda^x_{26,7}\xi_7 + \delta_{26}$ $x_{27} = \lambda^x_{27,7}\xi_7 + \delta_{27}$

$x_{28} = \lambda^x_{28,8}\xi_8 + \delta_{28}$ $x_{29} = \lambda^x_{29,8}\xi_8 + \delta_{29}$ $x_{30} = \lambda^x_{30,8}\xi_8 + \delta_{30}$

$x_{31} = \lambda^x_{31,8}\xi_8 + \delta_{31}$

Others (formal education, FED; informal education, IED; experience, EXP; languages, LNG)

$x_{32} = \lambda^x_{32,9}\xi_9 + \delta_{32}$ $x_{33} = \lambda^x_{33,10}\xi_{10} + \delta_{33}$ $x_{34} = \lambda^x_{34,11}\xi_{11} + \delta_{34}$ $x_{35} = \lambda^x_{35,12}\xi_{12} + \delta_{35}$

Based on parcelling – effective communication (communication quality and frequency), analytical skill (internal and external applications), leadership styles and human and non-human resources

$x_{36} = \lambda^{x}_{36,13}\xi_{13} + \delta_{36}$ $x_{37} = \lambda^{x}_{37,13}\xi_{13} + \delta_{37}$

$x_{38} = \lambda^{x}_{38,14}\xi_{14} + \delta_{38}$ $x_{39} = \lambda^{x}_{39,14}\xi_{14} + \delta_{39}$

$x_{40} = \lambda^{x}_{40,15}\xi_{15} + \delta_{40}$ $x_{41} = \lambda^{x}_{41,16}\xi_{16} + \delta_{41}$ $x_{42} = \lambda^{x}_{42,17}\xi_{17} + \delta_{42}$ $x_{43} = \lambda^{x}_{43,18}\xi_{18} + \delta_{43}$

(2) Equations for the measurement models (y_i dependent variables)

Service Quality (SRQ1- SRQ3) and Product Quality (PRQ1- PRQ3)

$y_1 = \lambda^{y}_{1,1}\eta_1 + \varepsilon_1$ $y_2 = \lambda^{y}_{2,1}\eta_1 + \varepsilon_2$ $y_3 = \lambda^{y}_{3,1}\eta_1 + \varepsilon_3$

$y_4 = \lambda^{y}_{4,2}\eta_2 + \varepsilon_4$ $y_5 = \lambda^{y}_{5,2}\eta_2 + \varepsilon_5$ $y_6 = \lambda^{y}_{6,2}\eta_2 + \varepsilon_6$

Financial Performance (FNP1- FNP3)

$y_7 = \lambda^{y}_{7,3}\eta_3 + \varepsilon_7$ $y_8 = \lambda^{y}_{8,3}\eta_3 + \varepsilon_8$ $y_9 = \lambda^{y}_{9,3}\eta_3 + \varepsilon_9$

Satisfaction (SAT1- SAT4) and Trust (TRT1- TRT3)

$y_{10} = \lambda^{y}_{10,4}\eta_4 + \varepsilon_{10}$ $y_{11} = \lambda^{y}_{11,4}\eta_4 + \varepsilon_{11}$ $y_{12} = \lambda^{y}_{12,4}\eta_4 + \varepsilon_{12}$

$y_{13} = \lambda^{y}_{13,5}\eta_5 + \varepsilon_{13}$ $y_{14} = \lambda^{y}_{14,5}\eta_5 + \varepsilon_{14}$ $y_{15} = \lambda^{y}_{15,5}\eta_5 + \varepsilon_{15}$

Based on parcelling – operational (service quality and product quality), financial and social performance (satisfaction and trust) – coordination effectiveness

$y_{16} = \lambda^{y}_{16,6}\eta_6 + \varepsilon_{16}$ $y_{17} = \lambda^{y}_{17,6}\eta_6 + \varepsilon_{17}$

$y_{18} = \lambda^{y}_{18,7}\eta_7 + \varepsilon_{18}$

$y_{19} = \lambda^{y}_{19,8}\eta_8 + \varepsilon_{19}$ $y_{20} = \lambda^{y}_{20,8}\eta_8 + \varepsilon_{20}$

Coordination effectiveness = β_{11}*formal education + β_{12}*language skills + β_{13}*informal education + β_{14}*experience + β_{15}* directive leadership style+ β_{16}*participative leadership style + β_{17}* effective communication + β_{18}*human resources + β_{19}*non-human resources + β_{20}* analytical skills + ζ_1

Where λ = factor loadings; ξ and η = vectors; δ, ε and $\zeta 1$ = measurement errors; β = regression coefficients

Evaluation of Measurement Models or Unidimensionality (NZ)

This section discusses the measurement models which established unidimensionality for the each underlying construct. The constructs include leadership styles, effectiveness communication (communication quality and frequency), analytical skills (internal and external applications), non-human resources, operational performance (service and product quality), financial performance and social performance (satisfaction and trust).

Leadership Styles (NZ)

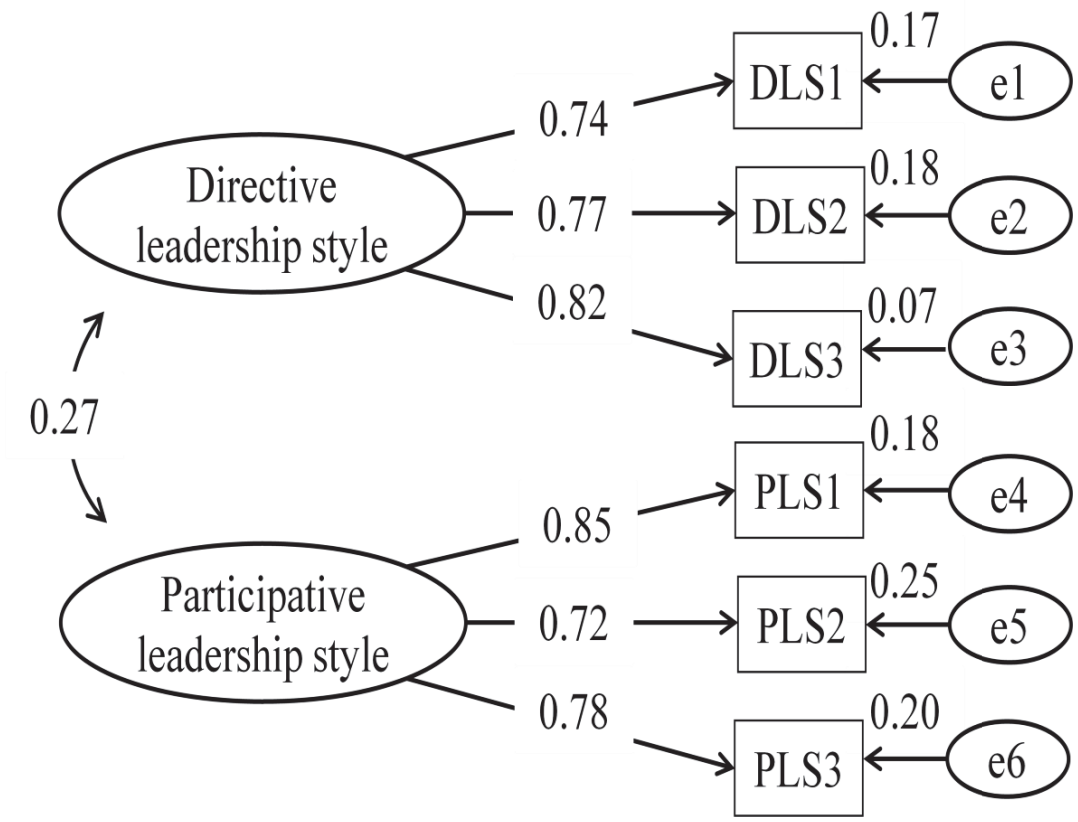
The measurement model of leadership was examined using two factors, directive and participative leadership styles. In total, 6 items were used to measure these leadership styles and they were submitted to confirmatory factor analysis. A non-significant χ^2 (as recommended, *p*-value = 0.39) jointly with a set of other measures shown in Table 6.1 and factor loadings depicted in Figure 6.2 (all factor loadings significant at $p = 0.00$) indicated that the model provided a more than satisfactory solution. The values of GFI, CFI, NFI, IFI and TLI were greater than 0.95 and RMSEA was less than threshold, 0.08 or 0.06. Moreover, no high error correlations and standardised residual covariances were found.

Table 6.1: Final Results of Measurement Models, NZ

Fit indices	Recommended values	Leadership styles	Eff. Comm.	Analytical Skills	Op. Perf.	Soc. Perf.
χ^2	–	8.42	20.91	33.19	15.29	19.78.
df	–	8	13	13	8	8
χ^2/df	< 5 or 3	1.05	1.61	2.55	1.91	2.47
p–value	> 0.05	0.39	0.08	0.00	0.05	0.01
GFI	> 0.90 or 0.95	0.99	0.97	0.96	0.98	0.97
CFI	> 0.90 or 0.95	0.99	0.98	0.96	0.98	0.97
NFI	> 0.90 or 0.95	0.98	0.96	0.94	0.97	0.96
IFI	> 0.90 or 0.95	0.98	0.99	0.96	0.98	0.99
TLI	> 0.90 or 0.95	0.98	0.98	0.94	0.97	0.95
RMSE	< 0.08 or 0.06	0.02	0.05	0.08	0.06	0.08

Source: (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012)

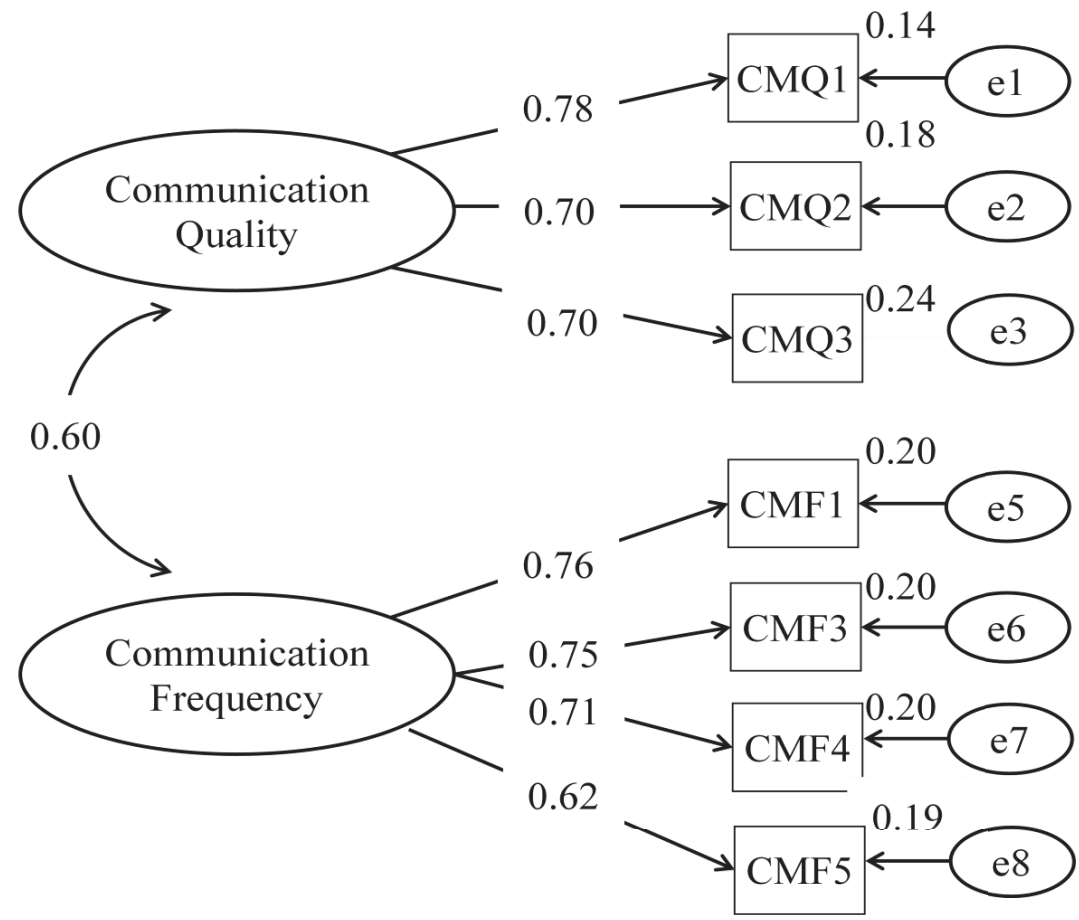
Figure 6.2: Measurement Model of Leadership Styles, NZ



Effective Communication (Communication Quality and Frequency, NZ)

A two-factor model of effective communication (communication quality and frequency) with 11 items was performed. Although the loadings were statistically significant ($p < 0.00$), the results indicated that CMQ5 (item 5) had error correlations with CMQ4, 12.98 modification index (MI), and CMQ3, MI (7.30). Additionally, fit indices (GFI = 0.95, NFI = 0.92, IFI = 0.95, TLI = 0.94) with significant χ^2 ($p = 0.001$) did not exceed the recommended value of 0.95. Thus, the model was re-investigated after removing the item (CMQ5). Again, CMQ4 had MIs with CMF3 (5.88) and CMQ2 (5.36). It also showed the low loadings and higher standardised residual covariances. Thus, after eliminating CMQ4 (also CMF2), the loadings shown in Figure 6.3 and fit indices listed in Table 6.1 indicated that the model did fit the data adequately.

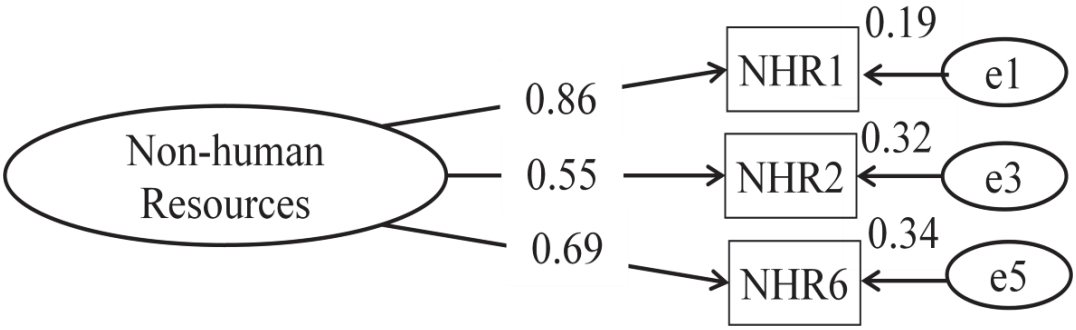
Figure 6.3: Measurement Model of Effective Communication, NZ



Non-human Resources (NZ)

A total of six indicators were used to measure non-human resources. The initial measurement model showed a poor fit with a significant χ^2 value. A set of other indices such as NFI = 0.90, IFI = 0.92, TLI = 0.86, CFI = 0.92 and RMSEA = 0.12 also gave evidence that the model needed to be re-specified. After investigating MIs and standardised residual covariances, it was found that NHR5 was problematic. It had MIs (19.01; 9.52; 4.65) and standardised residual covariances (2.44; -1.29; -1.38) with NHR3, NHR2 and NHR1. Furthermore, NHR3 and NHR4 were also deleted because of the low loadings and high standardised residual covariances and the final model provided a perfect fit. The graphical view of the model is shown in Figure 6.4 .

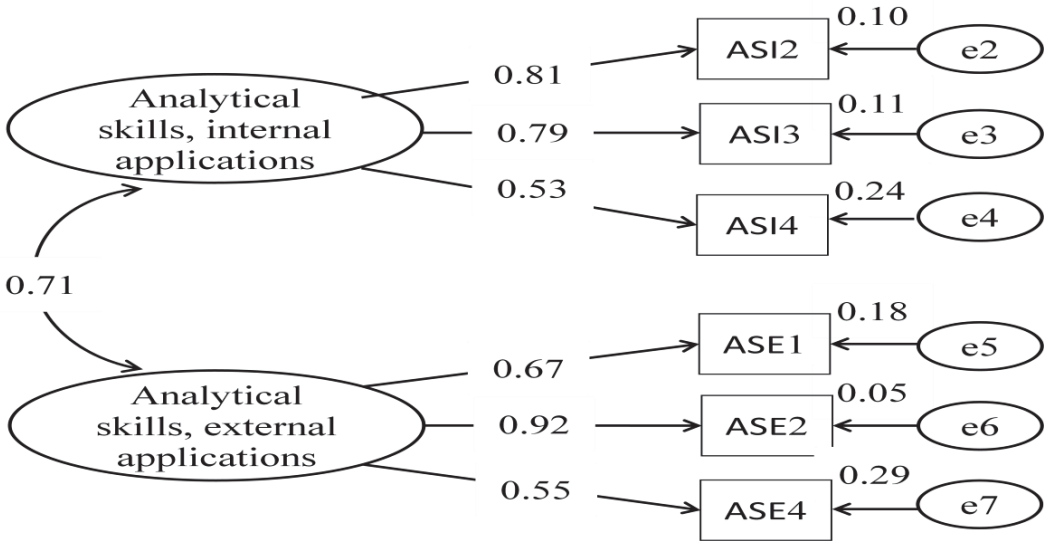
Figure 6.4: Measurement Model of Non-human Resources, NZ



Analytical Skills, Internal and External Applications (NZ)

A two-factor measurement model of analytical skills was conducted using CFA. A total of 9 items were used, but two indicators ASI1 and ASE5 had the low loadings. In addition to this, the fit indices (GFI = 0.94, NFI = 0.88, IFI = 0.92, TLI = 0.89, CFI = 0.92 and RMSEA = 0.094) with a significant chi-square value (p = 0.00) were not strong enough. First, ASI1 was deleted because it had the lowest loading. After assessing the model again, ASE5 was also eliminated. After re-investigating the model, ASE3 was removed because of the high MIs with ASI4 (12.63) and ASI2 (7.57). Finally, a significant χ^2 with a number of fit indices shown in Table 6.1 and the loadings depicted in Figure 6.5 indicated a reasonable fit to the data.

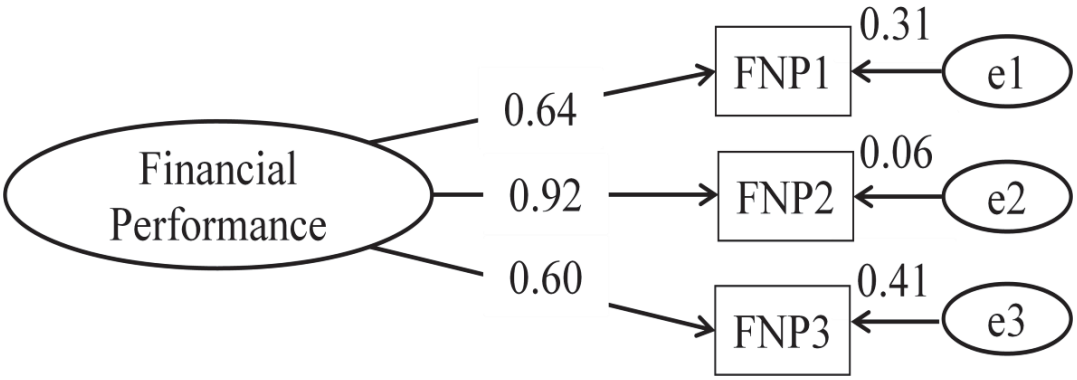
Figure 6.5: Measurement Model of Analytical Skills, NZ



Financial and Operational Performance (Service and Product Quality, NZ)

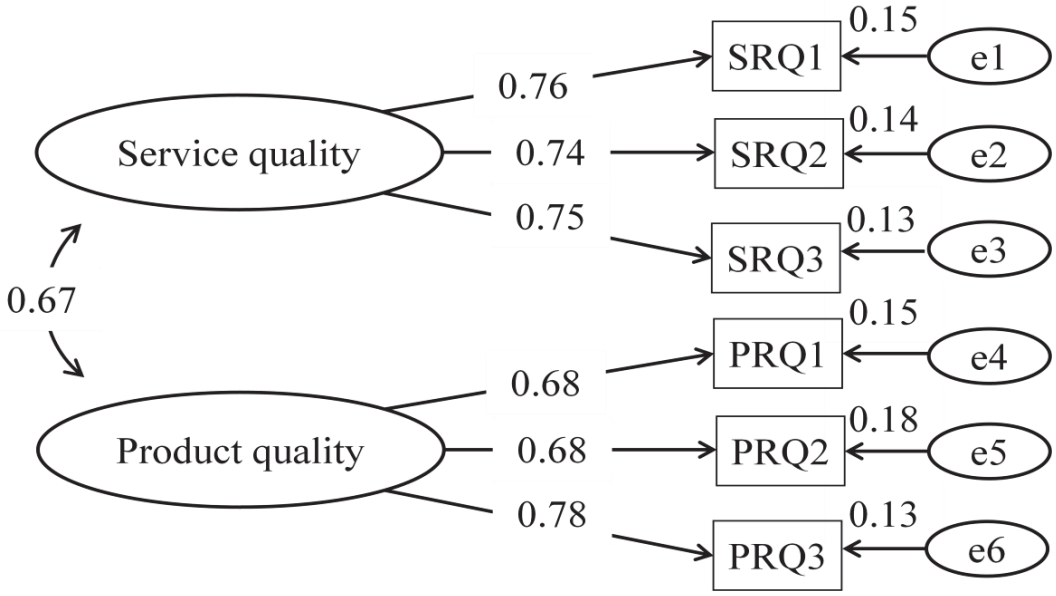
Figure 6.6 shows the measurement model of financial performance and it showed a perfect fit and no MIs or standardised residual covariances were found.

Figure 6.6: Measurement Model of Financial Performance, NZ



Operational performance was assessed by two factors, service quality and product quality. Six items in total were submitted to CFA. A non-significant χ^2 (p-value = 0.054) together with a number of other fit indices shown in Table 6.1 and factor loads highlighted in Figure 6.7 indicated that the model did fit the data reasonably well.

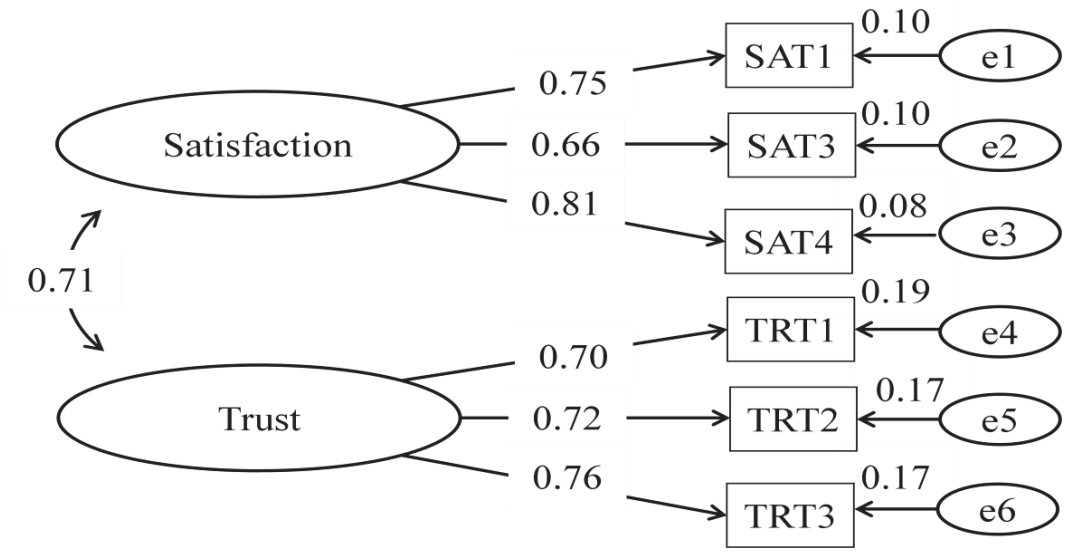
Figure 6.7 : Measurement Model of Operational Performance, NZ



Social Performance (Satisfaction and Trust, NZ)

A two-factor model measured social performance. A total of 7 items were analysed through CFA. The initial solution suggested that the model needed to be modified. Chi-square was significant (p = 0.00) with a number of poor fit indices (NFI = 0.94, TLI = 0.94, and RMSEA = 0.08). The indicator (SAT2) had MI (13.86) with TRT2, therefore, SAT2 was deleted. Although p-value was still significant, fit indices shown in Table 6.1 and the loadings depicted in Figure 6.8 provided evidence that the resultant model did fit the data adequately.

Figure 6.8: Measurement Model of Social Performance, NZ



Construct Reliability and Validity (NZ)

Construct reliability [CR= $\Sigma\lambda_i^2/(\Sigma\lambda_i^2 + \Sigma(1-\lambda_i^2))$] assessed the internal consistency of the items used to create the constructs. The reliability of the constructs shown in Table 6.2 exceeded the value of 0.70 which is a threshold for acceptability. The values ranged between 0.75 and 0.83. Moreover, the variance explained [VE = $\Sigma\lambda_i^2/(\Sigma\lambda_i^2 + \Sigma(1-\lambda_i^2))$] by the each underlying construct given in the last column of Table 6.2 was greater than the recommended value of 0.50 which means that the indicators well represented the constructs. The values of extracted variance varied from 0.51to 62.

Table 6.2: Evaluation of Measurement Models, NZ

Constructs	Item codes	Factor loadings	Alpha	Construct reliability	Ave. variance
Directive leadership style	DLS1	0.74	0.81	0.82	0.61
	DLS2	0.77			
	DLS3	0.82			
Participative leadership style	PLS1	0.85	0.83	0.83	0.62
	PLS2	0.72			
	PLS3	0.78			
Communication quality	CMQ1	0.78	0.77	0.77	0.53
	CMQ2	0.70			
	CMQ3	0.70			
Communication frequency	CMF1	0.76	0.80	0.80	0.51
	CMF3	0.75			
	CMF4	0.71			
	CMF5	0.62			
Non-human resources	NHR1	0.86	0.74	0.75	0.51
	NHR2	0.55			
	NHR6	0.69			
Analytical skills (internal applications)	ASI2	0.81	0.74	0.76	0.52
	ASI3	0.79			
	ASI4	0.53			
Analytical skills (external applications)	ASE1	0.67	0.75	0.77	0.53
	ASE2	0.92			
	ASE4	0.55			
Service quality	SRQ1	0.76	0.79	0.79	0.56
	SRQ2	0.74			
	SRQ3	0.75			
Product quality	PRQ1	0.68	0.76	0.76	0.51
	PRQ2	0.68			
	PRQ3	0.78			
Financial performance	FNP1	0.64	0.74	0.77	0.54
	FNP2	0.92			
	FNP3	0.60			
Satisfaction (with main partners)	SAT1	0. 75	0.74	0.79	0.55
	SAT3	0.66			
	SAT4	0.81			
Trust (in main chain partners)	TRT1	0.70	0.77	0.77	0.53
	TRT2	0.72			
	TRT3	0.76			

Additionally, the fit of the models to the data was supported by convergent and discriminant validity. All the standardised loadings were significant. Most of the loadings were above 0.70 and none of the loads were below the recommended value of 0.50. Furthermore, with regard to discriminant validity, the correlation between the respective constructs did not exceed threshold value, 0.85, which means the indicators measured different constructs. As can be seen from Figure 6.2 to Figure 6.8, the correlations between the each pair of constructs, (leadership styles, communication quality and frequency, analytical skills, service and product quality and satisfaction and trust) were 0.27, 0.60, 0.71, 0.67 and 0.71. Thus, the constructs showed discriminant validity (Aggelidis and Chatzoglou, 2008; Kline, 2011).

The discriminant validity was also checked by estimating whether the averaged variance explained (AVE) for the underlying two constructs was greater than the square of the correlation between the constructs (ϕ^2). As shown in the last column of Table 6.3, the condition (AVE > ϕ^2) was satisfied by all pairs of the constructs (Aggelidis and Chatzoglou, 2008; Kline, 2011).

Table 6.3: Discriminant Validity of the Constructs (2nd method), NZ

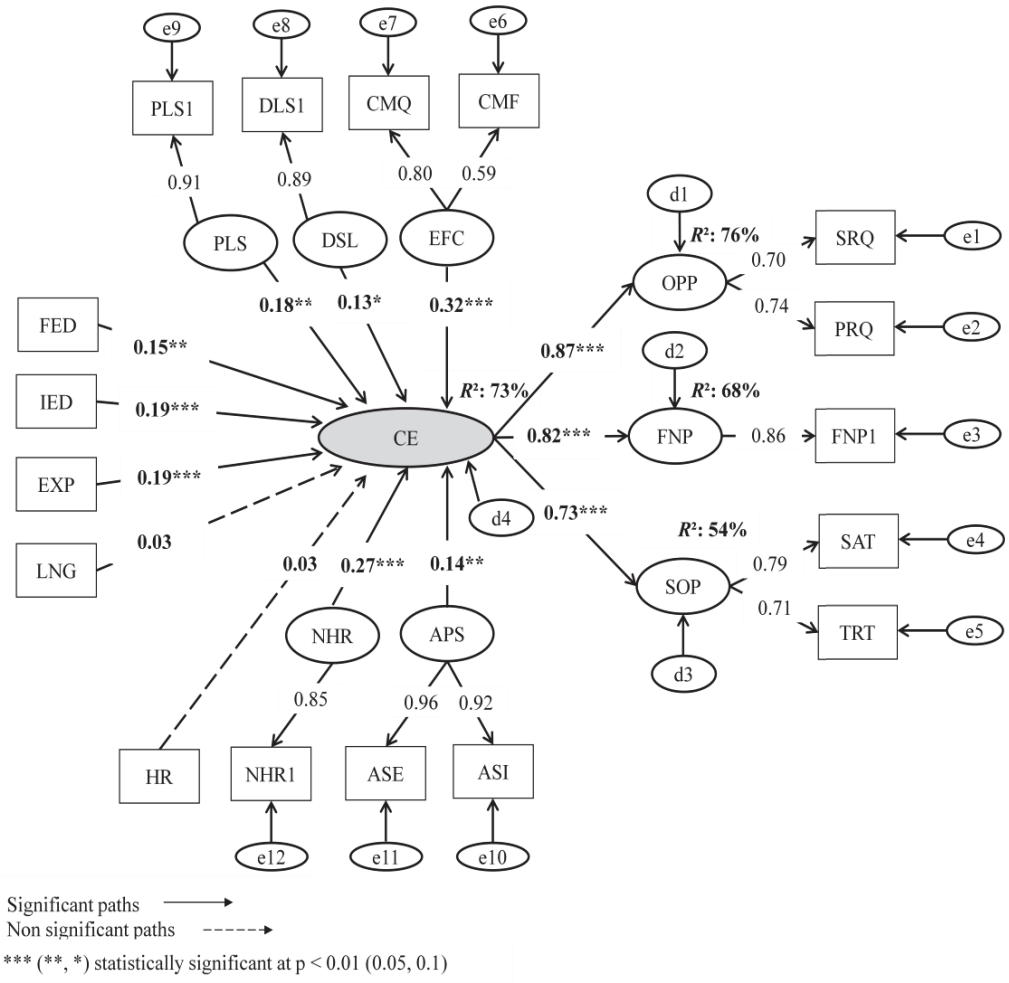
Constructs	Correlation (ϕ)	(ϕ^2)	AVE	AVE > ϕ^2
Leadership styles	0.27	0.07	(0.61+0.62)/2 = 0.62	Yes
Comm. quality and frequency	0.60	0.36	(0.53+0.51)/2 = 0.52	Yes
Analytical skills, internal and external applications	0.71	0.50	(0.52+0.53)/2 = 0.53	Yes
Service and product quality	0.67	0.45	(0.56+0.51)/2 = 0.54	Yes
Satisfaction and trust	0.71	0.50	(0.55+0.53)/2 = 0.54	Yes

SEM Results for Main Model (NZ)

Once all the measurement models were validated and reliability was established, the main proposed model was tested for the structural paths. The results from SEM are given in Figure 6.9 which shows the standardised path estimates and R^2 values of the

dependent variables (effective of supply chain coordination, operational performance, financial performance and social performance). The solid lines highlight significant paths and the dash dotted-lines depict non-significant paths. Triple (***), double (**) and a single (*) asterisks represent the levels of significance at 0.01, 0.50 and 0.10 respectively.

Figure 6.9: Results from Structural Equation Modelling (proposed model, NZ)



Overall, nearly 85% of the total structural coefficients were found significantly correlated with the effectiveness of supply chain coordination (CE). Starting with significant paths at $p < 0.01$, it can be seen that operational performance (OPP, $\beta = 0.87$; $p = 0.00$), financial performance (FNP, $\beta = 0.82$; $p = 0.00$) and social performance

(SOP, β = 0.73; p = 0.00) showed a very good representation of the effectiveness of supply chain coordination. Effective communication (EFC, β = 0.32; p = 0.00), non-human resources (NHR, β = 0.27; p = 0.00), informal education (IED, β = 0.19; p = 0.00) and experience (EXP, β = 0.19; p = 0.00) had highly significant effects on the effectiveness of supply chain coordination. Secondly at $p < 0.05$, formal education (FED, β = 0.15; p = 0.02) was also an important determinant followed by, the participative leadership style (PLS, β = 0.18; p = 0.03), analytical skills (APS, β = 0.14; p = 0.04) and the directive leadership style (DLS, β = 0.13; p = 0.09). Two paths (dotted lines) [a number of people specified for coordination activities (HR) and multiple foreign languages in which chain coordinators were fluent (LNG)] showed non-significant association with the effectiveness of supply chain coordination. A summary of the results is presented in the equation below.

Effectiveness of supply chain coordination = 0.32* effective communication + 0.27*non-human resources + 0.19*informal education + 0.19*experience + 0.18*participative leadership style + 0.15*formal education + 0.14* analytical skills + 0.13* directive leadership style + 0.03*language skills + 0.03* human resources + ζ_1

Additionally, together, all above mentioned variables explained 73% of the variance in the effectiveness of supply chain coordination. Service (SRQ) and product quality (PRO) explained 76% of the variance in operational performance whereas 54% of the variance in social performance was explained by satisfaction (SAT) and trust (TRT). Also, the parcel from the items represented financial performance explained (FNP) 68% of variance in financial performance.

The results were also supported by the model fit indices which are listed in Table 6.4. A non-significant χ^2 (p = 0.36) together with the number of other fit indices showed that the fit measures were very satisfactory. The parsimonious indices (χ^2/df = 1.05 and PCFI = 0.51) were within recommended limits. The values of GFI (0.99), CFI (0.99), IFI (0.99) and TLI (0.99) also exceeded the stringent criterion of recommended value, greater than 0.95. Moreover, RMSEA value was 0.02. Thus, it can be claimed that the proposed model did fit the data very well.

Table 6.4: Recommended and Resultant Values of Fit Indices, NZ

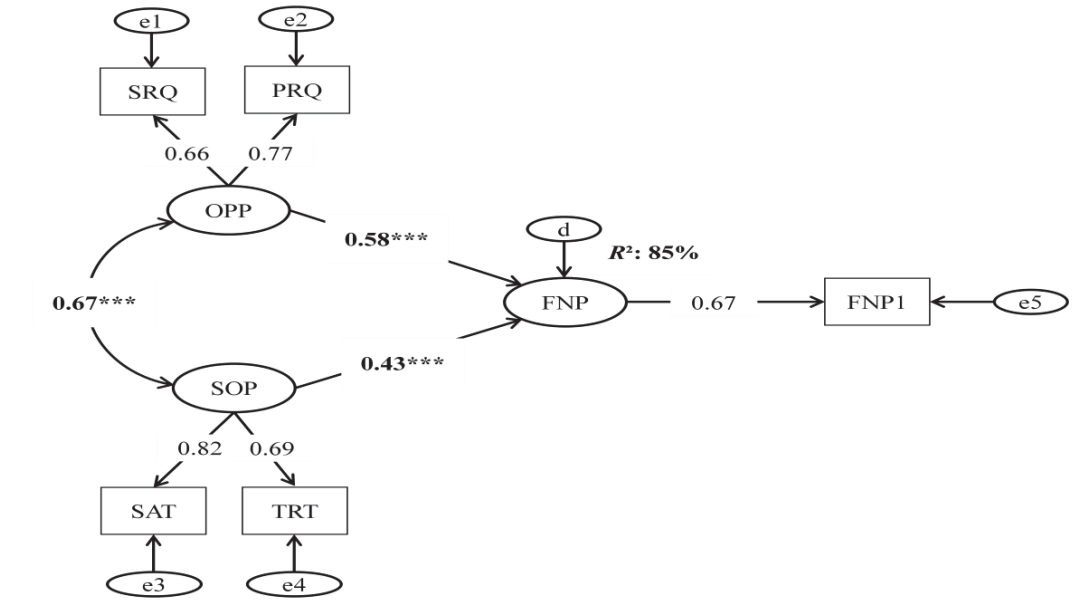
Fit indices	Recommended values	Resultant values
χ^2/	–	73.55
Degree of freedom (df)	–	70
p- value	> 0.05	0.36
Parsimonious fit index (χ^2/df)	< 5 or 3	1.05
Parsimonious fit index (PCFI)	0.50 or >	0.51
Goodness of fit index (GFI)	> 0.90 or 0.95	0.96
Comparative fit index (CFI)	> 0.90 or 0.95	0.99
Incremental fit index (IFI)	> 0.90 or 0.95	0.99
Tucker Lewis fit index (TLI)	> 0.90 or 0.95	0.99
Root mean square error of approximation (RMSEA)	< 0.08 or 0.06	0.02

Source: (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012)

Dimensions of Coordination Effectiveness (NZ)

The effectiveness of supply chain coordination was represented by three dimensions, namely, operational performance, social performance and financial performance. The linkages among the dimensions are shown in Figure 6.10.

Figure 6.10: Dimensions of Coordination Effectiveness, NZ



Operational performance (OPP, β = 0.58; p = 0.00) and social performance (SOP, β = 0.43; p = 0.01) were strongly correlated with financial performance (FNP). There was also a significant bivariate correlation (β = 0.67, p = 0.00) between the dimensions and the variables explained 85% of the variance in financial performance. The model also showed a perfect fit with a non-significant χ^2 (p =0.46).

6.3 Structural Equation Modelling – UK

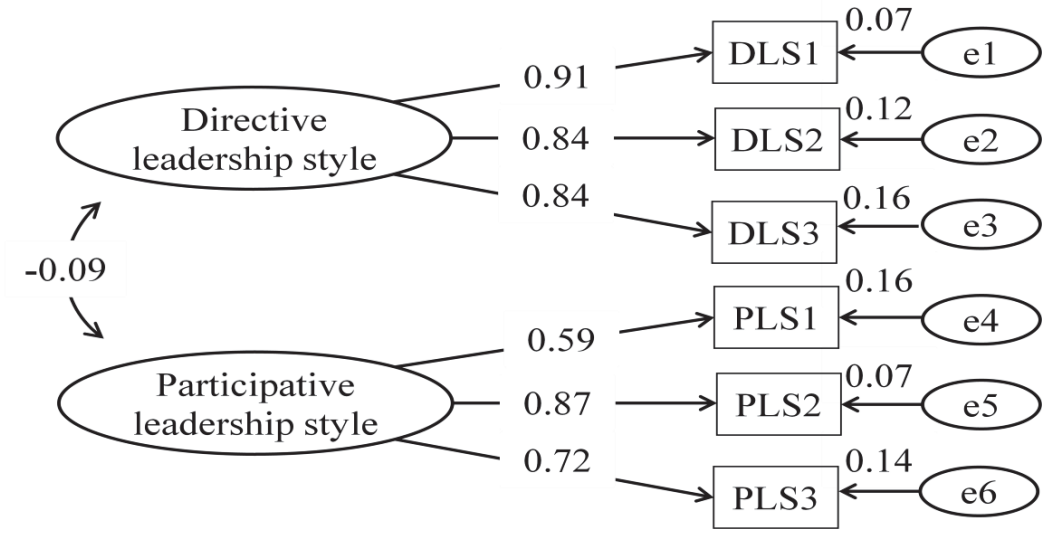
Evaluation of Measurement Models or Unidimensionality (UK)

This section investigates the UK sample. The measurement models established unidimensionality for each of the construct. The constructs were leadership styles, communication effectiveness (communication quality and frequency), non-human resources, analytical skills (internal and external applications), operational performance (service quality and product quality), financial performance and social performance (satisfaction and trust).

Leadership Styles

Two factors with a total of 6 items measured the leadership styles. A non-significant χ^2 (as desired, p-value = 0.46) jointly with a set of other fit indices showed a perfect fit. The factor loading are shown in Figure 6.11.

Figure 6.11: Measurement Model of Leadership Styles, UK



Effective Communication (Communication Quality and Frequency, UK)

A two-factor model of the effective communication (communication quality and frequency) with 11 items was submitted to CFA. Although the loadings were statistically significant ($p < 0.00$), the results indicated that CMQ1 (item one) had error correlations with CMF3 (MI 16.85) and CMF4 (MI 8.17). The fit indices (GFI = 0.90, NFI = 0.92, IFI = 0.96, TLI = 0.94, CFI = 0.96, RMSEA = 0.11) did not surpass the recommended values.

Thus, the model was re-investigated. After removing the item (CMQ1), CMF2 indicated higher modification indices (MIs) with CMQ3 (6.64) and CMQ5 (5.80). CMF2 was also eliminated and the final model depicted an excellent fit as shown in Table 6.5 (column Eff. Comm.). Figure 6.12 shows a graphical view of the model.

Table 6.5: Final Results of Measurement Models, UK

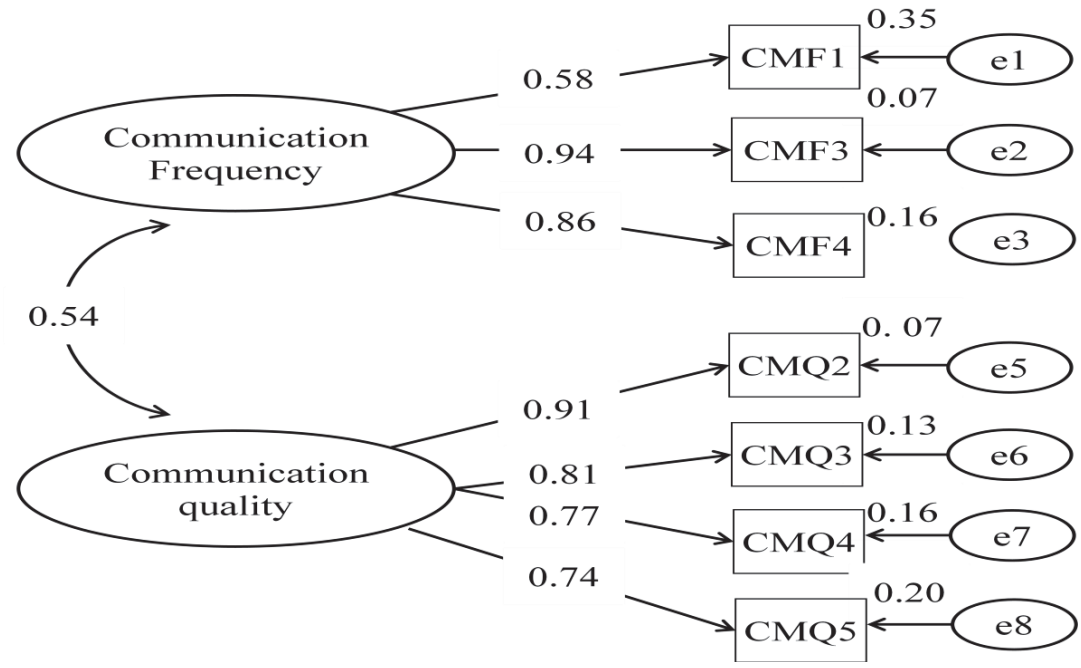
Fit indexes	Recommended values	Eff. Comm.	Analytical Skills	Soc. Perf
χ^2	–	16.20	19.21	12.73
df	–	13	13	8
χ^2/df	< 5 or 3	1.25	1.48	1.59
p–value	> 0.05	0.24	0.12	0.12
GFI	> 0.90 or 0.95	0.96	0.95	0.96
CFI	> 0.90 or 0.95	0.99	0.99	0.99
NFI	> 0.90 or 0.95	0.96	0.97	0.97
IFI	> 0.90 or 0.95	0.99	0.99	0.98
TLI	> 0.90 or 0.95	0.99	0.98	0.99
RMSEA	< 0.08 or 0.06	0.05	0.06	0.07

Source: (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012)

Non-human Resources (UK)

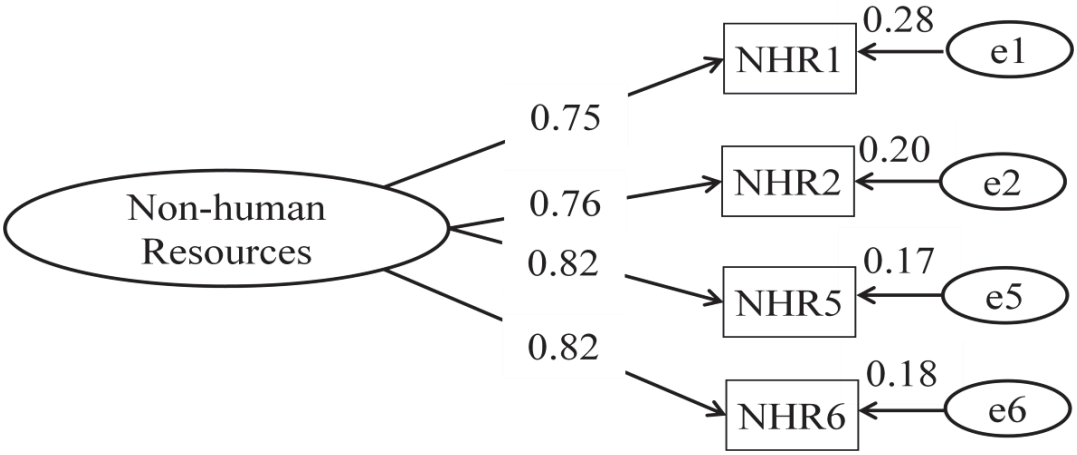
A total of six items were employed to assess non-human resources. The initial measurement model showed a poor fit with a significant χ^2. Furthermore, a set of other indices such as GFI = 0.91, NFI = 0.92, IFI = 0.94, TLI = 0.90, CFI = 0.94 and RMSEA = 0.16 showed that the model needed to be re-analysed.

Figure 6.12: Measurement Model of Effective Communication, UK



After investigating MIs, it was found that NHR3 had MIs with NHR2 (11.98) and NHR5 (8.01). Thus, NHR3 was deleted, and NHR4 was also eliminated because of the same above mentioned reason. The final model with the loadings shown in Figure 6.13 indicated a perfect fit to the data.

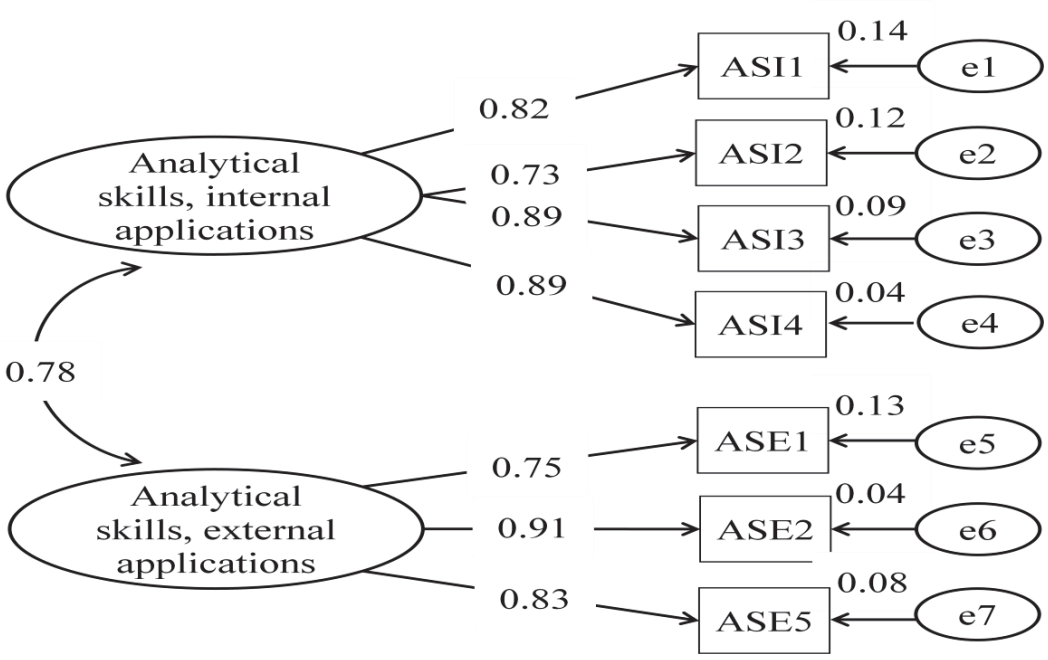
Figure 6.13: Measurement Model of Non-human Resources, UK



Analytical Skills, Internal and External Applications (UK)

A two-factor model measured the application of analytical skills. A total of 9 items were used, but ASE4 showed higher MIs with ASI (12.52), ASI4 (8.41) and ASE5 (5.72). In addition to this, the fit indices (GFI = 0.88, NFI = 0.91, IFI = 0.94, TLI = 0.92, CFI = 0.94 and RMSEA = 0.13) indicated the need to re-specify the model. First, ASE4 was deleted, and after assessing the model again, ASE3 was also eliminated. The final model showed a significant χ^2 with a number of fit indices shown in Table 6.5. Additionally, the loadings of the items were more than 0.5, and Figure 6.14 depicts the resultant model (Kline, 2011).

Figure 6.14: Measurement Model of Analytical Skills, UK



Operational (Service Quality and Product Quality) and Financial Performance (UK)

Operational performance was measured by two factors. In total, 6 items were submitted to CFA to assess service quality and product quality. The model fit the data perfectly and a non-significant χ^2 (as p-value = 0.80) resulted. Figure 6.15 shows a graphical view of the model. Figure 6.16 depicts a measurement model for financial performance and this model also fit the data perfectly and no MIs or standardised residual covariances were found.

Figure 6.15 : Measurement Model of Operational Performance, UK

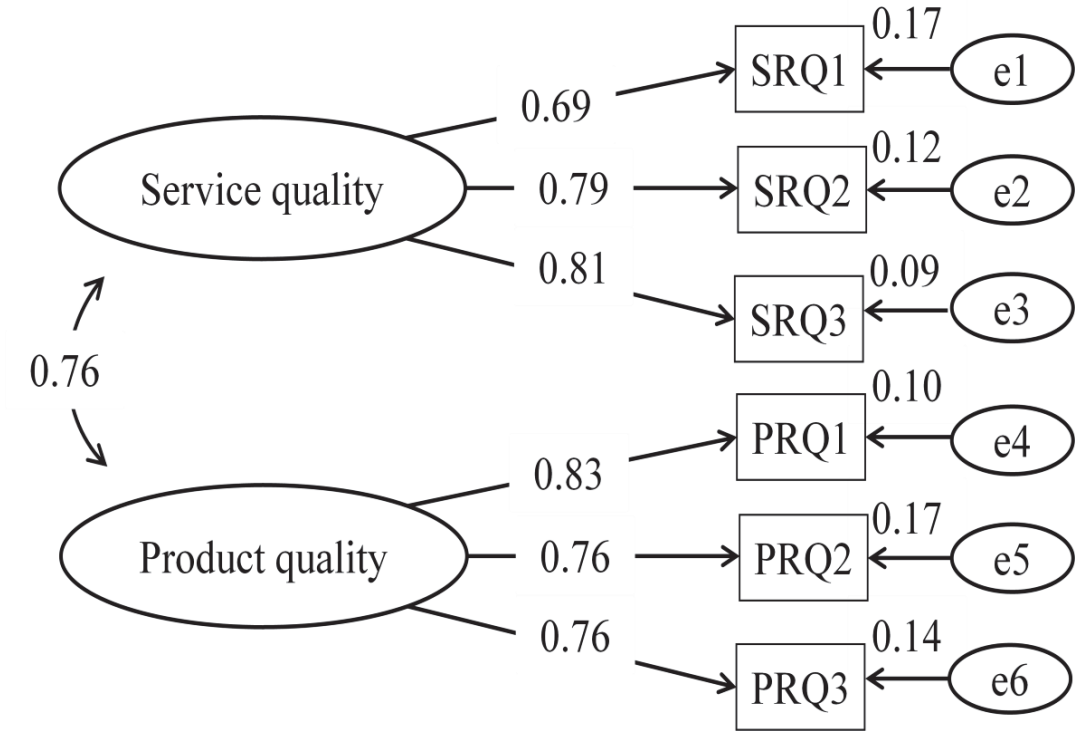
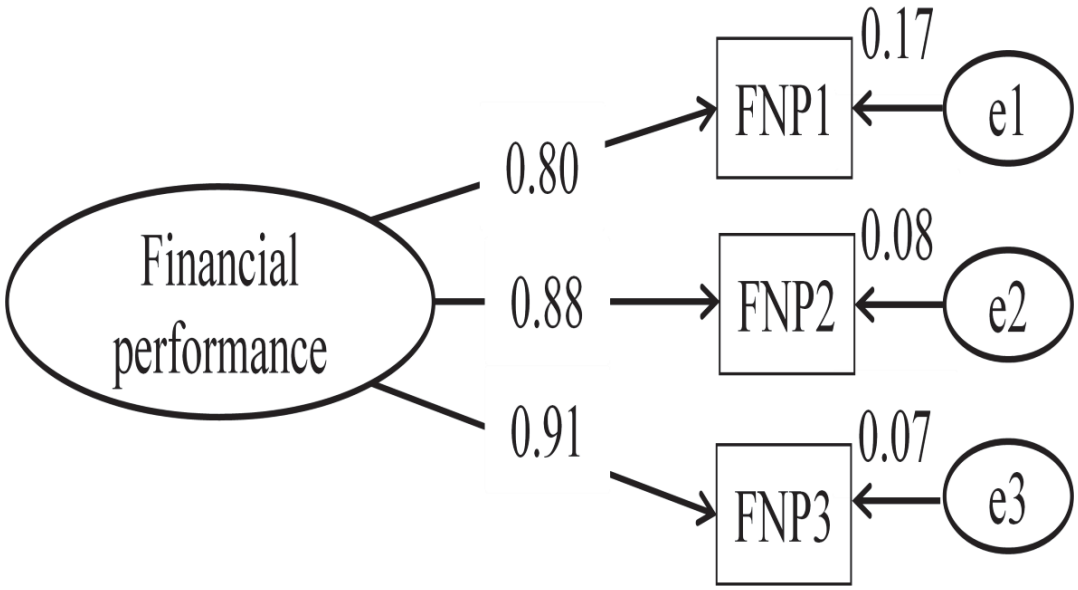


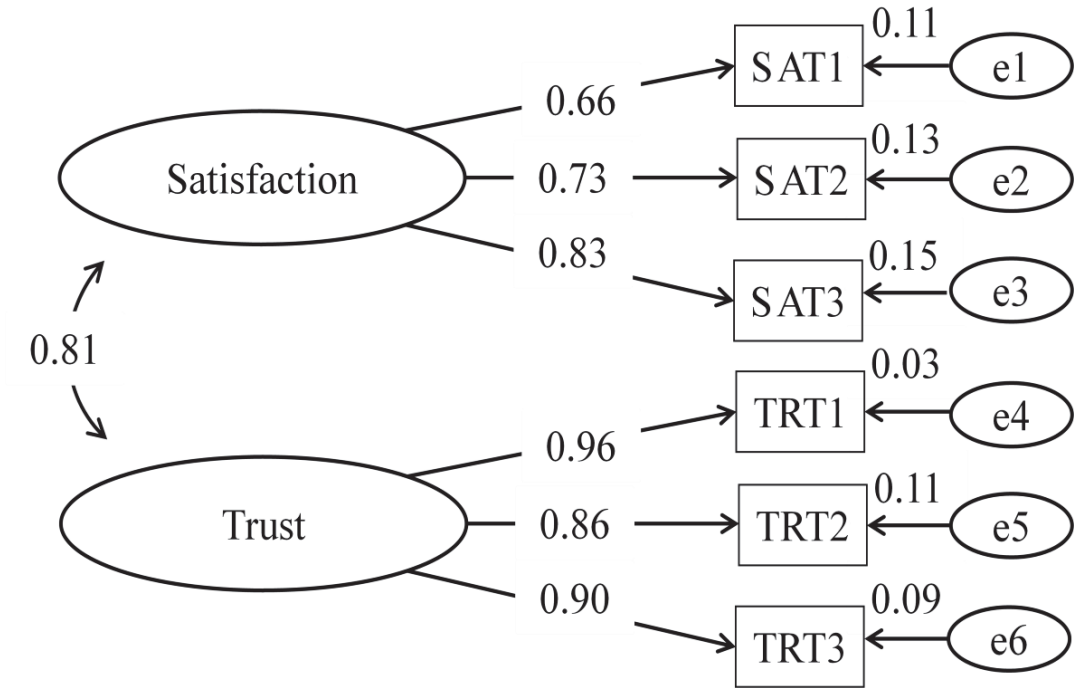
Figure 6.16: Measurement Model of Financial Performance, UK



Social Performance (Satisfaction and Trust, UK)

A two-factor model of social performance was submitted to CFA. A total of 7 items were analysed. The initial assessment indicated that the model had to be modified. Chi-square was significant (p = .02) with a number of poor fit indices (GFI = 0.94, NFI = 0.95, TLI = 0.94, and RMSEA = 0.09). The indicator (SAT4) had high MI (6.69) with TRT2. Thus, SAT4 was removed. The listed indices in Table 6.5 showed that the resultant model did fit the data adequately. A pictorial view of the model is given in Figure 6.17 which shows its factor loadings and the correlation between the factors.

Figure 6.17: Measurement Model of Social Performance, UK



Construct Reliability and Validity (UK)

The reliability of the constructs shown in Table 6.6 ranged between 0.78 and 0.93. The value of α for each construct exceeded the recommended value of 0.70. The percentage of the variance explained by the each underlying construct given in the last column of Table 6.6 was also greater than suggested value of 0.50 and the values varied from 0.54 to 0.82.

Table 6.6: Evaluation of Measurement Models, UK

Constructs	Item codes	Factor loadings	Alpha	Construct reliability	Ave. variance
Directive leadership style	DLS1	0.91	0.89	0.90	0.75
	DLS2	0.84			
	DLS3	0.84			
Participative leadership style	PLS1	0.59	0.77	0.78	0.54
	PLS2	0.87			
	PLS3	0.72			
Communication quality	CMQ2	0.91	0.88	0.88	0.66
	CMQ3	0.81			
	CMQ4	0.77			
	CMQ5	0.74			
Communication frequency	CMF1	0.58	0.83	0.85	0.65
	CMF3	0.94			
	CMF4	0.86			
Non-human resources	NHR1	0.75	0.87	0.87	0.62
	NHR2	0.76			
	NHR5	0.82			
	NHR6	0.82			
Analytical skills (internal applications)	ASI1	0.82	0.90	0.90	0.70
	ASI2	0.73			
	ASI4	0.89			
	ASI4	0.89			
Analytical skills (external applications)	ASE1	0.75	0.82	0.87	0.69
	ASE2	0.91			
	ASE4	0.83			
Service quality	SRQ1	0.69	0.80	0.81	0.59
	SRQ2	0.79			
	SRQ3	0.81			
Product quality	PRQ1	0.83	0.83	0.83	0.62
	PRQ2	0.76			
	PRQ3	0.76			
Financial performance	FNP1	0.80	0.90	0.90	0.75
	FNP2	0.88			
	FNP3	0.91			
Satisfaction (with main partners)	SAT1	0.66	0.78	0.79	0.55
	SAT2	0.73			
	SAT3	0.83			
Trust (in main chain partners)	TRT1	0.96	0.93	0.93	0.82
	TRT2	0.86			
	TRT3	0.90			

Additionally, the fit of the models to the data was supported by convergent and discriminant validity. All the standardised loadings were significant at $p = 0.00$ and the loadings were above 0.70 except for SRQ1 (0.69), SAT1 (0.66), and CMF1 (0.58). However, none of the loadings were below 0.50.

Furthermore, regarding the discriminant validity, the correlation between the respective constructs did not exceeded threshold value, 0.85, which means the items assessed different constructs. As depicted in Figure 6.11 to Figure 6.17, the correlations between the pair of constructs (leadership styles, communication quality and frequency, analytical skills, service and product quality, and satisfaction and trust) were -0.09, 0.54, 0.78, 0.76 and 0.81. Therefore, the constructs showed discriminant validity (Aggelidis and Chatzoglou, 2008; Kline, 2011).

The discriminant validity was also checked by estimating whether the average variance explained (AVE) by the each pair of constructs was greater than the square of the correlation between the constructs (ϕ^2). As given in the last column of Table 6.7, the condition (AVE > ϕ^2) was fulfilled by the underlying constructs. Thus, no discriminant validity issues were found in the data (Aggelidis and Chatzoglou, 2008; Kline, 2011).

Table 6.7 : Discriminant Validity of the Constructs (2nd method), UK

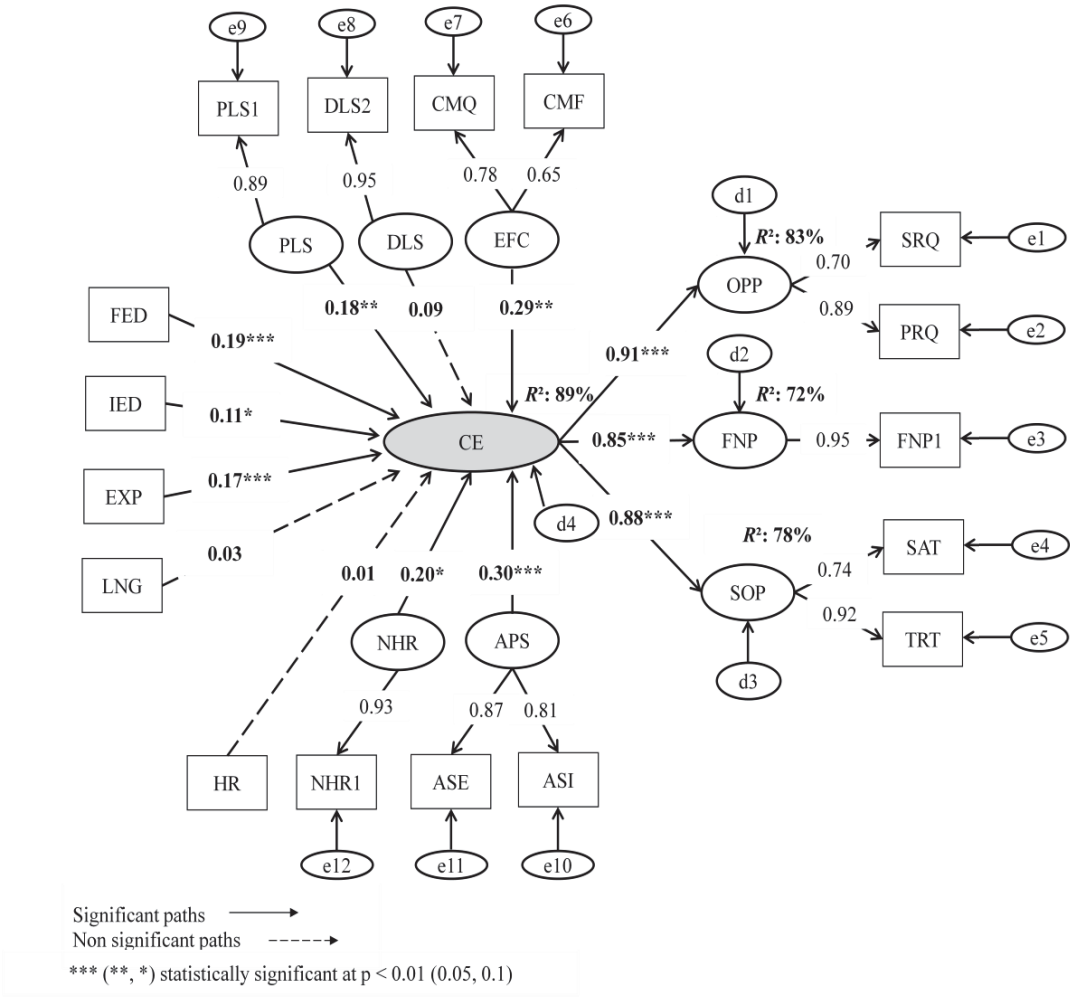
Constructs	Correlation (ϕ)	(ϕ^2)	AVE	AVE > ϕ2
Leadership styles	-0.09	0.01	(0.75+0.54)/2 = 0.65	Yes
Comm. quality and frequency	0.54	0.29	(0.66+0.65)/2 = 0.66	Yes
Analytical skills, internal and external applications	0.78	0.61	(0.70+0.69)/2 = 0.70	Yes
Service and product	0.76	0.58	(0.59+0.62)/2 = 0.61	Yes
Satisfaction and trust	0.81	0.66	(0.55+0.82)/2 = 0.69	Yes

SEM Results for Main Model (UK)

The SEM results produced from the UK data are shown in Figure 6.18 which shows the standardised path estimates and the variances explained by the variables. The solid lines

indicate significant paths and the dash dotted-lines symbolise non-significant paths. First, starting with significant paths at $p < 0.01$, it can be noticed that the effectiveness of supply chain coordination was very well demonstrated by operational performance (OPP, $\beta = 0.91$; $p = 0.00$), social performance (SOP, $\beta = 0.88$; $p = 0.00$) and financial performance (FNP, $\beta = 0.85$; $p = 0.00$). Education (EDU, $\beta = 0.19$; $p = 0.00$), analytical skills (APS, $\beta = 0.30$; $p = 0.01$) and experience (EXP, $\beta = 0.17$; $p = 0.01$) had highly significant effects on the effectiveness of supply chain coordination. Secondly ($p = < 0.05$), effective communication (EFC, $\beta = 0.29$; $p = 0.03$) and the participative leadership style (PLS, $\beta = 0.18$; $p = 0.03$) were significant at α level 0.05.

Figure 6.18: Results from Structural Equation Modelling (proposed model, UK)



Moreover, non-human resources (NHR, β = 0.20; p = 0.09) and informal education (IED, β = 0.11; p = 0.06) showed significant relationships at α level 0.1. Three paths (dotted lines) [the directive leadership style, a number of people specified for coordination activities (HR) and multiple foreign languages in which chain coordinators were fluent (LNG)] were found to be non-significant. A summary of the results can be seen in the equation below.

Effectiveness of supply chain coordination = 0.30* analytical skills + 0.19* formal education + 0.17*experience + 0.29* effective communication + 0.18*participative leadership style + 0.20*non-human resources + 0.11*informal education + 0.09*directive leadership style + 0.03*language skills + 0.01* human resources + ζ_1

Additionally, the variables together explained 89% of the variance in the effectiveness of supply chain coordination. Service quality (SRQ) and product quality (PRO) explained 83% of the variance in operational performance and 78% of the variance in social performance was explained by satisfaction (SAT) and trust (TRT). The variable representing financial performance explained (FNP) 72% of the variance in financial performance. The results were also confirmed by the model fit measures listed in Table 6.8. A non-significant χ^2 (p = 0.11) together with a number of other fit indices showed that the fit measures were very satisfactory.

Table 6.8: Recommended and Resultant Values of Fit Indices, UK

Fit indices	Recommended values	Resultant values
χ^2	–	85.01
Degree of freedom (df)	–	70
p- value	> 0.05	0.11
Parsimonious fit index (PCFI)	0.50 or >	0.50
Parsimonious fit index (χ^2/df)	< 5 or 3	1.21
Goodness of fit index (GFI)	> 0.90 or 0.95	0.93
Comparative fit index (CFI)	> 0.90 or 0.95	0.98
Incremental fit index (IFI)	> 0.90 or 0.95	0.98
Tucker Lewis fit index (TLI)	> 0.90 or 0.95	0.96
Root mean square error of approximation (RMSEA)	< 0.08 or 0.06	0.04

Source: (Amiot and Bourhis, 2005; Suki, 2011; Kline, 2011; Pandey and Jha, 2012)

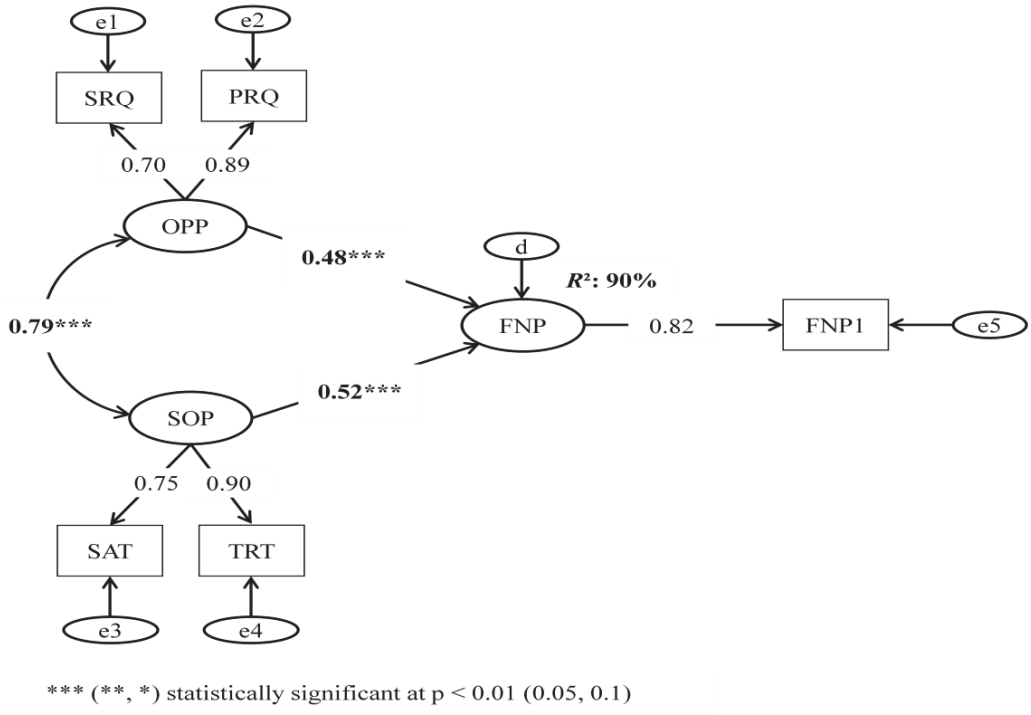
The parsimonious indices were within recommended limits. The values of CFI (0.98), IFI (0.98) and TLI (0.96) also exceeded the rigorous criterion of recommended value, greater than 0.95. Furthermore, the value of GFI (0.93) was also greater than 0.90 and RMSEA (0.04) was below the recommended value. Thus, it can be remarked that the proposed model did fit the data adequately.

Dimensions of Coordination Effectiveness (UK)

The relationships among the dimensions of effective coordination are shown in Figure 6.19. Operational performance (OPP, β = 0.48; p = 0.01) and social performance (SOP, β = 0.52; p = 0.01) were strongly associated with financial performance.

There was also a significant bivariate correlation (β = 0.79, p = 0.00) between the dimensions. The constructs (OPP and SOP) explained 90% of the variance in financial performance. Also, the model showed a perfect fit with a non-significant χ^2 (p = 0.45).

Figure 6.19 : Dimensions of Coordination Effectiveness, UK



6.4 Summary and Conclusion

The resulting items from the exploratory analysis conducted in the previous chapter were assessed through the measurement models. The measurement model consisted of the items representing leadership styles, effectiveness communication (communication quality and frequency), analytical skills (internal and external applications), non-human resources, operational performance (service and product quality), financial performance and social performance (satisfaction and trust).

Generally, a non-significant χ^2 ($p > 0.05$) jointly with a set of other measures [GFI, CFI, NFI, IFI and TLI > 0.90 or 0.95; RMSEA < 0.08 or 0.06] shows that a model fit the data adequately. It is also observed that if there are any error correlations or standardised residual covariances. Moreover, loadings should be above 0.50. Based on the New Zealand and UK data analysis, the measurement models were tested whether they meet these criteria or not. The measurement models satisfied the conditions after eliminating the problematic items.

The total of six items measured leadership styles. The measurement model of communication quality was represented by seven items. The New Zealand data resulted three items to assess the non-human resources whereas the UK data indicated that the four-item measurement model is suitable. Similarly, based on the New Zealand sample, the measurement model of analytical skills consisted of six items while the UK sample resulted seven items for the final model. In addition to this, each dependent variable (service and product quality, financial performance, satisfaction and trust) were assessed by three items.

Additionally, internal consistency (α), construct reliability and average extracted variance were estimated. For both data sets, the values of each α and construct reliability exceeded the recommended value of 0.70 and the percentage of the variance explained by the each underlying construct was greater than suggested value of 0.50. Thus, underlying construct established reliability and validity criteria. In addition to this, the correlation between the respective constructs did not exceeded threshold value of 0.85. Moreover, the average variance explained (AVE) for the pair of constructs was

greater than the square of the correlation between the constructs. Therefore, no discriminant validity issues were found in the data sets.

After developing acceptable measurement models, the main proposed model or framework was tested on the New Zealand and UK data sets. The model fit measures suggested that the hypothesised framework did fit the data adequately. It was posited that abilities of chain coordinators (education, training and experience), leadership styles (participative and directive), effective communication (communication quality and frequency), analytical skills (internal and external applications), non-human resources (budget and technology) influence the effectiveness of supply chain coordination. Also, operational and social performances have significant effects on financial performance.

Overall, results obtained from the New Zealand sample revealed that nearly 85% of the total structural coefficients were found to be significantly correlated whereas the findings based on the UK sample showed that about 77% of the total structural coefficients were significant. Based on both data sets, all path coefficients were found to be significant except for language skills and human resources (a number of people specifying for coordination activities). In addition to this, the directive leadership style was partially sustained; the relationship was only supported by the New Zealand sample at alpha level 0.1.

To sum, the results provided evidence that chain coordinators' intangible resources (formal and informal education, experience, participative styles, communication and analytical skills) *and* the tangible resources (budget and technology for coordination activities) are considered the key determinants for the effectiveness of supply chain coordination. Moreover, the operational and social performances are strongly associated with financial performance. A detailed discussion of hypotheses testing, addressing to the research objectives and managerial implications is presented in the next chapter which also concludes this thesis.

CHAPTER 7 DISCUSSION AND CONCLUSIONS

7.1 Introduction

The purpose of this chapter is to discuss the conclusions against the objectives. Following the introduction, section two presents the discussion of the findings which coincide with the research objectives and hypotheses. The possible managerial implications are also derived from the findings. The links between the literature, findings, hypotheses and objectives are discussed in section three. Section four draws the major limitations of the research. The final section provides an outline of contributions and also suggests directions for future research.

7.2 Research Objectives, Hypotheses and Managerial Implications

Nature of Coordination and Identification of Chain Coordinators

Objective 1: to investigate the nature of coordination in selected agri-food supply chains (dairy, meat, apples, onions and wine).

The results of the pilot survey explored that the nature of coordination in selected agri-food supply chains consists of potential closer interactions between farmers (growers), chemical suppliers, logistics providers, food processors, wholesalers, importers, exporters and retailers. These chain partners exchange information and work together to achieve the effectiveness of supply chain coordination. The chain partners generally believe in closer coordination rather than arm's-length relationships. The selected supply chains particularly in developed countries (UK and New Zealand) are based on closer and ongoing bonds, and chain partners claimed that this is the pivotal factor for their coordination success.

The intensity of supply chain coordination also varies across regions. For example, it was found that companies in the UK and New Zealand do believe in closer supply chain coordination whereas a limited coordination (low-to-medium) occurs in Pakistani selected supply chains. However, the farmers or growers who do not have enough

resources make agreements with pre-harvest contractors and these contractors facilitate them with various services such as providing tractors, chemicals and logistics support.

Objective 2: to identify who are the chain coordinators in the selected agri-food supply chains.

It was found that managing directors or directors (owners), CEOs and head of the departments (supply chain managers, marketing managers, and channel or chain managers) play the role of a chain coordinator. The numbers of people from different departments play this role which means the role does not depend on one individual. In other words, formal or informal chain coordination teams exist which are directed by the chain coordinators. Additionally, the results from the quantitative data provided evidence that less than 10% of companies had channel or chain coordinators' job titles in their organizational charts. This confirms that only some organizations have official chain coordinators' job titles.

Managerial Implications

The managerial implications deduced from the results are twofold. First, supply chain coordination seems to be an important component that keeps chain partners connected and provides operational, social and financial benefits. These are the reasons that coordination practices, particularly in selected agri-food chains, are widely applied in New Zealand and the UK. However, it is worth noting that supply chain coordination is only an effective means to achieve certain objectives. It could also create challenges such as organizational, cultural and structural conflicts. Moreover, the levels of coordination also depend on where a company operates because coordination levels vary region to region. Thus, it is vital for chain coordinators to set the appropriate intensity of coordination according to the nature of businesses and macro environments.

Second, beside the above complexity, chain coordinators are involved in a variety of activities – stock controlling, relationship management, training, contracting, supply of products, analysing reports, measuring performance, marketing, exploring opportunities, business research, auction management and preparing performance reports. The productivity of these activities contributes to the effectiveness of supply

chain coordination which ultimately depends on an effective chain coordinator. In particular medium and large sized-enterprises, it is perhaps worthwhile to have a separate chain coordinator (position) who can focus more on supply chain coordination and its outcomes. This may help to classify coordination outcomes and decide whether it is valuable to coordinate in the long run or not.

Intangible Resources (intangible resources represent the competencies or skills of chain coordinators)

Objective 3a: to examine the intangible core competencies or skills required to be considered as an effective chain coordinator.

The core competencies or skills are the functions of chain coordinators' acquired abilities (formal and informal education and experience), adopted leadership styles (directive and participative), effective communication (quality and frequency of communication) and analytical skills (internal and external applications). The *objective 3a* is addressed by the following *hypotheses (1a-1d; 2a and 2b; 3a and 3b)*.

H1a: There is a significant positive relationship between chain coordinators' formal education (college or university degree) and the effectiveness of supply chain coordination.

H1b: There is a significant positive relationship between chain coordinators' informal education (on-job training including workshops and seminars) and the effectiveness of supply chain coordination.

H1c: There is a significant positive relationship between a number of languages chain coordinators are fluent in (know well) and the effectiveness of supply chain coordination.

H1d: There is a significant positive relationship between chain coordinators' experience (of working with chain partners) and the effectiveness of supply chain coordination.

H2a: There is a significant positive relationship between chain coordinators' directive leadership style and the effectiveness of supply chain coordination.

H2b: There is a significant positive relationship between chain coordinators' participative leadership style and the effectiveness of supply chain coordination.

H3a: There is a significant positive relationship between chain coordinators' effective communication skills and the effectiveness of supply chain coordination.

H3b: There is a significant positive relationship between chain coordinators' analytical skills and the effectiveness of supply chain coordination.

All of the hypotheses were supported except for *H1c* (not supported), and *H2a* was partially supported. The original thought for *H1c* which stated that chain coordinators who have multiple-language skills are in a better position to achieve coordination effectiveness was taken from humanitarian supply chains. Perhaps, the skills are more appropriate for humanitarian supply chains because these chains are more mobile which means that chain coordinators frequently travel to various countries and multiple language skills can help them to communicate and negotiate with local stakeholders. The business community in New Zealand and the UK speak English and therefore the fluency in other languages probably did not show a significant impact on the effectiveness of supply chain coordination.

The *objective 3a* is clearly addressed by the hypotheses *H1a-d*, *H2a-b* and *H3a-b*. The intangible resources (formal and informal education, experience, participative leadership style, communication and analytical skills) are the required competencies or skills to be considered as an effective chain coordinator, and these competencies or skills help to achieve the effectiveness of supply chain coordination.

Managerial Implications

Modern supply chains are more complex and well educated chain coordinators can manage the complexities more effectively. Also, depending on the levels of success a company or a chain coordinator is seeking, it is wise to hire well educated chain coordinators who have relevant knowledge such as supply chain management, financial

management, marketing and business administration. The results from New Zealand and the UK showed that these are the educational fields where chain coordinators focus and their education has significant and positive impacts on the effectiveness of supply chain coordination.

Generally, education offers two benefits: one for company growth and another for chain coordinators' career progression. First, companies prefer to hire those chain coordinators who have good educational background because it helps to understand business activities. For example, formal supply chain education gives a broader sense of supply chain activities and helps to handle upstream and downstream efficiently. Also, informal education (e.g., training and retraining) assists to train new and existing chain coordinators. It ensures that they are aware of their key responsibilities and supply chain processes. Such chain coordinators are also more able to understand risks and benefits. As a result, it makes them more effective to respond to issues or breakdowns. For example, a well trained chain coordinator who has knowledge about database systems can resolve related troubleshooting in a timely manner which positively affects operational performance such as product and service quality. The findings from the data also supported the arguments that informal education such as training significantly and positively affects operational, social and financial performances. Second, in today's competitive world, a relevant education gives opportunities to enter into job markets and achieve career objectives. It also equips chain coordinators with the skills that are mainly applied in modern businesses.

The results also showed that 'experience is the best teacher' and it has highly significant effects on the effectiveness of supply chain coordination. This is one of the main reasons that most of employers look for experienced candidates as well. Experienced chain coordinators know how to get things done promptly and carefully. For example, the findings showed that experienced chain coordinators are more careful in dealing with chain partners' contracts, and they better understand the limitations of the contracts that contribute to the effectiveness of chain coordination. Also, such coordinators have better understandings that:

- Help to explore business environments

- Assist to develop effective policies
- Build better relationships
- Create trust and satisfaction
- Provide an effective forecasting for supply and demand of products or services

Additionally, chain coordinators' participative leadership style seems to be an important future of modern supply chains which are equipped with more knowledgeable workers (managers or team members). These people can be engaged in decision-making processes by encouraging them to share their ideas and opinions. Such decentralised processes create more trust and satisfaction; consequently, it increases performance. The findings suggested that a chain coordinator who leaves more autonomy to their chain partners is in a better position to achieve the effectiveness of supply chain coordination. Thus, this is essential for those firms which want to be responsive to the customers and staff members being served. The participative leadership style is not the last management tool but it is an effective means to achieve specific objectives. The directive leadership style can also be used where circumstances are sensitive and the leader is more experienced than the followers.

The practical implications taking place with regard to effective communication (skills) are triangulated. First, effective communication plays an important role in exchanging valuable information that makes supply chain links more effective and agile. For example, timely, accurate, reliable, complete and consistent information improves inventory control and ultimately it impacts coordination effectiveness. In other words, it does not only improve operational (service and product quality) and financial performance, but also creates trust and satisfaction which make scattered chains as a single coordinated unit. Moreover, timely and accurate information obtained from markets helps to tackle market trends and customers demand which, in turn, affect a business. It simply creates visibility not only within the network (of chain partners) but also at the macro environment level. Second, in today's digital world, it is important to use appropriate forms of communication, and the result showed that the most commonly used forms are computer links (email) and telephones. These forms of communications are faster, less expensive and environmental friendly. However, communication through email may be more reliable if digital signature can be added which make it more

trustworthy and legal. Third, depending on the nature of a business, monthly meetings and spending appropriate time with supply chain partners also increase trust and satisfaction which are significantly associated with operational and financial performance.

The applications of analytical skills include two perspectives; internal applications (within supply chain/company) and external applications (macro environment level). In terms of internal applications (item level implications), it is crucial to analyse supply chain reports critically. These reports highlight supply chain performance such as an accurate forecasting of demand and supply of products or services. The matching of the demand and supply effectively makes constant improvements, particularly in operational and financial performance. Furthermore, the information provided in the reports is not only utilised to visualise and identify supply chain problems, but is also used to plan and resolve the complexities such as delivery schedules and inventory replenishments. At macro environment levels, critically analysing competitors' strengths, knowing target markets better than competitors, managing market changes and considering multiple business views (item-level analysis) seem to be the future for business growth. Analysing competitive forces can be translated as a competitive advantage which can be achieved by offering lower prices, better service and product quality. Market analysis can further help chain coordinators to assess the size of markets and divide them into segments or niches (areas, cities or countries) which have potential for a relevant business. The external applications also include a number of questions – How many competitors are already working there? What is the size of the population? Do the products suit the target market? Is the targeted country politically stable? What are its taxation policies? What are the trade barriers? What are the characteristics of labour and material availability? Considering these multiple business perspectives enables chain coordinators to make better decisions.

Tangible Resources

Objective 3b: to scrutinise the relationships between tangible resources and the effectiveness of supply chain coordination.

H4a: Human resources (a number of people for supply chain coordination) are significantly related to the effectiveness of supply chain coordination.

H4b: Non-human resources (budget and advance technology) are significantly related to the effectiveness of supply chain coordination.

Human resources (*H4a*) are positively correlated with the effectiveness of supply chain coordination but not significantly whereas *H4b* was significant.

Managerial Implications

The SEM results regarding human resources were not supported. This is perhaps the result of a single item-measurement approach. Thus, managerial implications could not be derived. However, non-human resources such as specifying budget and employing advanced technology for coordination activities could play a pivotal role to achieve success in supply chain coordination.

It is important to allocate a reasonable budget and keep track of financial spending because chain coordinators make management decisions by knowing what is happening with allocated budget and what sort of impact it has on outcomes. The reports about the outcomes can be obtained from database systems such as SAP. Moreover, chain coordinators plan and manage their projects according to allocated budget from top management. Financial resources enable them to arrange coordination meetings, to travel and acquire necessary equipments. Thus, coordinators could solve more problems if they have more available monitoring resources. They are also in better positions to utilise relevant financial resources because they directly perform operational activities. With better financial resources, they can also employ more qualified staff when needed. However, if the resources are not enough, it is perhaps a good idea for chain coordinators to apply a restructuring approach that cuts operating expenses.

The positive impacts of utilizing advanced technology to handle supply chain activities have been widely accepted. It improves processes, service and product quality. Consequently, it reduces costs and increases profitability. For example, temperature controllers during the logistics process maintain product quality. Similarly, advanced

technology such SAP database systems are employed for stock controlling and research work that enable chain coordinators to analyse performance. Although implementation of such technology is expensive, it provides an advantage by keeping all chain players connected through efficient communication.

Dimensions of Coordination Effectiveness

Objective 4: to investigate the relationships between the dimensions of coordination effectiveness.

H5a: Operational performance significantly influences financial performance.

H5b: Social performance significantly influences financial performance.

Objective 4 was addressed by *H5a* and *H5b,* and the hypotheses were strongly supported.

Managerial Implications

The results obtained from SEM offered two implications. First, companies often only focus on financial indicators such as profit, market share and sales. This was also confirmed by the results extracted from the pilot survey. However, operational performance (service and product quality) and social performance (satisfaction with and trust in chain partners) significantly increase financial performance. Thus, it is pivotal to measure performance by using multiple dimensions.

Second (item level implications), in a fast-moving business world, service quality that offers on time deliveries, order flexibility and accuracy also create a competitive advantage. It also reduces extra logistics costs which can be the result of inaccurate deliveries. In turn, saving such costs contribute to financial performance. Moreover, product quality reduces defective rates, re-processing and increases reliability of products. These factors ultimately assist to maintain the natural environment (i.e., environmental sustainability). Additionally, trust and satisfaction are vital to build and maintain chain partners' business relationships. The companies which consider chain partners' interests and keep their promises are more successful in achieving

coordination outcomes. This also gives them more confidence to work together and invest more resources. Thus, the above mentioned performance dimensions seem to be the bright future of businesses which are connected in a web of various chain activities scattered across the globe.

7.3 Links between the Key Relevant Studies, Hypotheses and Objectives

The first two objectives were based on qualitative research thus they were not addressed by the developed hypotheses. The objectives have already been addressed in section 7.2. Therefore, to avoid the repetition, only the links to the literature are explained in this section. The objective one investigated the nature of coordination of the selected agri-food supply chains. The results revealed that potential closer interactions occur among chain partners and they avoid arm's-length relationships. The intensity of coordination also varies across regions, and these findings are consistent with the literature (Peterson et al., 2001; Rosenbloom, 2004; Gereffi et al., 2005; Kalantaridis and Vassilev, 2009; Kirsten et al., 2009; Loconto and Simbua, 2012). The second objective identified chain coordinators (managing directors, directors, CEOs and head of the departments). Moreover, it was found that less than 10% of the companies had channel or chain coordinators' job titles in their organizational charts. These results supported the study conducted by Mehta et al. (2002). Although not empirical research was conducted, Rosenbloom (2004) and Heggde (2008) also agreed with Mehta et al.'s (2002) findings.

The objectives 3a, 3b and 4 were addressed by the hypotheses. The links between the literature, hypotheses and objectives are shown in Table 7.1 The first and second columns describe the key studies and their research methods. The studies lead to form the hypotheses, which are numbered in column three. The fourth column describes the significant relationships between the underlying constructs. For example, formal education (FED) → coordination effectiveness (CE) means that there is a significant relationship between chain coordinators' formal education and the effectiveness of supply chain coordination. Similarly, the other relationships are presented. The column four also compares the strength of the relationships based on the NZ and UK data sets.

Table 7.1: Links between the Key Relevant Studies, Hypotheses and Objectives

Key relevant studies	Methods	Hyp.	Relat.	Sig.	Objv.
Nakos et al., 1998; Draulans et al., 2003; Herrmann & Datta, 2005; Kor & Mahoney, 2005; Karami et al., 2006; Heimerkiks & Duysters, 2007; Christos & Psomas, 2009; Stoian et al., 2011; Akhtar et al., 2012; Lacy et al., 2012	Structural equation modelling (SEM) Interviews; Descriptive statistics; Regression & factor analysis	1a	FED → CE $NZ^{**} < UK^{***}$	Yes	
		1b	IED → CE $NZ^{***} > UK^{*}$	Yes	
		1c	LNG → CE $NZ = UK$	No	
		1d	EXP → CE $NZ^{***} = UK^{***}$	Yes	
Mehta et al., 2003; Somech, 2005; Oshagbemi & Ocholi, 2006; Oshagbemi, 2008; Werder & Holtzhausen, 2009; Hansen & Villandersen, 2010; Randeree & Chaudhry, 2012	Same as above	2a	DLS → CE $NZ^{*} > UK$	Partly (NZ)	
		2b	PLS → CE $NZ^{**} = UK^{**}$	Yes	3a
Mohr & Speckman, 1994; Burkink, 2002; Hoek & Mitchel, 2006; Aramyan et al., 2007; Reynolds et al., 2009	SEM; Regression analysis; Case study	3a	EFC → CE $NZ^{***} > UK^{**}$	Yes	
Speckman et al., 1996; Analoui & Karami, 2002; Sporleder & Peterson, 2003; Rosenzweig & Roth, 2007; Akhtar et al., 2012a	SEM; Interviews; Descriptive statistics; Correlation analysis	3b	APS → CE $NZ^{**} < UK^{***}$	Yes	
Nakos et al., 1998; Kale et al., 2001; Rosenzweig & Roth, 2007; Akhtar et al., 2012a; Lao et al., 2012	``	4a	HR → CE $NZ = UK$	No	3b
		4b	NHR → CE $NZ^{***} > UK^{*}$	Yes	
Nakos et al., 1998; Badri & Davis, 2000; Amoaka-Gyampah, 2003; Chen & Paulraj, 2004; Aramayan et al., 2007; Reynolds et al., 2009; Nielsen & Nielsen, 2009; Akhtar et al., 2012a	SEM; Interviews; Regression analysis; Case study	5a	OPP → FNP $NZ^{***} = UK^{***}$	Yes	
		5b	SOP → FNP $NZ^{***} = UK^{***}$	Yes	4

Key: ***,**, * statistically significant at p < 0.01, 0.05, 0.1; FED (formal education); CE (coordination effectiveness); IED (informal education); LNG (language skills); EXP (experience); DLS (directive leadership style); PLS (participative leadership style); EFC (effective communication); APS (application of analytical skills); HR (human resources); NHR (non-human resources); OPP (operational perf.); FNP (financial perf.); SOP (social perf.)

In other words, it shows which data set resulted in stronger relationships. For instance, NZ** < UK*** means that the relationship (FED → CE) produced by the NZ data set was weaker (** < *** statistically significant at 0.05 < 0.01). The fifth column lists the results whether the hypotheses are supported or not. The final column depicts the research objectives which are addressed by the relevant hypotheses. The *objective 3a* was addressed by eight hypotheses (*1a-d, 2a-b and 3a-b*) and the *objective 3b* was countered by two hypotheses, namely *4a and 4b*. The *last objective* was related to the hypotheses *5a* and *5b* that explored the linkages between the dimensions of coordination effectiveness.

Overall, all of the hypotheses were supported except for *1c* (*language skills*) and *4a* (*a number of people specified for coordination activities*). The *hypothesis* 2a (*directive leadership style*) was only supported by the New Zealand sample at α level 0.1.

Chain Coordinators' ability was measured using four factors, namely: formal education (1a), informal education (1b), language skills (1c) and experience (1d). The findings (1a; 1b; 1d) from both data samples (NZ and UK) supported the literature (Nakos et al., 1998; Draulans et al., 2003; Herrmann and Datta, 2005; Kor and Mahoney, 2005; Karami et al., 2006; Heimerkiks and Duysters, 2007; Christos and Psomas, 2009; Stoian et al., 2011; Lacy et al., 2012). However, the results regarding language skills (1d) did not support the arguments raised from the humanitarian relief chains (Akhtar et al., 2012).

The vast majority of the literature (Mehta et al., 2003; Oshagbemi and Ocholi, 2006; Oshagbemi, 2008; Hansen and Villandersen, 2010; Randeree and Chaudhry, 2012) argued that a participative leadership style is more strongly associated with performance than a directive leadership style, and the results supported the arguments. Moreover, Somech (2005), Kruglanski et al. (2007) and Werder and Holtzhausen (2009) believed that the application of a suitable leadership style depends on leaders, situation, followers and culture. Thus, a directive leadership style is also employed in some organizations. The result arising from the New Zealand sample supported this viewpoint. Additionally, the literature mentioned in Table 7.1 (4th and 5th rows) lead towards the arguments that chain coordinators' effective communication and analytical skills are the key

determinants of coordination effectiveness. The SEM results of this study (hypotheses 3a and 3b) supported the literature.

The relationship between human resource and coordination effectiveness (4a) was not supported, and the results were inconsistent with the literature (Nakos et al., 1998; Kale et al., 2001). Perhaps, using of a single-item approach was the main reason of such unsupportive results. The findings regarding non-human resources were in line with the arguments raised from the literature (Rosenzweig & Roth, 2007; Akhtar et al., 2012a; Lao et al., 2012). Additionally, operational and social outcomes significantly influence financial performance, and the results supported the literature listed in the last row of Table 7.1.

7.4 Major Research Limitations

Although the selected samples (exporters from New Zealand and importers from the UK) controlled industrial variables, the generalization to other industries or countries is limited. The selected products (dairy, meat, apples, onions and wine) are also limited to agribusiness chains which have different characteristics from other supply chains such as fashion and IT chains. Furthermore, the targeted firms were small and medium-sized enterprises and perhaps findings could not be applied to large companies.

Additionally, the response rate from the UK is generally low. Though the sample size from the UK was large enough to apply SEM, geographical, sample group (high profile sample members particularly CEOs and managing directors), financial and time constraints affected the sample size. However, the sample size from New Zealand compensated for it and the SEM results produced the same outcomes (the intangible and tangible resources' significant correlations with coordination effectiveness, but the level of significant are different). Furthermore, the results obtained from the pilot survey also showed similarities.

Additionally, to reduce the complexity of the questionnaire, human resources (a number of people specified for coordination activities) and environmental impact were measured using a single item approach which probably affected the variables' impact on the effectiveness of supply chain coordination.

7.5 Contributions and Future Research

The study explored the nature of supply chain coordination from the selected chains of New Zealand and the UK. Chain coordinators from these chains were also identified and their competencies were investigated. First, the results obtained from the pilot survey contributed in the extant literature which has a lack of such findings.

Second, this research developed a two-stage theoretical model which was tested based on the data collected from New Zealand and the UK. The linkages estimated between the competencies or skills and the effectiveness of supply chain coordination were simultaneously scrutinised. Thus, the results appended knowledge to the literature related to chain coordinators' competencies and coordination outcomes. Moreover, similarities and differences found based on the data sets confront certain traditional assumptions such as different leadership styles which may not have similar outcomes in different countries.

Third, the previous studies focused on the dyadic relationships. This study focused on chain coordinators who were involved in a network of supply chains (at least three activities). Also, those chain coordinators were selected who were consulted for major decision making by more than three chain partners. These criteria distinguish this study from others. Additionally, the samples were selected from SMEs of New Zealand (exporters) and the UK (importers) thus it provides a particular contribution in these arenas.

Fourth, the pilot survey and the literature found evidence that traditionally companies mainly focus on financial indicators. However, this study also included operational and social performance. The explored linkages proved that it is pivotal to consider these multiple dimensions. In addition to this, the study outcomes provided possible management guidelines.

Fifth, this study further added the value in SEM applications which examined the linkages between the competencies/skills and the effectiveness of supply chain coordination. It also scrutinised the relationships among the dimensions of supply chain

coordination. Sixth, the study produced scientific papers that also contributed to the literature. Lastly, this study provided certain directions for future research.

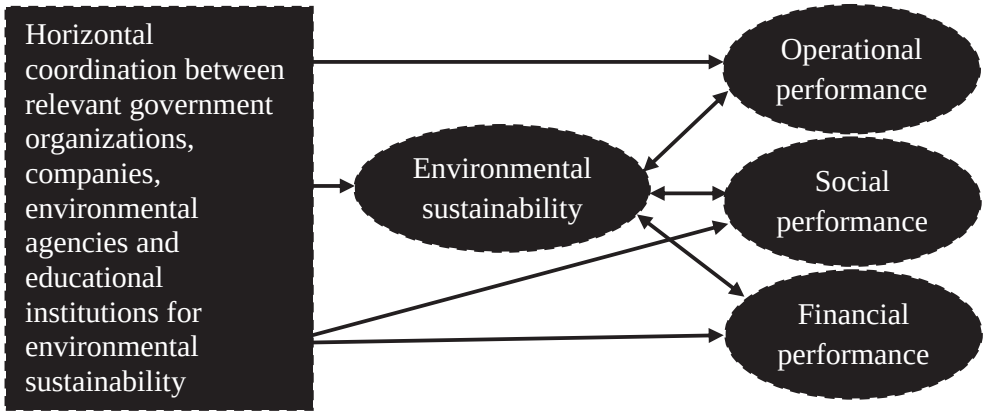
The directions for future research arising from this study are threefold. First, human resources *(HR)* showed positive but not a significant correlation with the effectiveness of supply chain coordination. It was probably the results of a single item measure or the question was too general. Similarly, language skills were assessed using a single item which produced the same non significant result. Language skills seem to be more important in humanitarian chains rather than commercial chains.

Additionally, the overall impact of business practices on natural environment was measure by a single indicator. It was expected that the item will show a strong association with other items used for coordination effectiveness. However, it was rated low and could not show meaningful relationships. One option could be the rectification of the model but this was not worthwhile because of the low rating of the item. The item low rating concludes that the impact of business practices on the natural environment (sustainability) is increasing which can be contrary to the effectiveness of supply chain coordination. Thus, the future research should consider two perspectives:

First, the application of proposed theoretical model in humanitarian supply chains can produce useful results. In this domain, not enough research has been conducted thus the research outcomes will be interesting and fruitful for humanitarian chain coordinators.

Second, multiple items that can better demonstrate the constructs should be used. Third, the linkages between horizontal coordination (i.e., relevant government organizations, companies, environmental agencies and educational institutions), coordination dimensions and environmental sustainability ought to be explored. An example of the linkages is shown in Figure 7.1.

Figure 7.1: Horizontal Coordination, Environmental Sustainability & Dimensions



REFERENCES

Abdulai, A., Birachi, A.E., 2008. Choice of coordination mechanism in the Kenyan fresh milk supply chain. *Review of Agriculture Economics* 31(1), 103–120.

Acquaah, M., 2007. Managerial social capital, strategic orientation and organizational performance in emerging economy. *Strategic Management Journal* 28(12), 1235–1255.

Aggelidis, V.P., Chatzoglou, P.D., 2008. Using a modified technology acceptance model in hospitals. *International Journal of Medical Informatics* 78(2), 115–126.

Aigbedo, H., 2009. On bills materials structure and optimum product-level smoothing of parts using JIT assembly systems. *International Journal of System Science* 40(8), 787–798.

Akhtar, P., Fischer, C., Marr, N., 2011. Improving the effectiveness of food chain coordinators: a conceptual model. *Acta Horticulturae.* 895, 15–21.

Akhtar, P., Marr, N.E., Garnevska, E., 2012. Coordination in humanitarian relief chains: chain coordinators. *Journal of Humanitarian Logistics and Supply Chain Management* 2 (1), 85–103.

Akhtar, P., Marr, N.E., Garnevska, E., 2012a. Chain coordinators and their role in selected agri-food supply chains: lessons from Pakistan, New Zealand and United Kingdom. *Food Chain* 2 (1), 104–116.

Allen, K., Byrne, S., Mclean, N., 2012. The dual-pathway and cognitive-behavioural models of binge eating: prospective evaluation and comparison. *European Child and Adolesc Psychiatry* 21(1), 51–62.

Amiot, C., and Bourhis, R., 2005. Ideological beliefs as determinants of discrimination in positive and negative outcome distributions. *European Journal of Social Psychology* 35(5), 581–598.

Amoaka-Gyampah, K., 2003. The relationships among selected business environment factors and manufacturing strategy: insights from an emerging economy. *The Journal of Management Science* 31(4), 287–301.

Analoui, F., Karami, A., 2002. How chief executives' perception of the environment impacts on company performance. *Journal of Management Development* 21(4), 290–305.

Anderson, K., Norman, D., Wittwer, G., 2003. Globalisation of the world's wine markets. *The World Economy* 26(5), 659–687.

Anderson, J., Gerbing, D., 1984. The effect of sampling error on convergence, improper solutions and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika* 4(2), 155–17.

Aramyan, H.L., Lansink, O.A., Vorst, V.J., Kooten, V.O., 2007. The performance measurement system in agri-business supply chain: a case study. *Supply Chain Management: An International Journal* 12(4), 304–315.

Arino, A., Torre, J., Ring, P., 2001. Rational quality: managing trust in alliances. *California Management Review* 44(1), 109–131.

Arshinder, Kanda, A., Deshmukh, S., 2008. Supply chain coordination: perspectives, empirical studies and research directions. *International Journal of Production Economics* 115(2), 316–335.

As-Sadeq, A.H., Khoury, C.G., 2006. Leadership styles in the Palestinian large-scale industrial enterprises. *Journal of Management Development* 25(9), 832–849.

Badri, A.M., Davis, D., 2000. Operations strategy, environmental uncertainty and performance: a path analytic model for industries in developing countries. *The Journal of Management Science* 28(2), 155–173.

Baker, M., 2000. *Marketing Theory*: *A Student Text*, 1st ed. Engage Learning EMEA, UK.

Balcik, B., Beamon, B., Krejci, C., Muramatsu, K., Ramirez, M., 2010. Coordination in humanitarian relief chains: practices, challenges and opportunities. *International Journal of Production Economics* 126(1), 22–34.

Bamford, J., Ernst, D., Fubini, G., 2004. Launching a world-class joint venture. *Harvard Business Review* 82(2), 91–100.

Bandalos, D.L., Finney, S.J., 2001. Item parcelling issues in structural equation modelling, in: Marcoulides G.A., Schumacker, R.E., *Advanced Structural Equation Modelling: New Developments and Techniques*. Lawrence Erlbaum Associates Inc., NJ.

Baourakis, G., 2004. *Marketing Trends for Organic Food in the 21st Century*, 3rd ed., series on computers and operations research. World Scientific, Greece.

Barbara, B.M., 2010. *Structural Equation Modelling With AMOS: Basic Concepts, Application and Programming*, 2nd ed. Taylor and Francis Group, New York, USA.

Barker, J., Lewis, N., Morgan, W., 2001. Reregulation and the development of the New Zealand wine industry. *Journal of Wine Research* 12(3), 199–221.

Barki, H., Pinsonneault, A., 2005. A model of organizational integration, implementation effort and performance. *Organization Science* 16(2), 165–179.

Bass, M.B., Farrow, L.D., Valenzi R.E., Solomon, J.R., 1975. Management styles association with organizational, task, personal and interpersonal contingencies. *Journal of Applied Psychology* 60(6), 720–729.

Bass, M., Avolio, J., Jung, D., Berson, Y., 2003. Predicting unit performance by assessing transformational and transactional leadership. *Journal of Applied Psychology* 88(2), 207–218.

Batt, P. J., 2003. Building trust between growers and market agents. *Supply Chain Management: An International Journal* 8 (1), 65–78.

Beef and Lamb New Zealand., 2011. Beef and lamb reference guide, available at: http://www.beeflambnz.co.nz/resources/Reference_Guide.pdf (assessed 27 July 2012)

Beef and Lamb New Zealand., 2012. Meat and wool price outlook 2012, available at: http://www.beeflambnz.com/Documents/Information/Meat%20and%20wool%20price%20outlook%202012-13.PDF (assessed 27 July 2012).

Belaya, V., Gagalyuk, T., Hanf, J., 2009. Measuring asymmetrical power distribution in supply chain networks: what is the appropriate method? *Journal of Relationship Marketing* 8(2), 165–178.

Bentler, P.M., and Chou, C.P., 1987. Practical issues in structural modelling. *Sociological Methods and Research* 16(1), 78–117.

Beri, G., 2008. *Marketing Research.* The McGraw-Hill Publishing, New Delhi, India.

Bessant, J., Kaplinsky., Lamming, R., 2003. Putting supply chain learning into practice. *International Journal of Operations and Production Management* 23(2), 167–184.

Bigliardi, B., Bottani, E., 2010. Performance measurement in the food supply chain: a balanced scorecard approach. *Facilities* 28(5), 249–260.

Biosecurity Australia., 2011. Final report for the non-regulated analysis of existing policy for apples from New Zealand. *Department of Agriculture, Fisheries and Forestry*, Canberra, 1–29.

Bititci,U., Mendibil, K., Nudurupati, S., Turner, T., Garengo, P., 2004. The interplay between performance measurement, organizational culture and management styles. *Measuring Business Excellence* 8(3), 28–41.

Bititci, U., Butler, P., Cahill, W., Kearney, D., 2009. Collaboration: a key competence for competing in the 21st century. *Supply Chain Prospective* 10(1), 24–32.

Black, T. R., 1999. *Doing quantitative research in the social sciences: An integrated approach to research design, measurement, and statistics*. Sage Publications, CA.

Blyth, N., 1981. A review of the world sheepmeat market: overview of international trade. Agricultural Economics Research Unit, Lincoln College, *Discussion Paper* 60(1), 1–42.

Boddy, D., Macbeth, D., Wagner, B., 2000. Implementing collaboration between organizations: an empirical study of supply chain partnering. *Journal of Management Studies* 37(7), 1003–1020.

Bogner, W., Bansal, P., 2007. Knowledge management as the basis of sustained high performance. *Journal of Management Studies* 44(1), 165–186.

Booth, A., Johnson, D., Branaman, A., Sica, A., 1995. Belief and behaviour: does religion matter in today's marriage? *Journal of Marriage and Family* 57(3), 661–671.

Bos, N., Olson, J., Gergle, D., Olson, G., Wright, Z., 2002. Effects of four computer-mediated channels on trust development. *CHI 02*, 4(1), 135–140.

Bougoure, U., Lee, B., 2009. Service quality in Hong Kong wet markets versus supermarkets. *British Food Journal* 111(1), 70–79.

Brown, J.W., 2002. Agribusiness cases in supply chain management. Department of Agriculture Economics, University of Saskatchewan, *Working Paper*, 1–12.

Brown, D.H., Locket, N., 2004. The potential of critical e-applications for engaging SMEs in e-business: a provider prospective. *European Journal of Information Systems* 13(1), 21–34.

Bryman, A., 2006. Integrating quantitative and qualitative research: how is it done? *Qualitative Research* 6(1), 97–113.

Burkink, T., 2002. Cooperative and voluntary wholesale groups: channel coordination and inter firm knowledge transfer. *Supply Chain Management: An International Journal* 7 (2), 60–70

Camara, A., 2001. The pricing of relative performance based incentives for executive compensation. *Journal of Business Finance and Accounting* 28(9), 1149–1188.

Cao, N., Zhang, Z., To, K., Ng, K., 2008. How are supply chains coordinated? *Journal of Fashion Marketing and Management* 12(3), 384–397.

Capie, F., Perren, R., 1980. The British market for meat 1850-1914. *Agricultural History* 54(4), 502–515.

Castaldi, R., Cholette, S., Hussain, M., 2006. A country-level analysis of competitive advantage in the wine industry. Wine Community, *Working Papers*, 1–18.

Chan, H., He, H., Wang, W., (2011). Green marketing and its impact on supply chain management in industrial markets. *Industrial Marketing Management* 41(4), 557–562.

Chatteeuw, F., Fileen, E., Vodnerhourst, J., 2007. Employee engagement: boosting productivity in turbulent times. *Organization Development Journal* 25(2), 151–155.

Chen, J.I., Paulraj, A., 2004. Towards a theory of supply chain management: the constructs and measurements. *Journal of Operations Management* 22(2), 119–150.

Chavez, R., Fynes, B., Gimenez, C., and Wiengarten, F., 2012. Assessing the effect of industry clock speed on the supply chain management practice-performance relationship. *Supply Chain Management: An International Journal* 17(3), 235–248.

Chin, W.W., Marcolin, B.L., Newsted, P.R., 2003. A partial least squares latent variable modelling approach for measuring interaction effects: results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information System. Research* 14(2), 189–217.

Chiang, C., Kocabasoglu-Hillmer, C., Suresh, N., 2012. An empirical investigation of the impact of strategic sourcing and flexibility on firm's supply chain agility. *International Journal of Operations & Production Management* 32(1), 49–78.

Childerhouse, P., Towill, D.R., 2003. Simplified material flow holds the key to supply chain integration. *Omega: The International Journal of Management Science* 31(1), 17–27.

Chitayat, G., Venezia, I., 1984. Determinants of management styles in business and non-business organizations. *Journal of Applied Psychology* 69(3), 437–447.

Christopher, M., 1998. Logistics and supply chain management (2nd ed.), FT Prentice-Hall, London.

Christos, F., Psomas, E., 2009. The impact of "soft" and "hard" TQM elements on quality management results. *International Journal of Quality and Reliability Management* 26(2), 150–163.

Churchill, A., Lacobucci, D., 2006. *Marketing Research: Methodological Foundations*, 10th ed., South-Western Cengage Learning, USA.

Chung, W., Leung, S., 2005. Collaborative planning, forecasting and replenishment: a case study in cooper and clad laminate industry. *Production, Planning and Control* 16(6), 563–574.

Ciliberti, F., Goot, D.G., Haan, D.J., Pontrandolfo, P., 2009. Codes to coordinate supply chains: SMEs' experiences with SA8000. *Supply Chain Management: An International Journal* 14(2), 117–127.

Claro, P.D., Hagelaar, G., Omta, O., 2003. The determinants of relational governance and performance: how to manage business relationships? *Industrial Marketing Management* 32(8), 703–716.

Clements, M., Dean, D., Cohen, D., 2007. Proposing an operational classification scheme for embryonic cooperative relationships. *Journal of Management and Organization* 13(1), 51–64.

Cook, J., Wall, T., 1980. New work attitude measures of trust, organizational commitment and personal need non fulfilment. *Journal of Occupational Psychology* 53(1), 39–52.

Russell, C., Todd, Y., Combs, G.; Woehr, J., Ketchen J., 2011. Does human capital matter? A meta-analysis of the relationship between human capital and firm performance. *Journal of Applied Psychology* 96(3), 443–456.

Creswell, J., 2009. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications, Inc.

Crossland, C., Hambrick, C.D., 2007. How national systems differ in their constraints on cooperation executives: study of CEOs effects in three countries. *Strategic Management Journal* 28(8), 767–789.

Crotty, M., 2003. *The Foundations of Social Research: Meaning and Perspective in the Research Process*. Sage, London.

Cullen, J.B., Johnson, J.L., Sakano, T., 1995. Japanese and local partner commitment to IJVs: Psychological consequences of outcomes and investments in the IJV relationship. *Journal of International Business Studies* 26(1), 91–115.

Curtis, B., Reveley, J., 2001. Producers, processors and unions: the meat producers' board and labour relations in the New Zealand meat industry, 1952–1971. *Australian Economics History Review* 41(2), 135–158.

DairyCo Datum., 2012. UK dairy imports, available at: http://www.dairyco.net/datum/dairy-processing-trade/imports-exports/uk-dairy-imports.aspx (accessed 08 August 2012).

DairyNZ., 2012. The dairy enterprise, available at: http://www.godairyeducation.co.nz/assets/resources/TUFSDairyNZfactsheetsP2HR2.pdf (accessed 21 July 2012).

Dairy UK Statistics., 2011. Dairy statistics, an insider's guide 2011, available at: http://www.dairyco.org.uk/resources-library/market-information/dairy-statistics/ (accessed 26 July 2012).

Dasgupta, T., 2003. Using the six-sigma metric to measure and improve the performance of a supply chain. *Total Quality Management* 14(3), 355–366.

Datamonitor., 2010. *Global Wine*. Datamonitor, New York, USA, 1–28.

DEFRA., 2012. Utilisation of milk by dairies in England and Wales available at: http://www.defra.gov.uk/statistics/files/defra-stats-foodfarm-food-milk-milkutil-statsnotice-120712.pdf (accessed 26 July 2012).

DEFRA., 2012b. UK meat production and supplies – quarterly dataset, available at: http://www.defra.gov.uk/statistics/foodfarm/food/slaughter/ (accessed 31 July 2012).

Demirbag, M., Tatoglu, E., Glaister, W.K., Zaim, S., 2010. Measuring strategic decision making efficiency in different country contexts: a comparison of British and Turkish firms. *Omega* 38(1–2), 95–104.

Denscombe, M., 2003. *The Good Research Guide: For Small Scale Social Projects*. Open University Press, Buckingham.

Donald, B., 2009. Contested notions of quality in a buyer-driven commodity cluster: The case of food and wine in Canada. *European Planning Studies* 17(2), 263–280.

Donna, L.C., MacCallum, R.C., 2005. Using parcels to convert path analysis models into latent variable models. *Multivariate Behavioural Research* 40(2), 235–259.

Dorling, K., Scott, J., Deakins, E., 2005. An organizational-level framework for the New Zealand industry-its development and application. *International Journal of Physical Distribution and Logistics Management* 35(10), 728–743.

Draulans, J., Deman, A.P., Volberda, H., 2003. Building alliance capability: management techniques for superior alliance performance. *Long Range Planning* 36(2), 151–166.

Dungen, S., Rosin, C., Hunt, L., 2011. Recalling management changes in the New Zealand sheep/beef and wool sectors as response to external and internal drivers: preliminary analysis of ARGOS retrospective interviews, *Research Report* 11/01, 1–43.

Dunne, A., 2008. The impact of an organization's collaborative capacity on its ability to engage its supply chain partners. *British Food Journal* 110(4/5), 361–375.

Dyer, J., Singh, H., 1998. The relational view: cooperative strategy and sources of inter-organizational competitive advantage. *Academy of Management Review* 23(4), 660–679.

EBLEX., 2011. No evidence that eating lean red meat in moderation has negative health effects, available at: http://www.eblex.org.uk/news/BNF-report.aspx (accessed 16 November 2011).

EBLEX., 2012. Sheet market outlook, May 2012, available at: http://www.eblex.org.uk/documents/content/publications/p_smo_may_2012.pdf (accessed 31 July 2012).

EBLEX., 2012b. Cattle market outlook, May 2012, available at: http://www.eblex.org.uk/documents/content/publications/p_cmo_may_2012.pdf (accessed 31 July 2012).

Eddy, T., 2001. The production and marketing interface. In: K. Moulton and K. Lapsley (eds) *Successful Wine Marketing*., Aspen Publishers, Gaithersburg, Maryland.

Eggers, J., 2012. All experience is not created equal: learning, adapting, and focusing in product portfolio management. *Strategic Management Journal* 33(3), 315–335.

Ellram, L., 1996. The use of the case study method in logistics research. *Journal of Business Logistics* 17(8), 93–138.

Enders, C.K., 2001. A primer on maximum likelihood algorithms available for use with missing data. *Structural Equation Modelling 8*(1), 128–141.

FAO., 2008. What's feeding our food?, available at: http://www.foe.co.uk/resource/briefings/livestock_impacts.pdf (accessed 16 November 2011).

FAO., 2009. *Grapes and Wine*, agribusiness handbook. Rome, Italy, 1–37.

FAO., 2010., June. *Food Outlook Global Market Analysis*, Rome – Italy, 1–104.

FAO., 2011. Data, available at: http://faostat.fao.org/site/567/DesktopDefault.aspx?PageID=567#ancor (assessed 2 November 2011).

FAO., 2011a.. Data, available at: http://faostat.fao.org/site/636/DesktopDefault.aspx?PageID=636#ancor (assessed 4 October 2011).

FAO., 2011b. Data, available at: http://faostat.fao.org/site/537/DesktopDefault.aspx?PageID=537 (assessed 3 November 2011).

FAO., 2011c. Data, available at: http://data.mongabay.com/commodities/category/1-Production/4-Livestock+Primary/977-Sheep+meat/51-Production+Quantity/5001-World+++%28Total%29 (assessed 27 July 2012).

FAO., 2012., May. *Food Outlook Global Market Analysis*, Rome – Italy, 1–104.

FAO., 2012a. Data, available at: http://faostat.fao.org/site/569/DesktopDefault.aspx?PageID=569#ancor (accessed 19 July 2012).

FAO., 2012b. Data, available at: http://faostat.fao.org/site/535/DesktopDefault.aspx?PageID=535#ancor (accessed 02 August 2012).

Fearne, A., 1998. The evolution of partnerships in the meat supply chain: insights from the British beef industry. *Supply Chain Management: An International Journal* 3(4) 214–231.

Ferraro, G., 1990. *The Cultural Dimension of International Business*. 1st ed., Englewood Cliffs Prentice Hall, NJ.

Fischer, C., Gonzalez, M., Henchion, M., Leat, P., 2007. Trust and economic relationships in selected European agri-food chains. *Food Economics* 4(1), 40–49.

Fonterra., 2011. Our history, available at: http://www.fonterra.com/wps/wcm/connect/fonterracom/fonterra.com/our+business/fonterra+at+a+glance/about+us/our+history (accessed 31 October 2011).

Galbraith, J., 2001. Building organizations around the global customer. *Ivey Business Journal*, 66(1), 17–24.

Gallos, V.J, Heifetz, A.R., 2008. *Business Leadership*, 2nd ed., A Jossey-Bass Reader, John Wiley and Sons, CA.

Garver, M.S., Mentzer, J.T., 1999. Logistics research methods: employing structural equation modelling to test for construct validity. *Journal of Business Logistics* 2(1), 35–57.

George, J., Hill, C., Jones, .G., 2008. *Principles of Management: Contemporary Management*, 2nd ed., The McGraw Hill, NY.

Gereffi, G., Humphrey, J., Sturgeon, T., 2005. The governance of global value chain. *Review of International Political Economy* 12(1), 78–99.

Ghisi, F., Silveira, J., Kristensen, T., Hingley, M., Lindgreen, A., 2008. Horizontal alliances amongst small retailers in Brazil. *British Food Journal* 110(4/5), 514–538.

Gill, D., Ramaseshan, B., 2007. Influences on supplier repurchase selection of UK importers. *Marketing Intelligence and Planning* 25(6), 597–611.

Giovanni, P., 2012. Do internal and external environmental management contribute to the triple bottom line? *International Journal of Operations and Production Management* 32(3), 265–290.

Global Markets Research., 2011. International wine industry review, available at: http://www.commbank.com.au/corporate/research/publications/commodities/agricultural-insights/2011/160611-International_Wine.pdf (accessed 4 August 2011).

Goel, V., Kaur, I., 2008. Strategic role of trade credit in chain coordination for the traditional farm business enterprises in Punjab, India. *Journal of International Food and Agribusiness Marketing* 20(2), 33–60.

Golob, T.F., 2003. Structural equation modelling for travel behaviour research. *Transport Research Part B: Methodology* 37(1), 1—25.

Goodhue, D., Lewis, W., Thompson, R. 2007. Statistical power in analyzing interaction effects: questioning the advantage of PLS with product indicators. *Information Systems Research* 18(2), 211–227.

Gordon, C.L., Kung, D., Dyck, H., 2006. IT deployment assessment: a two-dimensional supply chain life-cycle management framework for strategic analysis. *E-Leader*, 1–9.

Gray, W.A., Boehlje, D.M., 2005. Risk sharing and transactions costs in producer-processor supply chains. *Choices* 20(4), 281—286.

Greasley, D., Oxley, L., 2005. Refrigeration and distribution: New Zealand land prices and real wages 1873–1939. *Australian Economic History Review* 45(1), 23–44.

Green, R., Cornell, S., Scharlemann, J., Balmford, A., 2005. Farming and the fate of wild nature. *Science* 307(5709), 550–555.

Grzeskowiak, S., Khatib, J., 2009. Does morality explain opportunism in marketing channel negotiations? The moderating role of trust. *International Journal of Retail and Distribution Management* 37(2), 142–160.

Gulati, R., Wohlgezogen, F., Zhelyazkov, P., 2012. The two facets of collaboration: cooperation and coordination in strategic alliances. *The Academy of Management Annals* 6(1), 531–583.

Gundersen, G., Hellesøy, B., Raeder, S., 2012. Leading international project teams: the effectiveness of transformational leadership in dynamic work environments. *Journal of Leadership & Organizational Studies* 19(1), 46–57.

Gupta, M., and Gupta, D., 2011. *Research Methodology*. PHI Learning Pvt. New Delhi, India.

Hair, J.F., Anderson, R.E., Tatham, R.L., and Black, W.C., 1998. Multivariate Data Analysis, 5th ed., Prentice-Hall International, Inc. New Jersey.

Hair, J.F., Bush, R.P., Ortinau, D.J., 2000. *Marketing Research: a Practical Approach for the New Millennium*, The McGaw-Hill Companies, Inc. Boston.

Hansen, J., Villadsen, A., 2010. Comparing public and private managers' leadership styles: understanding the role of job context. *International Public Management Journal* 13(3), 247–274.

Harari, O., 1995. The missing link in performance. *Management Review* 84(3), 21–24.

Hawkes, C., Friel, S., Lobstein, T., Lang, T., 2012. Linking agricultural policies with obesity and noncommunicable diseases: a new perspective for a globalising world. *Food Policy* 37(3), 343–353.

Hawkins, O., 2011. Dairy industry in the UK: statistics, available at: www.parliament.uk/briefing-papers/SN02721.pdf (accessed 01 November 2011).

Hayward, D., Lewis, N., 2008. Regional dynamics in the globalising wine industry: the case of Marlborough, New Zealand. *The Geographical Journal* 174(2), 124–137.

Heggde, S.G., 2008. Channel design for effective bi-directional relations, in: FMCG sector, in: Vrontis, D., Weber, Y., Kaufmann, R., Tarba, S., (Eds.), *European and Mediterranean Trends and Challenges in the 21st Century*. EuroMed Press, France, pp. 264–283.

Heimerriks, H.K., Duysters, G., 2007. Alliance capabilities as a mediator between experience and alliance performance: an empirical investigation into the alliance capability development process. *Journal of Management Studies* 44(1), 25–44.

Herrmann, P., Datta, K.D., 2005. Relationships between top management team characteristics and international diversification: an empirical investigation. *British Journal of management* 16(1), 69–78.

Hingley, M., Lindgreen, A., Chen, L., 2009. Development of the grocery retail market in China. *British Food Journal* 111(1) 44–55.

Hoang, H., Rothaermel, T.F., 2005. The effect of general and partner specific alliance experience on joint research and development project performance. *Academic of management Journal* 48(2), 332–345.

Hoe, S.L., 2008. Issues and procedures in adopting structural equation modelling technique. *Journal of Applied Quantitative Methods* 3(1), 76–83.

Hoek, I.V.R., Mitchell, J.A., 2006. The challenge of internal misalignment. *International Journal of Logistics* 9(3), 270–280.

Hofstede, G., Bond, H.M., 1984. Hofstede's culture dimensions: an independent validation using Rokeach's value survey. *Journal of Cross-Cultural Psychology* 15(4), 417–433.

Holm, U., Holmstrom, C., Sharma, D., 2005. Competence development through business relationships or competitive environment?-subsidiary impact on MNC competitive advantage. *Management International Review* 45(2), 197–218.

Holmes-Smith, P., Coote, L., Cunningham, E., 2006. Structural Modelling: From the Fundamentals to Advanced Topics. SREAMs, Melbourne.

Hosni, W., Lancon, F., 2011. Apple value chain analysis. National Agriculture Policy Centre, *Working Paper* 28, 1–49.

Hoppe, M.R., 2001. *Outlining a Future of Supply Chain Management Coordinated Supply Networks* (Thesis, Massachusetts Institute of Technology, 2001).

Hu, X., Lin, Z., Whinston, A.B. and Zhang, H. 2004. Hope or hype: on the viability of escrow services as trusted third parties in online action environments. *Information Systems Research* 15(3), 236–249.

Huttman, J., 1978. British meat imports in the free trade era. *Agricultural History* 52(2), 247–262.

IFR., 2009. Apple facts, available at: http://www.ifr.ac.uk/info/society/spotlight/apples.htm (accessed 3 November 2011).

Imparato, N., 1995, May. Your managerial effectiveness is influenced by how see your role. *Research and Development Innovator* 4(5).

Jensen, C.M., Murphy, J.K., 1990. Performance pay and top management incentives. *Journal of Political Economy* 98(2), 225–262.

John, G., Reve T., 1982. The reliability and validity of key informant data from dyadic relationships in marketing channels. *Journal of Marketing Research* 19(4), 517–524.

Johnsen, E.R., 2007.The role of focal suppliers in strategic networks for internationalisation: perspective from small and medium-sized Italian and Thai silk suppliers. *Journal of Fashion Marketing Management* 11(1), 135–47.

Joshi, R., Banwetb, D., Shankarb, R., Gandhi, J., Performance improvement of cold chain in an emerging economy. *Production Planning & Control* 1–20.

Jung, D., Chow, C., Wu, A., 2003. The role of transformational leadership in enhancing organizational innovation: hypotheses and some preliminary findings. *The Leadership Quarterly* 14(4), 525–544.

Kalantaridis, C., Vassilev, I., 2009. Firm size and the nature of international relationships: the case of globally integrated small firms. *Journal of Small Business Management* 49(4), 639–658.

Kale, P., Dyer, J., Singh, H., 2001. Value creation and success in strategic alliances: aliasing skills and the role of alliance structure and systems. *European Management Journal* 19(5), 463–471.

Kale, P., Dyer, J. Singh, H., 2002. Alliance capability, stock market response and long term alliance success: building rational capital. *Strategic Management Journal* 23(8), 747–767.

Kanji, G.K., 1998. Measurement of business excellence. *Total Quality Management* 9(7), 633–643.

Kanter, R.M., 1994. Collaborative advantage: the art of alliances. *Harvard Business Review 72*(4), 96–108.

Kaplan, S.R., Norton, P.D., 2008. Mastering the management system. *Harvard Business Review* 86(1) 63–77.

Karami, A., Analoui, F., Kakabadse, K., 2006. The CEOs' characteristics and their strategy development in UK SME sector. *Journal of Management Development* 25(4), 316–324.

Kempaainen, K., Vepsalainen, A., 2003. Trends in industrial supply chains and networks. *International Journal of Physical Distribution and Logistics Management* 33(8), 701–719.

Kent, R., 2001. *Data Construction and Data Analysis for Survey Research*, Palgrave Macmillan, New York.

Khan, F., and Khan, M., 2012. Achieving success through effective business communication. *Information and Knowledge Management* 2(2), 46–50.

Kirsten, F., Dorward, R., Poulton, C., Vink, N., 2009. *Institutional Economics Perspectives on African Agricultural Development*, IFPRI, U.S.A.

Kline, R.B., 2011. *Principles and Practice of Structural Equation Modelling*, 3rd ed., Guilford Press, USA.

Kohn, A., 1993. Why incentive plans cannot work. *Harvard Business Review* 71(5), 54–63.

KOMPASS, What KOMPASS gives you access to, available at: http://www.caul.edu.au/content/upload/files/datasets/kompass2008.pdf (assessed 04 June 2012).

Kor, Y.Y., Mahoney, T.J., 2005. How Dynamics, management and governance of resources deployments influence firm-level performance. *Strategic Management Journal* 26(5), 489–496.

Korneliussen, T., Grønhaug, K., 2003. Quality perceptions in international distribution: An empirical investigation in a complete distribution channel. *Supply Chain Management: An International Journal* 8(5), 467–475.

Kruglanski, A., Pierro, A., Higgins, E., 2007. Regulatory mode and preferred leadership styles: how fit increases job satisfaction. *Basic and Applied Social Psychology* 29(2), 137–149.

Lacy, P., Haines, A., Hayward, R., 2012. Developing strategies and leaders to succeed in a new era of sustainability: Findings and insights from the United Nations Global Compact-Accenture CEO Study. *Journal of Management Development* (31)4, 346–357.

Lado, A., Paulraj, A., Chen, I., 2011. Customer focus, supply-chain relational capabilities and performance. *The International Journal of Logistics Management* 22(2), 202–221.

Lakshman, C., Parente, C.R., 2008. Supplier-focused knowledge management in the automobile industry and its implications for product performance. *Journal of Management Studies* 45(2), 318–339.

Lao, S., Choy, K., Ho, G., Yam, R., 2012. An RFRS that combines RFID and CBR technologies. *Industrial Management & Data Systems* 112(3), 385–404.

Laohavichien, T., Lawrence D., Fredendall, R., Cantrell, S., 2011. Leadership and quality management practices in Thailand, *International Journal of Operations & Production Management* 31(10), 1048 –1070.

Laroche, M., 2009. Impact of culture on marketing strategy: introduction to the special issue. *Journal of Business Research* 62(10), 921–923.

Larsen, T., Rosenbloom, B., Anderson, R., Mehta, R.,1999. Global sales manager leadership styles: the impact of national culture. *Journal of Global Marketing* 13(2), 31–48.

Ledgard, S., Lieffering, M., Coup, D., O'Brien, B., 2011. Carbon foot printing of New Zealand lamb from the perspective of an exporting nation. *Animal frontiers* 1(1), 40–45.

Lindgreen, A., Palmer, R., Wetzels M., Antioco, M., 2009. Do different marketing practices require different leadership styles? an exploratory study. *Journal of Business and Industrial Marketing* 24(1), 14–26.

Ling, Y., Simsek, Z., Lubatkin, H. M., Veiga, F.J., 2008. Transformational leadership role in promoting corporate entrepreneurship: examining the CEO-TMT interface. *Academy of Management Journal* 51(3), 557–576.

Liu, X., Cetinkaya, S., 2009. Designing supply contracts in supplier vs buyer driven channels: the impact of leadership, contract flexibility and information asymmetry, *IIE Transactions* 41(8), 689–688.

Liu, K., Entsuah, R.,2012. Missing data mechanisms in a dose-finding adaptive trial. *Journal of Biopharmaceutical Statistics* 22(2), 329–337.

Loconto, A., Simbua, E., 2012. Making Room for Smallholder Cooperatives in Tanzanian Tea Production: Can Fair-trade Do That? *Journal of Business Ethics* 108(4), 451–465.

Lu, H., Feng, S., Trienekens, J., Omta, O., 2012. Network strength, transaction-specific investments, inter-personal trust, and relationship satisfaction in Chinese agri-food SMEs. *China Agricultural Economic Review* 4(3), 1–11.

MAF., 2011. Dairy, facts and figures, available at: http://www.maf.govt.nz/agriculture/pastoral/dairy (accessed 31 October 2011).

MAF., 2011a. Draft report for the non-regulated analysis of existing policy for apples from New Zealand, 1–28.

Mammen, S., Sano, Y., 2012. Gaining access to economically marginalized rural populations: lessons learned from non-probability sampling. Rural Sociology (DOI: 10.1111/j.1549-0831.2012.00083.x), 1–21.

Manjunath, N., Ravindra, H., Archana, A., 2012. A study on sampling techniques for data testing. *International Journal of Computer Science and Communication 3(1), 13–16.*

Marsh, H.W., Hau, K.T., Balla, J.R., Grayson, D., 1998. Is more ever too much? The number of indicators per factor in confirmatory factor analysis. *Multivariate Behavioural Research* 33(2),181–220.

Marsh, H.W., Wen, Z.L., Hau, K.T., 2004. Structural equation models of latent interactions: evaluation of alternative estimation strategies and indicator construction. *Psychological Methods* 9(3), 275–300.

Martin, R.P., Patterson, W.J., 2009. On measuring company performance within a supply chain. *International Journal of Production Research* 47(9). 2449–2460.

Matopoulos, A., Vlachopoulou, M., Manthou, V., Manos, B., 2007. A conceptual framework for supply chain collaboration: empirical evidence from the agri-food industry. *Supply Chain Management: An International Journal* 12(3), 177–186.

Mehta, R., Dubinsky, J.A., Anderson, E.R., 2002. Marketing channel management and the sales manager. *Industrial Marketing Management* 31(5), 429–438.

Mehta R., Dubinsky, J.A., Anderson, E.R., 2003. Leadership style, motivation and performance in international marketing channels: an empirical investigation of USA, Finland and Poland. *European Journal of marketing* 37(1/2), 50–78.

Mehta, R., Polsa, P., Mazur, J., Xiucheng, F., Dubinsky, J.A., 2006. Strategic alliances in international distribution channels. *Journal of Business Research* 59(10–11), 1094–1103.

Menkhoff, T., and Wah, C., 2011. Improving small firm performance through collaborative change management and outside learning: trends in Singapore. *International Journal of Asian Business and Information Management*. 2(1), 1–24.

Mentzer, T., 2004. *Fundamental of Supply Chain Management: Twelve Drivers of Competitive Advantage*, 1st ed. Sage Publications Inc., USA.

Mikic, M., 1998. The impact of liberalisation: communicating with APEC communities. *Wine Industry in New Zealand*. Alexander Point Singapore, 1–19.

Miller, C.E., Reardon, J., McCorkle, D.E., 1999. The effects of competition on retail structure: an examination of intra-type, intertype and inter-category competition. *Journal of Marketing* 63(4), 107–120.

Miller, R., 2006, Feb 20. Channel champion plays a pivotal role: business skills are keys for person picked as liaison for customer and channel partners. *Channel Solutions*, E-Weak, ZDNet.

Ministry of Economic Development., 2007. *SMEs in New Zealand: Structure and Dynamics*, 1–51.

Mintzberg, H., 2009. *Managing*, Berret-Koehler Publishers, Inc., California.

Mintzbrerg, H., Sholom, G., 2001. Managing the care of health and the cure of disease-part II: integration. *Health Care Management Review* 26(1), 70–84.

Mohr, J., Speckman, R., 1994. Characteristics of partnership success: partnership attributes, communication behaviour and conflict resolution techniques. *Strategic Management Journal* 15(2), 135–152.

Momagri., 2011., Jan. Is Great Britain too dependent on agricultural imports?, available at: http://www.momagri.org/UK/a-look-at-the-news/Is-Great-Britain-too-dependent-on-agricultural-imports-_817.html#ANCRTOP (accessed 20 October 2011).

Morris, M., Scott, P., Cocoman, A., Chambers, M., Guise, V., Valimaki, M., Clinton, G., (2012). Is the community attitudes towards the Mentally Ill scale valid for use in the investigation of European nurses' attitudes towards the mentally ill? A confirmatory factor analytic approach. *Journal of Advance Nursing* 68(2), 460–470.

Moura, D.A., Mollenkopf, D., Martin, S., 2003. Understanding the relationship between product specifications and coordination in agri-business supply chains: an examination of the New Zealand meat industry. *International Food and Agribusiness Management Review* 5(2), 1–12.

Moura, D.A., Martin, S., Mollenkopf, D., 2009. Product specification and agribusiness chain coordination: introducing the coordination differential concept. *Agribusiness* 25(1), 112–127.

Muhammad, A., 2011. Wine demand in the United Kingdom and new world structural change: a source-disaggregated analysis. *Agribusiness* 27(1), 82–98.

Munck, E., 1979. *Model Building in Comparative Education. Applications of the LISREL method to cross-national survey data.* Almqvist and Wiksell, Stockholm.

Murphy, B.G., Trailer, W.L., Hill, C.R., 1996. Measuring performance in entrepreneurship research. *Journal of Business Research* 36(1), 15–23.

Myers, A.T., 2011. Goodbye, listwise deletion: presenting hot deck imputation as an easy and effective tool for handling missing data. *Communication Methods and Measures* 5(4), 297–310.

Nakos, G., Brouthers, D.K., Brouthers, E.L., 1998. The impact of firm and managerial characteristics on small and medium-sized Greek firm's export performance. *Journal of Global Marketing* 11(4), 23–47.

Narayanan, V., Raman, A., 2004. The 21st century supply chain: aligning incentives in supply chain. *Harvard Business School Review* 82(11) 94–102.

Ness, H., 2009. Governance, negotiations and alliance dynamics: explaining the evolution of relational practice. *Journal of management practice* 46(3), 451–478.

Neuman, W.L., 2000. *Social Research Methods: Qualitative and Quantitative Approaches,* 4th ed., Allyn and Bacon, Boston.

Neven, D., Hopkins, R., Weatherspoon, D., Reardon, T., 2005. Small farmer organizations and transformed markets in Southern Africa. Michigan State University, Department of Agricultural Economics, *Staff Paper*, 1–35.

New Zealand Meat Board., 2010. *New Zealand Meat Board Annual Report* 2009–10.

New Zealand Dairy Statistics., 2010-11. DairyNZ and Livestock Improvement Corporation Report. Hamilton, New Zealand, pp. 1–54.

New Zealand Ministry of Foreign Affairs., 2011. Why does agriculture matter to New Zealand?, available at: http://mfat.govt.nz/Trade-and-Economic-Relations/NZ-and-the-WTO/Improving-access-to-markets/0-agriculturenegs.php#why (accessed 06 October 2011).

Nielsen, B.B., Nielsen, S., 2009. Learning and innovation in international strategic alliances: An empirical test of role of trust and tacitness, *Journal of Management Studies* 46(6), 1031–1056.

NZ Customs., 2012. Onions New Zealand export, summary ytd week 10, available at: http://www.sofresh.co.nz/Reports%5CWeek%2010.pdf (accessed 2 August 2011).

OECD., 2011. *OECD Agricultural, Outlook* 2011 – 2020, available at: http://www.agri-outlook.org/dataoecd/2/34/48184340.pdf (accessed 26 October 2011).

OECD., 2012. *OECD Agricultural, Outlook* 2012, meat, available at: http://www.keepeek.com/Digital-Asset-Management/oecd/agriculture-and-food/oecd-fao-agricultural-outlook-2012/meat_agr_outlook-2012-10-en (accessed 26 July 2012).

Olsen, J., Harmsen, H., Friis, A., 2008. Product development alliances: factors influencing formation and success. *British Food Journal* 110(4/5), 430–443.

Onions New Zealand, 2012. All about onions, the NZonion industry, available at: http://www.onionsnz.com/ (accessed 2 August 2012).

Oppenheim, A., 1992. *Questionnaire Design, Interviewing and Attitude Measurement*, Pinter Publisher, Britain.

Oshagbemi, T., Ocholi, A.S., 2006. Leadership styles and behaviour profiles of managers. *Journal of Management Development* 25(8), 748–762.

Oshagbemi, T., 2008. The impact of personal and organisational variables on the leadership styles of managers. *The International Journal of Human Resource Management* 19(10), 1896–1910.

Osman-Gani, M.A., Tan, J., 2002. Influence of culture on negotiation styles of Asian managers: an empirical study of major cultural/ethnic groups in Singapore. *Thunderbird International Business Review* 44(6), 819–839.

Pandey, M., Jha, A., 2012 Widowhood and health of elderly in India: examining the role of economic factors using structural equation modelling. *International Review of Applied Economics* 26(1), 111–124

Pangarker, N., 2009. Do firms learn from alliance terminations? An empirical examination. *Journal of Management Studies* 46(6), 982–1001.

Patzelt, H., Shepherd, A.D., 2008. The decision to persist with underperforming alliances: the role of trust and control. *Journal of Management Studies* 45(7), 1217–1240.

Perks, H., Jeffery, R., 2006. Global network configuration for innovation: a study of international fibre innovation. *Research and Development Management* 36(1), 67–83.

Peter, A., 1994. Coherence, chaos and evolution in the social context. *Futures* 26(6), 583–597.

Peterson, H., Wysocki, A., Harsh, S., 2001. Strategic choice along the vertical coordination continuum. *International Food and Agribusiness Management Review* 4(2), 149–1666.

Petrick, I., 2007. Tipping the balance of power: the case of large scale systems integrators and their supply chains. *International Journal of Foresight and Innovation Policy* (3)3, 240–255.

PHDEB., 2006. Onion marketing strategy, available at: http://www.phdeb.org.pk/MktStrategies/Onion.pdf (assessed 16 November 2011).

Philips, W., 1981. Assessing measurement error in key informant reports: a methodology note on organizational analysis in marketing, *Journal of Marketing Research,* 18(4), 395–415.

Polonsky, J., Waller, S., 2005. *Designing and Managing a Research Project: A Business Students Guide*. Sage Publications, CA.

Potter, A., Mason, R., Lalwani, C., 2007. Analysis of factory gate pricing in the UK grocery supply chain. *International Journal of Retail and Distribution Management* 35(10), 821–834.

Randeree, K., Chaudhry, A., 2012. Leadership-style, satisfaction and commitment: An exploration in the United Arab Emirates' construction sector. *Engineering Construction and Architectural Management Electronic Resource* 19(1), 61–85.

Reynolds, N., Fischer, C., Hartmann, M., 2009. Determinants of sustainable business relationships in selected German agri-food chains. *British Food Journal* 111(8), 776–793.

Ritter, T., Genmunden, H.G., 2003. Network competence: impact on innovation success and its antecedents. *Journal of Business Research* 56(9), 745–755.

Robson, C., 2011. *Real World Research*. Wiley, Chichester, UK.

Rocco, E., 1998. Trust breaks down in electronic contexts but can be repaired by some initial face-to-face contacts. *CHI 98*, 496–502.

Rosenvold, K., Wiklund, E., 2011. Retail colour display life of chilled lamb as affected by processing conditions and storage temperature. *Meat Science* 88(3), 354–360.

Rosenbloom, B., 2004. *Marketing Channel: A Management View*, 7th ed., Thomson Corporation, CA.

Rosenzweig, E., Roth, A., 2007. B2B seller competence: construct development and measurement using a supply chain strategy lens. *Journal of Operations Management* 25(6), 1311–1331.

Rujipak, T., 2009. *The Re-entry Adjustment of Thai Students in the Transition from Graduation in Australia to the Return Home.* (PhD thesis, Swinburne University of Technology, Victoria, Australia).

Sass, D.A., Smith, P.L., 2006. The effects of parcelling unidimensionnal scales on structural parameter estimates in structural equation modelling. *Structural Equation Modelling 13*(4), 566–586.

Scandurra, L., 2011. *New Zealand Wine Report 2011, GAIN Report*, NZ1104, 1–14.

Schewe, R., 2011. Two wrongs don't make a right: state and private organic certification in New Zealand dairy. *Environment and Planning* 43(6), 1421–1437.

Sekaran, U., 2000. *Research Method for Business: A Skill Building Approach*. John Wiley and Sons, New York.

Shapiro, J., 2001. Modelling and IT perspectives on supply chain integration. *Information Systems Frontiers* 3(4), 455–464.

Shaw, J.M., Subramaniam, C., Tan, W.G., Welge, E.M., 2001. Knowledge management and data mining for marketing. *Decision Support System* 31(1), 127–135.

Siegle, D., 2012. Samples and populations, available at: http://www.gifted.uconn.edu/siegle/research/samples/sampling.gif (accessed 16 August 2012).

Sikweyiya, Y., Jewkes, R., 2011. Perceptions about safety and risks in gender-based violence research: implications for the ethics review process, *Culture, Health and Sexuality. An International Journal for Research, Intervention and Care* 13(9), 1091–1102

Sims, H.P., Faraj, S., Yun, S., 2009. When should a leader be directive or empowering? How to develop your own situational theory of leadership? *Business Horizons* 52(2), 149–158.

Smith, L.G. D., 2006. *The Role of Retailers as Channel Captains in Retail Supply Chain Change: The Example of Tesco* (PhD thesis, University of Stirling).

Somech, A., 2005. Directive versus participative leadership: two complementary approaches to managing school effectiveness. *Educational Administration Quarterly* 41(5), 777–800.

Soosay, C., Fearne, A., Dent, B., 2012. Sustainable value chain analysis – a case study of Oxford Landing from "vine to dine". *Supply Chain Management: An International Journal,* 17(1) 68–77.

Soriano, D., Castrogiovanni, G., 2012. The impact of education, experience and inner circle advisors on SME performance: insights from a study of public development centers. *Small Business Economics* 38(3), 333–349.

Souchon, A.L., Durden, G.R., 2002. Making the most of export information: an exploratory study of UK and New Zealand exporters. *Journal of Euro marketing* 11(4), 65–86.

Speckman, E.R., Isabella, A.L., MacAvoy, C.T., Forbes, T., 1996. Creating strategic alliances which endure. *Long Range Planning* 29(3), 346–356.

Speckman, R., Kamauff, J., Myhr, N., 1998. An empirical investigation into supply chain management: a perspective on partnerships. *International Journal of Physical Distribution & Logistics Management* 28(8), 630–650.

Sporleder, T.L., 1994. Assessing vertical strategic alliances by agribusiness. *Canadian Journal of Agricultural Economics* 42(4), 533–540.

Sporleder, T.L., Peterson, H.C., 2003. Intellectual capital, learning and knowledge management in agri-food supply chains. *Journal on Chain and Network Science* 3(2), 75–80.

Sporleder, T.L., Jackson, C.C, Bolling, D., 2005. Transitioning from transaction-based markets to alliance-based supply chains: implications for firms. *Choices* 20(4), 275–280.

Spriggs, J., Hobbs, J., Fearne, A., 2000. Beef producer attitudes to coordination and quality assurance in Canada and the UK. *International Food and Agriculture Management Review* 3(1), 95–109.

Statistics New Zealand., 2012. Global New Zealand – International trade, investment, and travel profile: year ended December 2011, available at: http://www.stats.govt.nz/browse_for_stats/industry_sectors/imports_and_exports/global-nz-dec-11/key-points.aspx (accessed 20 July 2012).

Statistics New Zealand., 2012a. Agricultural Production Statistics, available at: http://www.stats.govt.nz/searchresults.aspx?q=2011%20onion%20production (accessed 2 August 2012).

Statistics New Zealand., 2011. Overseas merchandise trade: December 2010, available at:http://www.stats.govt.nz/browse_for_stats/industry_sectors/imports_and_exports/OverseasMerchandiseTrade_HOTPDec10/Commentary.aspx, (accessed 06 October 2011).

Sterner, R.W., 2011. What is missing in counselling research? Reporting missing data. *Journal of Counselling and Development* 89(1), 56–62.

Stoian, M., Rialp, A., Rialp, J., 2011. Export performance under the microscope: a glance through Spanish lenses. *International Business Review* 20(2), 117–135.

Stuart, F., Verville, J., Taskin, N., 2012. Trust in buyer-supplier relationships: Supplier competency, interpersonal relationships and performance outcomes. *Journal of Enterprise Information Management* 25(4), 392–412.

Suki, M.N., 2011. A structural model of customer satisfaction and trust in vendors involved in mobile commerce. *International Journal of Business Science and Applied Management 6*(2), 581–598.

Sun, F., Long, A., Boore, J., 2007. The attitudes of casualty nurses in Taiwan to patients who have attempted suicide. *Journal of Clinical Nursing* 16 (2), 255–263.

Sun, Z., Firmin, S., 2012. A strategic perspective on management intelligent systems. *Advances in Intelligent Systems and Computing* 171(1), 3–14.

Tabachnick. B.G., Fidell, A., 2001. *Using Multivariate Statistics*, 4th ed., Allyn and Bacon, USA.

Taber, K., 2012. Prioritising paradigms, mixing methods, and characterising the 'qualitative' in educational research. *Teacher Development: An International Journal of Teachers' Professional Development* 16(1), 125–138.

Tanaka, K., 2005. Redefining the moral responsibility for food safety: the case of red meat in New Zealand. *Rural Sociology* 70(4), 470–490.

Tavella, E., and Hjortsø, C., 2012. Enhancing the design and management of a local organic food supply chain with soft systems methodology. *International Food and Agribusiness Management Review* 15(2), 47–68.

TEARA., 2011. Story: Apples and pears (pip fruit) in New Zealand, available at: http://www.teara.govt.nz/en/apples-and-pears/1 (accessed 3 November 2011).

Thankappan, S., Flynn, A., 2006. Exploring the UK red meat supply chain. Economic and Social Research Council, *Working Paper Series* 32, 1–67.

Thomas, P., 2004. Understanding management: Henry Mintzberg on the activities of managers. *Canadian Public Administration* 27(2), 243–249.

Thorpe, M., 2001. The globalization of the wine industry: new world, old world and China. *China Agricultural Economic Review* 1(3), 301–313.

Trask, M. K., Rice, W.R., Anchors, S., Lilieholm, J.R., 2009. Management style of lumber mill manager in the northern United States. *Forest Products Journal* 59(3), 29–34.

Tripples, R., 2008. Cottesbrooke's New Zealand sauvignon balance wine to Tesco. *British Food Journal* 110(4/5), 444–459.

Tripples, R., 2010. Wine supply chain breaks: New Zealand wines from Cottesbrook, Canterbury. *International Journal of Wine Business Research* 22(2), 148–163.

Turner, S., 2010. Networks of learning within the English wine industry. *Journal of Economic Geography* 10(5), 685–715.

UK Statistics., 2011. Business population estimates for the UK and regions 2010, 1–14.

UNITC., 2010. *Apple, Industry and Trade Summary*, 1–45.

USDD., 2001. Quadrennial defence. available at: www.defense.gov/qdr/report/report20060203.pdf (accessed 3 January 2012).

USDA., 2011. Fresh deciduous fruit (apples, grapes, & pears): world markets and trade, available at: http://www.fas.usda.gov/htp/2011_fruitNov.pdf (accessed 01 August 2012).

USDA., 2011a. Fresh deciduous fruit annual report (E60062), available at: http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Fresh%20Deciduous%20Fruit%20Annual_Vienna_EU-27_10-28-2011.pdf (accessed 01 August 2012).

USDA., 2011b. Fresh deciduous fruit semi-annual (NZ1108), available at: http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Fresh%20Deciduous%20Fruit%20Semi-annual_Wellington_New%20Zealand_5-13-2011.pdf (accessed 01 August 2012).

USDA., 2011c. Wine: world markets and trade, available at: http://www.fas.usda.gov/info/Wine%204-11.pdf (accessed 06 August 2012).

USDA., 2012. Fresh apples production by country in MT, available at:http://www.indexmundi.com/agriculture/?commodity=apples&graph=production (accessed 01 August 2012).

USDA., 2012a. New Zealand fresh apples production by year, available at http://www.indexmundi.com/agriculture/?country=nz&commodity=apples&graph=production (accessed 01 August 2012).

USDA., 2012b. New Zealand fresh apples exports by year, available at http://www.indexmundi.com/agriculture/?country=nz&commodity=apples&graph=expors (accessed 01 August 2012).

USDA., 2012c. Fresh deciduous fruit semi-annual (NZ1206), available at http://gain.fas.usda.gov/Recent%20GAIN%20Publications/Fresh%20Deciduous%20Fruit%20Semi-annual_Wellington_New%20Zealand_5-17-2012.pdf (accessed 01 August 2012).

Van der Vorst, J., 2006. Performance measurement in agri-food supply-chain networks: an overview, in: Ondersteijn, C.J.M., Wijnands, J.H.M., Huirne, R.B.M., van Kooten, O., (eds.), *Quantifying the Agri-Food Supply Chain. Frontis*, Wageningen (Springer), Dordrecht, pp. 13–24.

Vogt, W., Gardner, D., Haeffele, L., 2012. *When to Use What Research Design*. The Guilford Press, New York, USA.

Walker, P., Rhubart-Berg, P., McKenzie, S., Kelling, K., Lawrence, R., 2005. Public health implications of meat production and consumption. *Public Health Nutrition* 8(4), 348–356.

Ward, T.P., Duray, R., 2000. Manufacturing strategy in context: environment, competitive strategy, and manufacturing strategy. *Journal of Operations Management* 18(2), 123–138.

Watchenheim, J.C., Singley, R., 1999. The beef industry in transition: Current status and strategic options. *Journal of Agribusiness* 17(1), 49–62.

Wathne, H., Heide, B., 2000. Opportunism in inter-firm relationships: forms, outcomes and solutions. *Journal of Marketing*, 64(4), 36–51.

Werder, K., Holtzhausen, D., 2009. An analysis of the influence of public relations department leadership style on public relations strategy use and effectiveness. *Journal of Public Relations Research* 21(4), 404–427.

Wheeler, S., Hirsh, E., 2000, Feb 17. Channel champions: customer service is the heart of channel management. *Executive Excellence* 17(2), 17–18.

Wagner, B.A., Fillis, I., Johansson, U., 2005. An exploratory study of SME local sourcing and supplier development in the grocery retail sector. *International Journal of Retail & Distribution Management* 33(10), 716–733.

Wine Institute., 2012. World wine consumption - ranked by consumption, available at: http://www.wineinstitute.org/files/2010_World_Wine_Consumption_By_Volume_Rank.pdf (accessed 04 August 2012).

Wong, A., Tjosvold, D., Zhang, P., 2005. Developing relationships in strategic alliances: commitment to quality and cooperative interdependence. *Industrial Marketing Management* 34(7), 722–729.

Wysocki, F.A., 2005. A frictionless marketplace operating in a world of extremes. *Choices* 20(4), 263–268

Wysocki, F.A., Peterson, C.H., Harsh, B.S., 2006. Quantifying strategic choice along the vertical coordination continuum: implications for agri-food chain performance, in: Ondersteijn, C.J.M., Wijnands, J.H.M., Huirne, R.B.M., van Kooten, O. (Eds.), *Quantifying the Agri-Food Supply Chains.* Frontis, Wageningen (Springer), Dordrecht, pp. 173–188.

Yu, Y., Huang, G., Liang, L., 2008. Stackelberg game-theoretic model for optimizing advertising, pricing and inventory policies in vendor managed inventory production supply chains. *Computers and Industrial Engineering* 57(1), 368–382.

Yuan, K.H., Bentler, P.M., Kano, Y., 1997. On averaging variables in a CFA model. *Behaviormetrika* 24(1) 71–83.

Zikmund, W.G., 2003. *Business Research Methods*, 8th ed., Thomson South-Western, Ohio.

Zineldin, M., Bredenlöw, T., 2003. Strategic alliance, synergies and challenges: a case of strategic outsourcing relationship. *International Journal of Physical Distribution and Logistics Management* 33(5), 449–461.

APPENDIX A

A review of variables used to measure performance

Variables used for performance measuring	References
Accuracy of role of perception, ability and motivation	Harari, 1995
Efficiency (ROI, equity, assets, net worth and gross revenues per employees), growth (change in sales and employees), profit and liquidity size.	Murphy et al., 1996
Organizational values, vision, mission, strategy, key issues and leadership excellence	Kanji, 1998
Low cost, flexibility, quality and delivery	Badri et al., 2000
Stock gains and long term coordination success	Kale et al., 2002
Sales growth rate and perceived satisfaction	Claro et al., 2003
Motivation (effort-performance linkage, performance-reward linkage and attractiveness of reward), sales volume, sales per employee, assets turn over and overall performance.	Mehta et al., 2003
Processing efficiency, inventory level and order supplied	Dasgupta, 2003
Operational performance (quality, cost, flexibility, delivery and prompt response) and financial (return on investment, profit, present value and net income)	Chen and Paulraj, 2004
Market share, sales, revenue, net income, productivity, returns on assets and sales	Acquaah, 2007
Efficiency (costs of production/distribution/transaction, profit, ROI and inventory), flexibility(customers satisfaction, volume and delivery flexibility and back orders/lost sales), responsiveness (filling rate, lateness, response time, customer complaints, lead time and errors), product quality (sensory properties and shelf life, safety and health, reliability and convenience) process-environmental aspects (characteristics of production system and marketing)	Aramyan et al., 2007
Return on assets, sales growth and market-to-book value	Crossland and Hambrick, 2007
Low performance (0–40%), average level performance (41–60%) and high level performance (61–100%)	Heimeriks and Duysters, 2007
Inventory (raw materials, finished goods and in stock rates), cycle time (inventory turn-over and order fulfilment rates) and financial (return on assets, sales, market share and earnings)	Martin and Patterson, 2009

Profits, sales, market share, return on total assets, total sales and overall performance	Demirbag et al., 2010
Customer satisfaction, process efficiency, learning and financial	Bigliardi and Bottani, 2010
Operational, social and financial	Akhtar et al., 2012a
Quality, safety, service, cost, return on asset, innovativeness and traceability	Joshi et al., 2012

Source: Based on the literature review

The table below summarises the information on Pakistani selected chains. Pakistan is the 5th largest milk producing country with 35,491,000 tonnes of milk production. On average, the average annual per capita consumption is about 172 kg of milk annually. Pakistan also imports milk (944 tonnes, negative trade balance) to meet the local demand. Butter production reached 649433 tonnes in 2009/10 season and the average annual per capita consumption was 3.70 kg with an over 100 tonnes of surplus. The meat production was 2,655,280 tonnes. The average annual per person consumption of meat in Pakistan is nearly 15 kg and the data shows that Pakistan imports more meat than the exports. In 2009/10 season, apple and dry onion productions reached 37,800 and 1,701,100 tonnes respectively. The country imported 9,206 and 32,896 tonnes of apples and green onions. As far as wine is concerned, Pakistan does not produce/export wine. The country imported 125 tonnes of wine in 2009/10, but generally the local people in Pakistan do not use wine because of religious reasons and the imported quantity is consumed by foreign visitors.

Background Information on Pakistani Selected Chains, 2009/10

Products/chains	Production (tonnes)	Consumption(kg/c/yr)	Imports (tonnes)	Exports (tonnes)
Milk	35491000	171.90	11046	10102
Butter (inc. ghee)	649433	3.70	93	207
Meat	2655280	14.70	2044	207
Apples	378300	2	9206	2278
Onions	1701100	9.3	**352116	***32896
Wine	*	–	125	*

*Pakistan does not produce or export wine
**Onions green including shallots, ***Dry onions
Source: Developed based on data (FAO, 2012a)

APPENDIX B

Cultural values by country setting

Countries	Uncertainty avoidance	Power distance	Individualism	Masculinity
New Zealand	49	22	79	58
United Kingdom	35	35	89	66
Pakistan	70	55	14	50
Distribution	**Medium-high**	**Low-medium**	**Low-high**	**Medium-high**

Source: (Souchon and Durden, 2002)

Typologies of Information Shared

Information types: Customer service, product quality, lead time, revenue/profit, loading, routing, damages, picking, order processing, stock availability, market information, production plans, demand planning, performance measurement, incomplete orders, delivery reliability, delivery schedules, computer assisted design, replenishment, direct procurement, capacity planning, business strategy, tracking and tracing, cost-to-cash cycle time, asset turning, perfect order fulfilment, total logistics cost, value-added employee productivity and warranty. **References:** Bowersox and Closs, 1996; Speckman et al., 1998; Trienekens, 1999; Van Der Vorst, 2000; Hoppe, 2001; Hardman et al., 2002; Goldsmith et al., 2002; Matanda and Schroder, 2002; Kornieliussen and Grønhaug, 2003; Simmons et al., 2003; Léger and Hadaya, 2003; Huang et al., 2004

Source: Based on the literature review

APPENDIX C

Advantages and disadvantages of different modes of data collection

Modes of data collection	Advantages	Disadvantages
Face-to-face interviews	Questions' clarification Create non-verbal cues Visual aids to clarify points. Rich data	Time consuming Costly particularly when wide geographic region is covered Respondents' confidentiality risk Interviewers need to be trained Interviewers biased risk
Telephone interviews	Less costly and speedier than personal interviews Wide geographical areas can be accessed	Respondents prefer short interviews No visual help
Mail questionnaires	Anonymity is high Wide geographic regions can be reached. Respondent can take more time to respond at own convenience	Response rate is almost always low Follow up procedures of non-responses may be required
Electronic questionnaires	Easy to administer Global access Very inexpensive Fast delivery Respondents can answer at their convenience	Computer literacy is must Respondents must have access to the facility Respondents must be willing to complete the survey Response rate is very low

Source: (Sekaran, 2000)

Sampling techniques: Advantages and disadvantages

Technique	Advantages	Disadvantages
Purposive	Ensures balance of group sizes Focus on specific group	Samples are not easily defensible Subjectivity nature
Quota	Ensures adequate numbers' selection	Same as purposive
Snowball	Possible to include members of groups	Same as purposive
Volunteer, accidental, convenience	Inexpensive way of ensuring sufficient numbers of a study	Highly unrepresentative
Simple random	Highly representative	Not possible without complete list of population members Potentially uneconomical Disruptive to isolate members Time-scale may be too long Data/sample could change
Stratified random	Specific groups are represented by selecting individuals from strata list	More complex, Requires greater effort than simple random; Strata must be carefully defined
Cluster	Possible to select randomly	Clusters in all level must be equivalent and some natural ones are not for essential characteristics
Stage	Possible to select randomly	Complex,

Source: (Black, 1999)

APPENDIX D

The table (in appendix D) was developed to justify the research methodology for this study. A number of relevant studies [Osman-Gani and Tan, 2002; Korneliussen and Grønhaug, 2003; Mehta et al., 2003; As-Sadeq and Khoury, 2005; Karami et al., 2006; Heimerriks and Duysters, 2007; Patzelt and Shepherd, 2008; Akhtar et al., 20121a; 2012b] used both interviews and mail questionnaire survey methods and same approach was also used in the present study.

Methodology Summary Identified from the Key Studies

Studies	Methods & Analyses	Resp. rates & samples	Induct. & Areas	Themes
Speckman et al., 1996	Interviews	31 interviews; senior managers	Multiple; EU & USA	Alliances & endure
Speckman et al., 1998	Survey questionnaire; regression	71% (out of 161); Ops. & proc. managers	Multiple, EU& USA	Partnerships
Fearne, 1998	Case study (survey & semi-structured interviews)	Farmers, meat processors & buyers (major supermarkets)	Select beef chains; Britain	Trust & partnerships
Nakos, et al., 1998	Mail questionnaire; (MANOVA)	34% (out of 400); managers	Multiple; Greece	Managerial characteristics
Boddy et al., 2000	Two case study (semi-structured interviews)	Staff involved in partnering activities at all level	Elec. & plastics; UK & USA	Supply chain partnering
Spriggs et al., 2000	Mail questionnaire; regressing analysis	From Canada 26% (out of 381) & UK 16% (out of 1100); beef producers	Select beef chains; Canada & UK	Coordination & quality assurance
Osman-Gani & Tan, 2002	Personal distribution, mail fax & interviews; (MANOVA)	56% (out of 600) & 30 interviews; relevant managers	Multiple; Singapore	Negotiation styles
Mehta et al., 2002	Mail questionnaire Regression analysis	32% (out of 500) ; sales managers	Manufacturing; USA	Sales manager & channel activities

	(MANOVA)			
Mehta et al., 2003	Questionnaire survey & interviews (from Poland only); regression	17% (out of 1017 for USA, 600 for Finland) & 75 dealerships for Poland; General managers	Automobile, USA, Finland & Poland	Leadership styles' impacts channel perf.
Draulans et al., 2003	International mail-surveys; regression	6-11% response rate (out of 625, 500 world largest companies); CEOs & managers	Multiple; Netherlands & others	Management Techniques and alliance perf.
Korneliussen & Grønhaug, 2003	Regression analyses	27% (out of 250) & 5 interviews); managers	Salmon farming; Norway & Singapore	International distribution
Zineldin & Bredenlöw, 2003	A case study (interviews)	25 interviews, key decision makers	Heavy equipment manufacturing; Sweden	Alliances & challenges
Moura et al., 2003	A case study (interviews)	21 interviews; key decision makers	Meat chains; New Zealand	Product specification & coordination
As-Sadeq & Khoury, 2005	Questionnaire & interviews; regression	82% (out of 220); leaders	Palestine	Leadership styles
Herrmann & Datta, 2005	Regression analyses	Top managers	Manufacturing; USA	Management & diversification
Karami et al., 2006	Survey questionnaire & interviews; regression (ANOVA)	26% (out of 508) & 12 interviews; CEOs	Electronics (SME);UK	CEOs' characteristics & development
Mehta et al., 2006	Mail questionnaire; regression (MANOVA)	31% (out of 480) Exporters	Manufacturing; USA	Cultural impact on marketing
Perks & Jeffery, 2006	Three case studies	87 semi-structured interviews; managers	Fibre, W. Europe & North America	Fibre innovation
Heimerriks & Duysters,	Mail survey& interviews; regression	32% (out of 500) & 10 expert interviews; alliance managers &	Multiple, USA, EU & others	Alliance capabilities & performance

2007		Vice-Presidents		
Johnsen, 2007	Multiple case studies	17 interviews; suppliers	Silk; Italy & Thailand	The role of focal suppliers
Abdulai & Birachi, 2008	Questionnaire survey; descriptive Statistics	340 transactions were analysed; farmers & intermediaries	Milk; Kenya	Coordination
Cao et al., 2008	Three case studies	Brand owners, manufacturer & 3PL-	Apparel; Hong Kong	Coordination
Ling et al., 2008	Mail questionnaire; regression (ANOVA)	20% (out of 795); CEOs &team members	Multiple; USA	Leadership styles
Patzelt & Shepherd, 2008	Telephone & mail questionnaire; conjoint analysis	47% (out of 196); alliance managers	Software & IT; Germany	Decisions & alliance performance
Tipples, 2008	Single case study	Semi-structured interviews; key personnel	Wine; New Zealand & Britain	New Zealand wine to Britain
Trask et al., 2009	In person & telephone interviews; chi-square & descriptive	32 interviews; CEOs	Sawmills; USA	Management styles
Ness, 2009	Multiple case studies	37 semi-structured interviews; key decision makers	Retailing , Norway	Rational practices
Nielsen & Nielsen, 2009	Online survey; structural equation modelling	6% (out of 1851); key decision makers	Multiple; Netherland	Trust, coordination and performance
Reynolds et al., 2009	structural equation modelling	Interviews and total 142 usable responses	Multiple agri-food; Germany	Effective comm., trust & satisfaction
Werder & Holtzhausen, 2009	Online survey; regression (ANOVA)	13% (out of 6982, supervisors; directors & managers	Public relations; USA	Leadership styles & effectiveness
Demirbag et al., 2010	Structured mail questionnaire; data envelopment analysis (DEA)	23% (British, out of 500) & 21% (Turkish, out of 500); CEO	manufacturing Britain & Turkey	Strategic decision making
Akhtar et al., 2012	Case study (semi-structured interviews)	15 interviews; from country directors & managers (chain coordinators)	Multiple (NGO); Kashmir (Pakistan)	Chain coordinators & outcomes

Akhtar et al., 2012a	Semi-structured interviews	24 semi-structured interviews; CEOs, managing directors	Multiple; NZ, UK & Pakistan	Chain coordinators

The case study method, particularly, for the exploratory nature of research, was also used in different studies (Fearne, 1998; Zineldin and Bredenlöw, 2003; Moura et al., 2003 and Tipples, 2008; Akhtar et al., 2012). The table depicts that the face-to-face and telephone interviews produced better response rate than other methods. Particularly, online survey response rate (minimum 6%) is very low. Moreover, multiple industries were used to increase the number of respondents. The table also shows that the response rate from UK is low as compared to other countries. In terms of data analysis methods, structural equation modelling, regression analysis, factor analysis and descriptive statistics were often used.

APPENDIX E

Covering letter for the pilot survey

I am Pervaiz Akhtar, a PhD student at Massey University (www.massey.ac.nz), New Zealand. My research aims to study the relationships between the effectiveness of supply chain coordination and decision makers' characteristics. This research is being conducted in selected agri-food supply chains of New Zealand and UK.

Enclosed please find a questionnaire to participate in this research. The interview will take about an hour. Your participation will make this research successful and it is completely voluntary and you may refuse to participate at any time. There is no risk to you in this study. For maintaining confidentiality, only the aggregated data will be used- no individuals/companies will be identified. Please advise when would be a convenient date/time for you to participate in the interviews.

Many thanks in advance for your valuable inputs. We highly appreciate your time to help us in this survey. If you need further information, please do not hesitate to contact myself or…

Questionnaire for the pilot survey

Section 1

Please specify the industry (which your company belongs to).

a) Wholesale b) Retail c) Manufacturing d) Import e) Export

Please state the average number of employees in your company.

a) < 20 b) 20-49 c) 50-99 d) 100-250 d) >250

Please indicate the average annual turnover (in million NZ$/UK£).

a) <$14 b) $15-52 c) $53-82 d) $83-99 e) >$100

a) < £7 b) £8-26 c) £27-43 d) £44-50 e) >£50

Please state a number of partners in your supply chain.

Do you mind to specify your job title name?

Please state the details about the job.

Do you have any supply chain management related education? If yes, please specify.

Please state your formal level of education.

Have you got any specialised training relevant to chain coordination activities? If yes, please specify.

How many years of work experience do you have in coordinating supply chain activities?

Have many years of total experience you have?

Section 2

Part 1 (thinking about major player/chain coordinators and their activities…)

Which chain player (as an organization) makes the major decisions in your supply chain? Explain why?

Do you have a chain coordinator (s) in your company? If no, who is (are) responsible for chain coordination activities with supply chain players?

What are the responsibilities (you involved) of the chain coordinator in your company?

What are the chain coordination activities you perform (with your supply chain partners)?

Part 2 (thinking about performance…)

Do you measure supply chain performance? How often? How?

Do you think your supply chain performance is effective? Why? Or why not?

Can you suggest anything for effective measurements of supply chain performance?

Part 3 (thinking about skills/competencies/resources…)

Do you suggest specialised skills for a chain coordinator? Which skills?

Do you think any specialised experience is needed to become an effective chain coordinator? What kind?

Do you think any specialised education is needed to become an effective chain coordinator? What kind?

Do you think any specialised level of education (degree) is needed to become an effective chain coordinator? What level?

Do you think a chain coordinator needs any specialised training? Why? What kind of training?

What kind of the communication is required for effective coordination with your supply chain partners?

What extra efforts (such as extra time, in person visits, time and accurate information etc) do you think a chain coordinator should put for supply chain coordination activities?

How do you forecast the demand of products?

How do you forecast the supply of products?

What kind of the problems do you face in coordinating with chain players? How often? Any examples?

Do you have conflicts with your supply chain partners? How often?

How do you manage conflicts with supply chain partners, any examples?

How you manage contracts with supply chain partners?

How do you attract new chain player(s) to work with you?

What (tangible) coordination resources are needed for more effective chain coordination with supply chain partners?

How do you see the future of chain coordinators?

APPENDIX F

Covering letter for chain coordinators (UK main data collection)

I am Pervaiz Akhtar, a PhD student at Massey University (www.massey.ac.nz), New Zealand. My research aims to study the relationships between the effectiveness of supply chain coordination and decision makers' characteristics. This research is being conducted in selected agri-food supply chains of New Zealand and UK.

Enclosed please find a questionnaire to participate in this research. Your participation will make this research successful. The pre-tested results showed that it only takes 15-20 minutes to fill in the questionnaire.

Your participation is completely voluntary and you may refuse to participate at any time. There is no risk to you in this study. For maintaining confidentiality, only the aggregated data will be used-no individuals/companies will be identified. The (free) summary of results will be sent to respondents who provide contact details.

After completing the questionnaire, please send it back (*within a month*) in the enclosed pre-paid envelope. The questionnaire is administrated locally and later will be sent to New Zealand.

Many thanks in advance for your valuable inputs. We highly appreciate your time to help us in this survey. If you need further information, please do not hesitate to contact myself or…

Covering letter for chain coordinators (New Zealand main data collection)

My name is Pervaiz Akhtar, I am a PhD student at Massey University (www.massey.ac.nz), New Zealand. My research aims to study the relationships between the effectiveness of supply chain coordination and decision makers' characteristics. This research is being conducted in selected agri-food supply chains of New Zealand and UK.

Enclosed please find a questionnaire to participate in this research. Your help and cooperation will make this research successful. The pre-tested results showed that it only takes 15-20 minutes to fill in the questionnaire.

Your participation is completely voluntary and you may refuse to participate at any time. For maintaining confidentiality, only the aggregated data will be used-no individuals/companies will be identified. The (free) summary of results will be sent to respondents who provide contact details.

After completing the questionnaire, please send it back within a month in the enclosed pre-paid envelope**.** Many thanks in advance for your valuable inputs. We highly appreciate your time to help us in this survey. If you need further information, please do not hesitate to contact myself or…

Questionnaire for Quantitative Data Collection

Please answer each of the General Questions:

1. Your job title…….…….…….**.....**

2. Highest education attainment (UK and NZ).

a) Less than O-level ☐ b) O-level ☐ c) A-level ☐

d) Undergraduate ☐ e) Master ☐ f) PhD ☐

a) Primary school ☐ b) Secondary/high school ☐ c) Undergraduate ☐

d) Postgraduate ☐ e) PhD ☐

Other (please specify……..……..…….....

3. Main field of education (e.g. supply chain, finance, management etc)? Please specify …….....

4. In which foreign language are you fluent? Please specify languages...…….……..…….....

5. Age group

a) <30 ☐ b) 30-39 ☐ c) 40-49 ☐ d) 50-59 ☐ e) > 60 ☐

6. Professional experience in working with main supply chain partners (producers/suppliers/retailers /processors/wholesalers /service providers/distributors/importers/exporters)?
Number of years ……

7. Please specify your main field(s) of experience (e.g. marketing, accounting, supply chain etc).
……

8. Please select name of product(s) in which you are involved.

a) Meat ☐ b) Dairy ☐ c) Wine ☐ d) Apples ☐ e) Onions ☐

If other main agriculture product(s), please specify

……..…….....

9. Please tick all activities of supply chain in which you are involved.

a) Stock controlling
b) Relationship management
c) Contracting
d) Supply of products
e) Analysing reports
f) Measuring performance
g) Marketing
h) Business research
i) Auctions management
j) Preparing performance-reports
k) Pricing

Other (activities), please specify……

10. How many main partners (or their employees) consult with you for major decision making? Please specify number.....

11. Your type of business.

a) Wholesale ☐ b) Retail ☐ c) Manufacturing ☐ d) Import ☐ e) Export ☐

Other types (please specify)……..……

12. In which year was your company first established?

.....

13. What is total number of employees in the parent company?

a) < 20 ☐ b) 20-100 ☐ c) 101-200 ☐ d) >200 ☐

14. Please indicate annual sales volume (in million UK£/NZ$).

a) < £7 ☐ b) £8-26 ☐ c) £27-43 ☐ d) £44-50 ☐ e) > £50 ☐

a) < $14 ☐ b) $15-52 ☐ c) $53-82 ☐ d) $83-99 ☐ e) > $100 ☐

Practices and Performance Questions:

Please specify the main product for which you are involved ..... and answer questions Q1-Q4 based on this product.

Q.1 Please circle number to show agreement or disagreement with statements	Strongly disagree	Disagree	Neither	Agree	Strongly agree
Top management:					
Encourages to use uniform procedure	1	2	3	4	5
Does not spell out rights and obligation	1	2	3	4	5
Provides sufficient guidelines & instructions	1	2	3	4	5
Middle and lower management:					
Influence determination of policies	1	2	3	4	5
Do not pass ideas to top management	1	2	3	4	5
Sometimes determine promotional allowances	1	2	3	4	5
Communication behaviour is:					
Timely	1	2	3	4	5
Accurate	1	2	3	4	5
Not reliable	1	2	3	4	5
Complete	1	2	3	4	5
Consistent	1	2	3	4	5
Company:					
Does not specify people for coordination activities	1	2	3	4	5
Has sufficient technology for coordination activities	1	2	3	4	5
Separates financial budget for coordination activities	1	2	3	4	5
Advance technology is:					
Used in vehicles to maintain product	1	2	3	4	5

temperature

Not employed for stock controlling	1	2	3	4	5
Used for communication with main partners	1	2	3	4	5
Utilised for research work	1	2	3	4	5

Q.2 Please circle number to rate the importance of statements **regarding main product you entered in Q.1.**

	Very Unimportant	Unimportant	Neither important nor unimportant	Important	Very important
Understanding competitors' strengths.	1	2	3	4	5
Knowing target markets better than competitors.	1	2	3	4	5
Understanding customers' requirements	1	2	3	4	5
Analyzing reports of supply chain performance.	1	2	3	4	5
Forecasting demand and supply accurately	1	2	3	4	5
Matching supply and demand effectively	1	2	3	4	5
Managing market changes effectively	1	2	3	4	5
Considering multiple business points of view	1	2	3	4	5
Making constant improvements in performance	1	2	3	4	5

Q.3 a) For each mode, please circle numbers how frequently you communicate with main partners **regarding main product you entered in Q.1**

	6-Monthly	Quarterly	Monthly	Weekly	Daily
Face-to-face communication	1	2	3	4	5
Communication on **telephones**	1	2	3	4	5
Written correspondence (paper based)	1	2	3	4	5
Computer links	1	2	3	4	5
Communicating through **fax**	1	2	3	4	5
Interactions through **seminars**	1	2	3	4	5

b) Of time spent communicating with your main partners, what percentage is initiated by you?

Please circle group of percentage

0-20% 21-40% 41-60% 61-80% 81-100%

c) Please state the details of training/courses/seminars your company focuses on to improve coordination with partners.

……...……

……...……

Q.4 Please circle a number to show your agreement or disagreement to the following statements **regarding main product you entered in Q.1.**

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Provide deliveries on time	1	2	3	4	5
Do not fulfil 100% orders with accuracy	1	2	3	4	5
Offer very flexible options for changing orders' quantity	1	2	3	4	5

Product defective rate is very low	1	2	3	4	5
Provide100% products safety certification	1	2	3	4	5
Very reliable products are not offered	1	2	3	4	5
Profitability growth is high	1	2	3	4	5
Sales growth is increasing	1	2	3	4	5
Market share growth is reducing	1	2	3	4	5
Relationships with main partners are satisfactory	1	2	3	4	5
Main partners are not good companies for business	1	2	3	4	5
Are satisfied with main-partners' performance	1	2	3	4	5
Do not have high confidence in main partners	1	2	3	4	5
Main partners always consider our best interests	1	2	3	4	5
Main partners do not always keep their promises	1	2	3	4	5
Have successful coordination with main partners	1	2	3	4	5
Overall impact of practices on natural environment is reducing	1	2	3	4	5

Please write your name (optional) here .....

A summary of results will be sent to all respondents who provide contact details. Please attach your business card or write contact details on backside of the questionnaire and put in the given pre-paid envelope. THANK YOU FOR YOUR TIME AND COOPERATION! ☺

APPENDIX G

26 May 2010

Pervaiz Akhtar
#1 Massey Apartments
440 Albany Highway
ALBANY 0632

Dear Pervaiz

Re: Determinants of Coordination Effectiveness of Selected International Agri-food Supply Chains: A Structural Equation Modelling Approach (title changed)

Thank you for your Low Risk Notification which was received on 21 May 2010.

Your project has been recorded on the Low Risk Database which is reported in the Annual Report of the Massey University Human Ethics Committees.

The low risk notification for this project is valid for a maximum of three years.

Please notify me if situations subsequently occur which cause you to reconsider your initial ethical analysis that it is safe to proceed without approval by one of the University's Human Ethics Committees.

Please note that travel undertaken by students must be approved by the supervisor and the relevant Pro Vice-Chancellor and be in accordance with the Policy and Procedures for Course-Related Student Travel Overseas. In addition, the supervisor must advise the University's Insurance Officer.

A reminder to include the following statement on all public documents:

> *"This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.*
>
> *If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, e-mail humanethics@massey.ac.nz".*

Please note that if a sponsoring organisation, funding authority or a journal in which you wish to publish requires evidence of committee approval (with an approval number), you will have to provide a full application to one of the University's Human Ethics Committees. You should also note that such an approval can only be provided prior to the commencement of the research.

Yours sincerely

J. O'Neill

John G O'Neill (Professor)
Chair, Human Ethics Chairs' Committee and
Director (Research Ethics)

cc Assoc Prof Norman Marr
Institute of Food, Nutrition and Human Health
PN452

Prof Richard Archer, HoI
Institute of Food, Nutrition and Human Health
PN452

APPENDIX H

Missing Data for New Zealand Sample

	N	Mean	Std.	Count	Percent
AgeGrp	223	3.57	0.93	2	.90
CompAge	224	29.31	20.50	1	.40
EmpNo	223	1.93	0.81	2	.90
SalMilNZD	222	1.95	0.79	3	1.30

Little's MCAR test: Chi-Square = 3.268, DF = 4, Sig. = .514

Missing Data for UK Sample

Variables	N	Mean	Std.	Count	Percent
SalMilUKP	109	1.7	0.50	3	2.70
AgeGrp	110	3.96	0.90	2	1.80
FNP1	110	3.96	0.70	2	1.80
PatCnstNo	110	6.29	5.11	2	1.80
CompAge	111	37.59	24.93	1	0.90
EmpNo	111	1.79	0.87	1	0.90

Little's MCAR test: Chi-Square = 22.441, DF = 30, Sig. = .838

APPENDIX I

Summary Statistics (New Zealand)

Constructs/Items description	Items codes	Mean	St. D	Skew. ness	Kur- tosis
Directive leadership style					
Top management encourages to use uniform	DLS1	4.16	0.62	-0.22	0.03
Top management does not spell out rights and obligations*	DLS2	3.92	0.66	0.08	-0.67
Top management provides sufficient guidelines & instructions	DLS3	4.11	0.46	0.39	1.36
Participative leadership style					
Middle and lower management influence determination of policies	PLS1	3.91	0.81	-0.49	-0.13
Middle and lower management do not pass ideas to top management*	PLS2	3.96	0.72	-0.59	0.61
Middle and lower management sometimes determine promotional allowances	PLS3	3.76	0.72	-0.56	0.42
Communication quality					
Communication behaviour is timely	CMQ1	4.02	0.61	-0.01	-0.30
Communication behaviour is accurate	CMQ2	3.94	0.60	0.02	-0.20
Communication behaviour is not reliable*	CMQ3	3.98	0.68	-0.06	-0.58
Communication behaviour is complete	CMQ4	3.77	0.57	-0.24	0.17
Communication behaviour is consistent	CMQ5	3.84	0.58	-0.24	0.42
Communication frequency					
Of time spent communicating with your main partners, what percentage is initiated by you	CMF1	4.16	0.70	-0.23	-0.92
Face-to-face communication	CMF2	3.84	0.65	-0.02	-0.27
Communication on telephones	CMF3	4.30	0.67	-0.45	-0.78
Computer links	CMF4	4.25	0.63	-0.26	-0.65
Written paper based correspondence	CMF5	4.11	0.56	0.04	0.14
Communicating through fax	CMF6	2.08	1.33	0.92	-0.48
Human resources for coordination					
Company does not specify people for coordination activities*	HR	3.73	0.73	-0.53	0.30
Non-human resources					
Company has separate financial budget for coordination activities	NHR1	3.82	0.86	-0.42	-0.38
Company has sufficient technology for coordination activities	NHR2	3.92	0.68	-0.33	0.26
Advance technology is used in vehicles to maintain temperature for products	NHR3	3.88	0.86	-0.36	-0.54

Advance technology is not employed for stock controlling*	NHR4	3.53	0.80	0.29	-0.49
Advance technology is used for communication with main partners	NHR5	4.04	0.73	-0.69	0.81
Advance technology is utilised for research	NHR6	3.72	0.80	-0.13	-0.48
Analytical skills (internal applications)					
Analyzing reports of supply chain performance	ASI1	4.04	0.47	0.12	1.54
Forecasting demand and supply accurately	ASI2	4.51	0.53	-0.30	-1.30
Matching supply and demand effectively	ASI3	4.62	0.55	-1.22	1.47
Making constant improvements in performance	ASI4	4.42	0.58	-0.39	-0.74
Analytical skills (external applications)					
Understanding competitors' strengths	ASE1	4.31	0.57	-0.09	-0.59
Knowing target markets better than competitors	ASE2	4.57	0.56	-0.85	-0.32
Understanding customers' requirements	ASE3	4.75	0.47	-1.54	1.30
Managing market changes effectively	ASE4	4.24	0.65	-0.37	-0.25
Considering multiple business points of view	ASE5	3.85	0.61	-0.04	-0.07
Service quality					
Provide deliveries on time	SRQ1	4.41	0.61	-0.49	-0.63
Do not fulfil 100% orders with accuracy*	SRQ2	4.22	0.55	0.08	-0.21
Offer very flexible options for changing orders' quantity	SRQ3	4.32	0.54	0.50	-0.72
Product quality					
Product defective rate is very low	PRQ1	4.31	0.52	0.17	-0.68
Provide100% products safety certification	PRQ2	4.46	0.57	-0.49	-0.71
Very reliable products are not offered*	PRQ3	4.35	0.56	-0.15	-0.73
Impact of practices on natural environment is reducing	PRQ4	2.61	0.86	0.42	0.66
Financial performance					
Profitability growth is high	FNP1	3.72	0.73	-0.22	-0.11
Sales growth is increasing	FNP2	3.92	0.64	-0.55	1.10
Market share growth is reducing*	FNP3	3.77	0.81	-0.14	-0.57
Satisfaction (with main chain partners)					
Relationships with main partners are satisfactory	SAT1	4.10	0.48	0.03	1.38
Main partners are not good companies for business*	SAT2	4.26	0.62	-0.24	-0.60
Are satisfied with main-partners' performance	SAT3	3.92	0.42	-0.48	2.25
Have successful coordination with main partners	SAT4	3.98	0.48	-0.07	1.46
Trust (in main chain partners)					
Do not have high confidence in main partners*	TRT1	4.06	0.60	-0.15	0.25
Main partners always consider our best interests	TRT2	4.03	0.60	-0. 13	0.29
Main partners do not always keep their promises*	TRT3	3.96	0.63	-0.18	0.14

APPENDIX J

Final Factor Analysis Results and Reliability (New Zealand)

Items codes	Loadings	Eigenvalue	Variance	Reliability
Directive and participative leadership styles				
DLS1	0.83			
DLS2	0.86	2.72		0.81
DLS3	0.86			
PLS1	0.88		73.98	
PLS2	0.83	1.75		0.83
PLS3	0.85			
Communication quality				
CMQ1	0.81			
CMQ2	0.76			
CMQ3	0.74	2.81	56.27	0.80
CMQ4	0.73			
CMQ5	0.70			
Communication frequency				
CMF1	0.81			
CMF2	0.72			
CMF3	0.79	2.92	58.53	0.82
CMF4	0.78			
CMF5	0.73			
CMF6	Deleted because of low loading in its intended			
Human and non-human resources				
HR	0.88	1.09		–
NHR1	0.76			
NHR2	0.62			
NHR3	0.69			
NHR4	0.67	3.01	58.53	0.76
NHR5	0.68			
NHR6	0.80			
Analytical skills (internal applications)				
ASI1	Deleted because of low loading in its intended			
ASI2	0.86			
ASI3	0.86	2.00	66.49	0.74
ASI4	0.72			
Analytical skills (external applications)				
ASE1	0.78			
ASE2	0.86			

ASE3	0.73			
ASE4	0.75	2.68	68.58	0.78
ASE5	Deleted because of low loading in its intended			
Service quality				
SRQ1	0.83			
SRQ2	0.84	2.12	70.64	0.79
SRQ3	0.83			
Product quality				
PRQ1	0.82			
PRQ2	0.83	2.02	67.31	0.76
PRQ3	0.85			
PRQ4	Deleted because of low loading in its intended			
Financial performance				
FNP1	0.81			
FNP2	0.88	2.01	67.13	0.74
FNP3	0.77			
Satisfaction (with main chain partners)				
SAT1	0.86			
SAT2	0.80			
SAT3	0.76	2.46	61.65	0.78
SAT4	0.86			
Trust (in main chain partners)				
TRT1	0.79			
TRT2	0.86	2.04	68.14	0.77
TRT3	0.83			

APPENDIX K

Summary Statistics (UK)

Constructs/Items description	Items codes	Mean	St. D	Skew-ness	Kurt-osis
Directive leadership style					
Top management encourages to use uniform procedure	DLS1	3.52	0.64	-0.17	-0.18
Top management does not spell out rights and obligations*	DLS2	3.35	0.64	-0.04	-0.25
Top management provides sufficient guidelines & instructions	DLS3	3.58	0.74	-0.21	-0.19
Participative leadership style					
Middle and lower management influence determination of policies	PLS1	4.10	0.50	0.19	0.87
Middle and lower management do not pass ideas to top management*	PLS2	4.12	0.52	-0.23	2.60
Middle and lower management sometimes determine promotional allowances	PLS3	4.17	0.55	0.07	0.02
Communication quality					
Communication behaviour is timely	CMQ1	3.77	0.67	-0.97	1.33
Communication behaviour is accurate	CMQ2	3.79	0.65	-1.42	2.44
Communication behaviour is not reliable*	CMQ3	3.82	0.63	-0.71	1.28
Communication behaviour is complete	CMQ4	3.67	0.64	-0.88	0.77
Communication behaviour is consistent	CMQ5	3.74	0.67	-0.57	0.62
Communication frequency					
Of time spent communicating with your main partners, what percentage is initiated	CMF1	3.47	0.722	0.168	-0.202
Face-to-face communication	CMF2	3.47	0.72	0.17	-0.20
Communication on telephones	CMF3	3.96	0.76	-0.42	-0.05
Computer links	CMF4	4.10	0.79	-0.51	-0.36
Written correspondence	CMF5	3.99	0.78	-0.34	-0.41
Communicating through fax	CMF6	2.62	1.06	-0.06	-0.32
Human resources for coordination					
Company does not specify people for coordination activities *	HR	3.77	0.70	0.19	-0.64
Non-human resources					
Company has separate financial budget for coordination activities	NHR1	3.50	0.81	0.11	-0.44
Company has sufficient technology for	NHR2	3.97	0.69	-0.63	1.03
Advanced technology is used in vehicles to maintain temperature for products	NHR3	3.90	0.77	-0.31	-0.25
Advance technology is not employed for stock controlling*	NHR4	3.88	0.80	-0.32	-0.36

Advance technology is used for communication with main partners	NHR5	3.88	0.72	0.03	-0.71
Advance technology is utilised for research work	NHR6	3.57	0.74	0.35	-0.43
Analytical skills (internal applications)					
Analyzing reports of supply chain	ASI1	4.04	0.65	-0.04	-0.58
Forecasting demand and supply accurately	ASI2	3.93	0.52	-0.11	0.79
Matching supply and demand effectively	ASI3	4.06	0.65	-0.06	-0.58
Making constant improvements in performance	ASI4	4.06	0.63	-0.05	-0.47
Analytical skills (external applications)					
Understanding competitors' strengths	ASE1	4.05	0.55	0.03	0.36
Knowing target markets better than competitors	ASE2	4.06	0.51	0.11	0.93
Understanding customers' requirements	ASE3	4.27	0.62	-0.23	-0.58
Managing market changes effectively	ASE4	4.07	0.58	-0.00	0.00
Considering multiple business views	ASE5	4.09	0.53	0.10	0.54
Service quality					
Provide deliveries on time	SRQ1	4.47	0.57	-0.49	-0.74
Do not fulfil 100% orders with accuracy*	SRQ2	4.28	0.57	-0.08	-0.49
Offer very flexible options for changing orders' quantity	SRQ3	4.25	0.51	0.31	-0.27
Product quality					
Product defective rate is very low	PRQ1	4.17	0.57	-0.29	1.37
Provide100% products safety certification	PRQ2	4.28	0.63	-0.52	0.46
Very reliable products are not offered*	PRQ3	4.29	0.58	-0.11	-0.52
Impact of practices on natural environment is reducing	PRQ4	2.85	1.13	0.65	-0.55
Financial performance					
Profitability growth is high	FNP1	3.96	0.70	0.05	-0.91
Sales growth is increasing	FNP2	4.04	0.59	-0.28	0.94
Market share growth is reducing*	FNP3	4.07	0.64	-0.27	0.26
Satisfaction (with main partners)					
Relationships with main partners are	SAT1	4.13	0.52	0.16	0.49
Main partners are not good companies for	SAT2	4.37	0.54	0.02	-0.94
Are satisfied with main-partners' performance	SAT3	4.17	0.58	-0.04	-0.22
Have successful coordination with main partners	SAT4	4.11	0.51	0.18	0.74
Trust (in main chain partners)					
Do not have high confidence in main partners *	TRT1	4.12	0.63	-0.09	-0.45
Main partners always consider our best	TRT2	4.01	0.65	-0.01	-0.59
Main partners do not always keep their promises *	TRT3	4.08	0.69	-0.10	-0.85

APPENDIX L

Final Factor Analysis Results and Reliability (UK)

Items codes	Loadings	Eigenvalues	Variance	Reliability
Directive and participative leadership styles				
DLS1	0.92			
DLS2	0.91	2.56		0.89
DLS3	0.90			
PLS1	0.76		75.90	
PLS2	0.88	1.98		0.77
PLS3	0.84			
Communication quality				
CMQ1	0.94			
CMQ2	0.92			
CMQ3	0.86	3.78	75.69	0.92
CMQ4	0.82			
CMQ5	0.81			
Communication frequency				
CMF1	0.71			
CMF2	0.83			
CMF3	0.93	2.82	70.71	0.86
CMF4	0.88			
CMF5	Deleted because of low loading in its intended construct			
CMF6	Deleted because of low loading in its intended construct			
Human and non-human Resources				
HR	0.83	1.29		-
NHR1	0.75			
NHR2	0.86			
NHR3	0.81			
NHR4	0.89	4.17	69.51	0.91
NHR5	0.84			
NHR6	0.85			
Analytical skills (internal applications)				
ASI1	0.87			
ASI2	0.82			
ASI3	0.92	3.08	77.016	0.90
ASI4	0.89			
Analytical skills (external applications)				
ASE1	0.84			
ASE2	0.88			

ASE3	0.87			
ASE4	0.82	3.67	73.37	0.91
ASE5	0.88			
Service quality				
SRQ1	0.81			
SRQ2	0.86	2.16	72.02	0.72
SRQ3	0.86			
Product quality				
PRQ1	0.86			
PRQ2	0.84	2.23	74.20	0.83
PRQ3	0.86			
PRQ4	Deleted because of low loading in its intended construct			
Financial performance				
FNP1	0.89			
FNP2	0.92	2.49	83.12	0.89
FNP3	0.93			
Satisfaction (with main chain partners)				
SAT1	0.75			
SAT2	0.80			
SAT3	0.88	2.64	66.10	0.83
SAT4	0.82			
Trust (in main chain partners)				
TRT1	0.95			
TRT2	0.95	2.65	88.46	0.93
TRT3	0.93			