Effective Horizontal Coordination

Bridging the barriers to effective supply chain management

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Abstract

This research takes a supply chain management perspective to explore the barriers to effective horizontal coordination in clusters of companies that otherwise compete but which come together to cooperate. Vertical coordination in supply chains is more commonly investigated; however, horizontal coordination can provide a valuable source of competitive advantage for clusters.

A multiple-case study design was used in the data collection process. Data were gathered from three clusters, each exhibiting different degrees of success in managing the horizontal coordination. Case studies were created and compared to infer how the clusters bridged barriers to horizontal coordination. Cluster members compete in some markets while cooperating through coordinated activity in other markets, representing a 'coopetitive' situation. The primary barriers identified are lack of information sharing, distrust and unwillingness to work together, power and capability imbalances, competitive pressures, lack of risk and reward sharing, inconsistent goals, and a limited competitive focus. The barriers can be bridged through engaging with all members, generating value in the supply chain that breeds group pressures, structuring the division of costs and benefits, aligning member goals with the cluster, and sharing and respecting member capabilities.

Coordinating activities in a cluster enables small firms to gain cost benefits while also generating greater value in the supply chain. Bridging the barriers and being aware of key variables that relate to trust within coopetitive clusters enables managers to navigate the relationships successfully. The long-term success of the coopetitive venture must be supported with clear communication and structure in the relationships. When the decision to cluster is operationalised greater value can be created throughout the supply chain, returning significant benefits to cluster members.

The research highlights the importance of governance and competitiveness in supply chain management, particularly the importance of capabilities and group pressure to effective coordination. It complements existing research on vertical coordination by expanding the focus to horizontal coordination and explaining how it may be enhanced. Many issues in horizontal coordination are interrelated and the connections between important variables are explicated to allow improved decision making for enhanced coordination.

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Abbreviations

CDP	–	Cluster Development Programme
CLD	–	Causal loop diagram
DIFOTIS	–	Delivery in full, on time, in spec
EB	–	Export board
GCC	–	Global commodity chain
KPI	–	Key Performance Indicator
NZTE	–	New Zealand Trade and Enterprise
RBV	–	Resource-based view
RDT	–	Resource dependency theory
SC	–	Supply chain
SCM	–	Supply chain management
SD	–	System dynamics
SME	–	Small and medium-sized enterprises
TC	–	Transaction cost
TCE	–	Transaction cost economics
UAHPEC	–	the University of Auckland Human Participants Ethics Committee
VPC	–	Value Price Cost (Framework)

Chapter 1. Introduction

"The real voyage of discovery consists not in seeking new landscapes but in having new eyes."

Marcel Proust, French novelist and author

Distances around the globe have shrunken; with technology and globalisation, capital and jobs can easily be switched between locations. The search to maintain, and improve, competitiveness in this 'slippery' world has increased in importance and receives much attention from political leaders, business people, and scholars (Markusen, 1996). Many methods to improve competitiveness have been proposed and one that receives particular attention is the concept of a cluster of companies. "Clusters are geographic concentrations of interconnected companies and institutions in a particular field" (Porter, 1998b, p. 78), anchoring firms and providing benefits to the members of the cluster as well as the region in which the cluster is located. A leading business scholar, Michael Porter, indicates that a key advantage for an individual member of clustering is that they gain 'as if' they were larger companies. For this gain, as if they had more scale, horizontal coordination between the members is required; the members most likely to gain from this coordination will tend to be competitors. Where competitors agree to cooperate as a single unit a coalition emerges and it is in this sense that the term cluster is used. The ability of competitors to cooperate is highly variable.

Clustering has been posited as a method to improve competitiveness, yet there appear to be difficulties in applying horizontal coordination in a cluster to improve performance. There are few examples of it being successfully applied in New Zealand. The lack of uptake indicates that there are barriers preventing firms from taking this approach. This research identifies these barriers and seeks to understand how they can be overcome, or bridged. Working effectively in a cluster can unlock considerable value for the participants, yet the challenges to this approach are significant.

1.1. Horizontal coordination in clusters

It is well accepted that clustering provides benefits, yet the methods used to unlock these benefits are not clearly articulated in the literature. Having similar firms in the same industry located nearby does not, in itself, help any of the firms. It is the ability for these disparate entities to coordinate their activities that helps them to see benefits. Working together involves the coordination of activities between themselves. Yet, there is no clear direction provided as to how

the firms can coordinate their activities in this manner to gain advantages as if they have greater scale. The vast expanse of research on clusters has focused on a network and knowledge approach, which is periphery to the present research on coordination of activity.

When competitors also cooperate with one another the situation is commonly termed coopetition, a mixture of both situations. This mode of activity has increasingly gained attention over the past decade but most research still focuses on the relationships at a strategic level and less frequently at an operational level (Bonel & Rocco, 2007). While barriers at the strategic level may be overcome to create a joint focus between the members going forward, the relationships must be managed and utilised at an operational level in order to create value for the members. There seems to be reluctance of companies to discuss how they do something, as opposed to whether or not they are actually doing something. This is understandable, as this how is invisible to an outsider; the ability to accomplish objectives using available resources, known as a capability, can be very valuable in terms of enhancing competiveness. This fact, coupled with the difficulty of gathering data from disparate parties in a network, indicates that the reason there is little available research lies in the difficulties in acquiring the necessary data.

1.2. Supply chain management

Coordination between firms for the purposes of supply is frequently conducted within the domain of supply chain management. This discipline focuses on the coordinated flow of materials, information, and finances throughout the supply chain, using coordination of processes and the management of relationships between firms, to achieve success. These forms of relationships and coordinated activity are usually perceived vertically, along a chain consisting of multiple tiers of suppliers. Indeed, “supply chain management is viewed as lying between fully-vertically-integrated systems and those where each channel member operates completely independently” (Cooper & Ellram, 1993, p. 13), indicating a strong focus on the vertical dimension of the supply chain. When coordination between competitors is considered, it falls into the category of horizontal coordination in the supply chain (Figure 1.1). Horizontal coordination has received little attention, despite the fact that a compelling case is made, in management literature, that coopetition (incorporating horizontal coordination) can prove to be very beneficial to the participants (Bonel & Rocco, 2007; Brandenburger & Nalebuff, 1996; Walley, 2007, *inter alia*). Coordination, even along the horizontal dimension, clearly relates well with many of the objectives of supply chain management and remains under-researched; vertical coordination along a chain receives greater attention, particularly as competition is perceived to be between supply

chains rather than companies (Christopher, 2005); as "individual businesses no longer compete as stand-alone entities but rather as supply chains" (Christopher & Towill, 2000, p. 209).

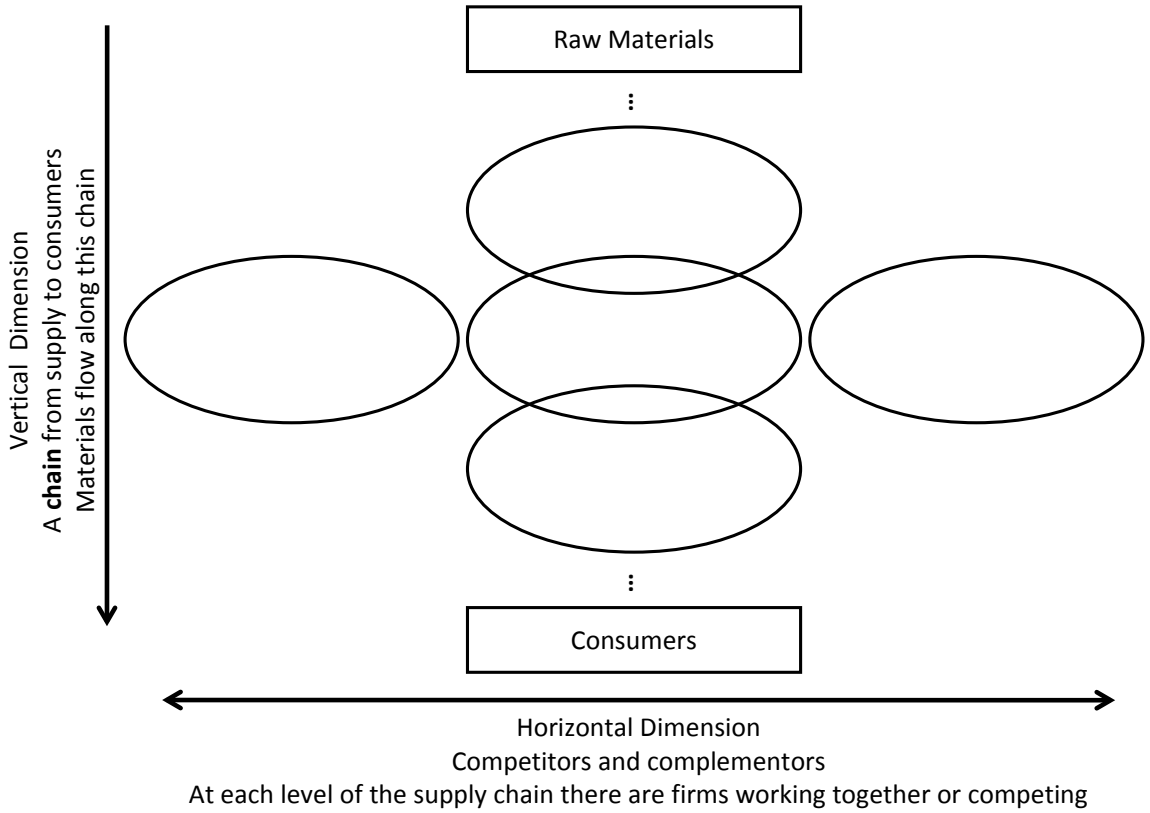

Figure 1.1: A comparison between horizontal and vertical dimensions in the supply chain

While much research in supply chain management focuses on process integration vertically along the chain (Lambert & Cooper, 2000), the present research contains greater emphasis on the management of unstructured relationships on the horizontal dimension of the supply chain. This is accomplished by drawing on theories and concepts from other disciplines that are little used in supply chain management, and in doing so, answers the call for theoretical lenses and theories from other disciplines to be applied within the domain of logistics and supply chain management (Halldorsson, Kotzab, Mikkola, & Skjøtt-Larsen, 2007; Halldorsson, Skjøtt-Larsen, & Kotzab, 2003; Ketchen & Hult, 2007; Stock, 1997).

The term 'coordination' has been used throughout this thesis in place of 'integration' in relation to the horizontal relationships. The rationale for using the term coordination is explained in §2.1.5.

1.3. The New Zealand experience of clusters

New Zealand Trade and Enterprise (NZTE) is a Crown entity tasked with the goal "to improve the international competitiveness and sustained profitability of New Zealand business by providing access to people, knowledge and opportunities" (NZTE, 2009, p. 2). During 2001-2002 NZTE started the Cluster Development Programme (CDP); (MED, 2006). The CDP was designed to

replicate much of the work that other government organisations around the world have been attempting: to encourage companies to cluster and to use the concept of clusters successfully to boost productivity and business success. Clustering was seen as important in the New Zealand context as in the internationalisation of small firms; "competitors are becoming an important source from which to acquire resources" (Chetty & Wilson, 2003, p. 78), and clustering is one way for a small firm to access these resources as if it were a larger firm.

The CDP programme operated for several years, with the key activity being the funding of cluster facilitators, before being disestablished in 2006. The programme had "generally been successful in improving collaboration between targeted firms;" however, it was considered to be an "ill-defined programme," representing a small volume of funding, "very thinly spread" over 82 clusters (OMED, 2006). Furthermore, collaboration in a cluster relating to a specific outcome, such as market or sector development, is already promoted through existing NZTE programmes (MED, 2006). Despite the disestablishment of the CDP the NZTE maintains interest in clusters; however, this interest will be pursued at a regional level and as part of other NZTE programmes. Working at a regional level allows stakeholders to make decisions that best suit their individual needs, rather than decisions being made at a national level by NZTE (MED, 2006).

Anecdotal evidence, gathered during the start of this research in 2007, showed that many clusters supported by NZTE that were involved in the production of products had ceased to function adequately. During the course of enquiring with clusters (previously supported by the CDP) about interest in the study, it was found that many of them no longer worked together. The implication is that when the cluster facilitator was no longer funded by NZTE the cluster itself appeared to disintegrate. The tendency towards disintegration indicates that there are some significant barriers that prevent the organisations in a cluster from effectively coordinating their activities. It is these barriers to horizontal coordination that the present research seeks to address, specifically with a focus on understanding how they may be bridged.

1.4. The context – New Zealand

The research was conducted in New Zealand and commenced soon after the CDP programme was formally disestablished. Basing the research setting in New Zealand where I am based ensured simple and economic access to data. This does not limit the value of the research findings; the issues facing the cases studied are relatively universal and are relevant where competitors within a cluster coordinate activities. This means that while the research draws from data gathered around New Zealand the results can be generalised beyond this context. Firms that aim to improve their

horizontal coordination with competitors will find many of the same issues are relevant to them, as are the solutions and bridges to the barriers that are proposed. Throughout this research the participants were clusters of companies within New Zealand. In each case the cluster is located close to the physical source of raw materials and the companies are located in close geographic proximity in relation to the length of the entire supply chain within which they are situated.

Clustering may help smaller firms act as if they had greater scale, strongly suggesting that small firms are able to secure large advantages from the practice. Within New Zealand small- and medium-sized enterprises (SMEs) are crucial to the economy. SMEs with five or fewer employees accounted for over 40% of all 2007 nation-wide profits and, at NZ $106b, represented one third of total retail sales and other income in 2007 (MED, 2009, p. 34-35).

The quantification of benefits derived from the horizontal coordination in a cluster is difficult as there is frequently no control case that may be used by way of comparison. Challenges in judgement are exacerbated by the uncertainties inherent in the horticulture and produce sector, to which the clusters examined in this study belong. Further challenges are presented by the earning of income in currencies other than the New Zealand dollar. Leaving aside the impact of the exchange rate, the most successful cluster in the present research has been able to increase the prices received in the target market by 30%. This is only one market and such results may not be applicable over all markets. However, if all New Zealand SMEs increased revenue by only 5% this would be an increase in revenue of $5.3b.[1]

1.5. The gap that needs to be filled

At present there is little understanding in supply chain management as to what the barriers to effective horizontal coordination are and how they may be bridged. Horizontal coordination is marginalised in the supply chain management literature; most research focuses on the vertical linkages between firms down a chain. This is in contrast with the present research which focuses on relationships between firms at the same level of the supply chain. There is a paucity of research that can help to guide firms in their horizontal coordination of activities between competitors in a cluster. To accomplish this would also require identification of barriers to such coordination. While barriers to vertical integration have been identified and studied (Fawcett, Magnan, & McCarter, 2008), barriers to horizontal coordination have not received the same thorough treatment.

[1] Based on a 5% increase of total sales recorded for SMEs in 2007, based on data sourced from MED (2009).

1.6. Theoretical lenses

Many of the problems and issues described in the present research are not frequently dealt with in supply chain management and have required the application of theoretical lenses and concepts from other domains. These lenses include transaction cost economics (TCE) to understand the opportunistic behaviours in coopetitive relationships and the social mechanisms in network governance that may be used to curb the behaviours. The issues surrounding competitiveness were examined through the use of the resource-based view (RBV) of the firm, the closely related dynamic capabilities perspective, and the VPC framework that analyses the value, price, and cost profiles of firms. Finally, causal loop diagrams, from systems dynamics, are employed to make sense of the complex interrelationships that may be perceived in the 'messy' situations involving coopetition. Together, these theories allow examination of various aspects of the behaviours exhibited by the clusters in a structured manner to better understand what occurs and why. Using these multiple theories allows examination of the phenomenon with a different pair of eyes.

Having used these theories it is possible to make sense of the events in the cases in ways that are not readily apparent with traditional supply chain management frameworks. This alone reinforces the value that may be derived through the use of alternate theories from other disciplines.

1.7. Objectives of the research

If the use of clustering can provide significant benefits then it behoves us to ask the question: why are more firms not clustering in this manner? Both literature and logic dictate a simple answer: there are barriers that block firms from forming these clusters to provide supply chain management benefits. While cases of coopetition and effective horizontal coordination can be identified in New Zealand, why are there not many more examples of such coordination by firms at the same level in clusters? This leads us to two research questions, which will be elaborated on in the following chapter, presenting the literature review.

Research question one:

> *What are the barriers to improved horizontal coordination, between the members of a cluster, to improve supply chain management?*

Research question two:

> *How can these barriers be bridged to allow successful coordination?*

The objective of this research is to answer both of these questions through the study of several clusters. As there is little extant literature on this subject the research necessitates an exploratory stance. Qualitative methods were chosen to enable the subject matter to be more clearly understood. Case studies were created based on the primary data gathered on three clusters that exhibited different levels of coordination and success, along with secondary data on one other exemplary case. Analysis of these cases allows determination of the factors that underpinned the success of the ventures, allowing the research questions to be answered. This results in a valuable contribution to the literature as well as practical managerial implications.

The research will contribute to the understanding of supply chain management through the identification of barriers to horizontal coordination and outlining how these barriers may be bridged. This task is accomplished through the use of theories frequently employed in other disciplines to provide insight into the problem. These theories, and the research process itself, generate other interesting contributions which are outlined in the final chapter.

1.8. Outline of the manuscript

This section of the thesis has sought to underline the importance of, and introduce, the topic of the research to the reader. In the following chapter the extant literature will be investigated more fully. There are several sections of interest, the first being the study of clusters from different perspectives, drawing upon literature from several disciplines. After investigating the disciplines perspectives, the literature review in Chapter 2 will begin to involve itself more fully in some of the prime and most important perspectives. While doing this the chapter highlights several gaps in the extant literature which the present study attempts to fill, or plug, with the research outcomes. Following from this the review will begin to uncover the exact perspectives from the current supply chain management discipline regarding the study of clusters, in order to understand the line of questioning that will be most beneficial. Issues of governance, utilising transaction cost economics, and competitiveness, using the resource-based view of the firm, will also be investigated and incorporated.

Chapter 3 deals with the methodology employed during the present research. In this section the structure of the research project will be explained in more depth. First of all, an understanding of what is being investigated will be outlined and the consequences for the research design will be presented. Using a set of best practices from the discipline, and other related studies, the research design is discussed. This involves not only the initial design of the project but also a discussion on how data has been analysed and presented in the final manuscript.

The cases studied are presented and the analysis of each case occurs separately. This phase consists of three chapters, NZBrand in Chapter 4, HortCom in Chapter 5, and WineCom in Chapter 6. (The JEMCO oyster case, based on secondary data, is included in Appendix I.) Each case is a cluster of companies. The attributes and characteristics of each cluster, as well as other important details, are outlined.

Chapter 7 will advance the analysis of the cases examining differences between them. Through this process the research attempts to understand the differences between the clusters. The design of the research reveals that there are clusters exhibiting varying degrees of success; the barriers and methods of bridging the barriers can thus be compared between successful and less successful cases. This approach aims to understand what factors are contributing to the success or failure of the cluster initiatives by bridging these barriers, from a supply chain management perspective.

Chapter 8 seeks to take the preceding analysis and craft this into a coherent and brief analysis through reiteration of critical components identified, and comparisons with literature. The key aspects from the literature review are once more discussed while the understanding gained from this research can then be related back to the extant literature. It is also important to note that in this chapter the research questions themselves are answered, as well as the outcomes from the research being positioned relative to extant literature and theory. The research findings are discussed in a manner that is of practical value to a professional, to broaden the appeal of the present research. Methods for the operationalisation of key factors identified in the study are outlined so that managers may more easily make use of the lessons learned from exemplary clusters.

Finally, in Chapter 9 the focus is once more on a wider context. Previous chapters have placed the present research in the context of the body of literature within which it is embedded and also within the realm of managerial action. The final chapter begins to position the research in a much broader context than just the field of study and provides a conclusion to the research. Finally, the limitations of the present research are identified, along with several proposed avenues for future research.

Chapter 2. Literature Review

> *"How can we establish significant facts about the world through observation if we do not have some guidance as to what kind of knowledge we are seeking or what problems we are trying to solve?"*
>
> *A. F. Chalmers (2002, pp. 12-13), Philosopher*

This chapter seeks to explore extant literature related to the phenomenon under consideration in order to comprehend what is already known about it, and also to determine how, and where, the present research can make a valuable contribution.

The chapter commences with an overview of supply chain management and begins to examine the nature of clusters within this domain. The commonly understood barriers to coordination in supply chain management are investigated and explicated. The subject of clusters is investigated in more detail to understand what features of clusters are most important in the context of the present research. The concept of coopetition in the context of clusters is considered using strategic management literature, along with barriers to collaboration, drawing on extant literature from SCM. Since the rationale for forming a cluster is usually competitiveness, the concepts of the resource-based view of the firm (RBV) and the VPC framework are then explored to help understand the role that clustering plays in this context. Finally, the formation of clusters calls into question the 'nature of the firm' which is investigated in more depth through the lens of transaction cost economics (TCE). An alternate form of governance, that of network governance, is explored in the context of clusters. The chapter culminates in a discussion of the importance of considering both TCE and RBV perspectives when investigating clusters.

2.1. Supply chain management

The flow of goods from source to customer has been long realised as an important component of business. For many decades, until the 1980's and 1990's, each phase in the production process was filled by different companies, each acting independently in a fractured fashion. The concept of supply chain management was an attempt to integrate these chains of supply and distribution into a cohesive chain from source to customer. In classical management literature the functions of materials management and manufacturing was performed by various segments in a chain which, though recognised as being connected in this chain, were still fragmented and relegated to separate

functions such as manufacturing, distribution, purchasing, and sales. There was no overview at the strategic level, despite the fact that supply is a shared objective of both each firm, and the combined firms, in a supply chain. Traditionally, the way in which this was approached was to use interfacing between different groups, as opposed to integration as we find in modern SCM literature. The use of inventories has also changed; these were frequently used as a mechanism to ease managerial tasks, and yet with modern SCM, combined with lean management, this reliance on inventories has been decreased (Houlihan, 1988).

2.1.1. Understanding supply chain management

The modern conceptualisation of supply chain management differs from traditional conceptualisations of manufacturing and supply in several critical ways. Houlihan (1988, p. 44) states that:

> Supply chain management differs from classical materials and manufacturing control in four respects:
>
> - The supply chain is viewed as a single process. Responsibility for the various segments in the chain is not fragmented and relegated to functional areas such as manufacturing, purchasing, distribution and sales.
> - Supply change [sic] management calls for and in the end depends on strategic decision making. "Supply" is a shared objective of practically every function in the chain and is of particular strategic significance because of its impact on overall costs and market share.
> - Supply chain management calls for a different perspective on inventories which are used as a balancing mechanism of last, not first, resort.
> - A new approach to systems is required – integration rather than interfacing. (p. 44)

In essence, the role of the supply chain is one of coordination, often achieved through integration, between the functions in a firm and the firms in a chain. A more holistic approach is required, considering the chain as a larger system, in order to understand the impact of the flows of materials and the role of inventory. The origins and eventual development of the field has been long anticipated due to the importance of the individual components. Forrester asserted in 1958 that:

> management is on the verge of a major breakthrough in understanding how industrial company success depends on the interaction between the flows of information, materials, money, manpower, and capital equipment. The way these five flow systems interlock to amplify one another and to cause change and fluctuation will form a basis for anticipating the effects of decisions, policies, organizational forms, and investment choices. (p. 37)

Understanding functions and flows, previously seen as loosely connected, as a connected whole or a system is one of the strengths of the industrial dynamics approach championed by Forrester. The interactions between, and simultaneous importance of, information, materials, and money are today frequently considered aspects of supply chain management.

As supply chain management has been derived from multiple perspectives, and evolved from different disciplines, there are many definitions for the term 'supply chain management' (Croom, Romano, & Giannakis, 2000). It is generally accepted that the objective of SCM is to "integrate and manage the sourcing, flow, and control of materials using a total systems perspective across multiple functions and multiple tiers of suppliers" (Monczka, Trent, & Handfield, 1998). This integration is an attempt "to synchronise the requirements of the customer with the flow of material from suppliers in order to effect a balance between what are often seen as the conflicting goals of high customer service, low inventory investment and low unit cost" (Stevens, 1989, p. 3). These definitions focus on the flow of materials. Other scholars perceive supply chain management as being concerned with the management of a network, or a chain, of companies (Christopher, 2005). Harland considers supply chain management to be the management of a complex web of different firms involved in various exchanges (Harland, 1996).

From this we can see that the generally accepted objective is to integrate and manage the activities of the supply chain (specifically sourcing, flow, and control of materials) over multiple functions and firms to deliver better customer service and value to the customer. These three phases in a supply chain: the sourcing of materials, the manufacturing, and the distribution (Ballou, 2007, p. 339; Coyle, Edward, & Langley, 2003, p. 561) are commonly understood to be the main phases of a supply chain. The distribution phase is frequently split between the shipment and the distribution and retailing to the end consumer (Wu, Yue, & Sim, 2006, p. 47). Supply chains exist not only to deal with the sourcing, manufacturing, and movement of goods to the consumer, but also to perform "market mediation," ensuring "that the variety of products reaching the marketplace matches what consumers want to buy" (Fisher, 1997, p. 107).

However, Vaaland and Heide (2007, p. 20-21) note that in the literature there are three main groups of definitions of supply chain management:

Actor-orientated definitions, which focus on the capabilities of specific actors or firms to organise, manage, and coordinate the flow of materials throughout the supply chain;

Process-orientated definitions, focusing on the processes embedded within a supply chain, typically defining supply chain management as "the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders" (Lambert, 2004, p. 19); and

Relation-orientated definitions, focusing on the relationships between firms in the supply chain and how mutual interest, with cooperation, can lead to an increase in benefits and improvements

for the firms in the supply chain. This definition is important as "the quality of relationships with upstream and downstream firms is one of the most significant drivers of shareholder value" (Christopher & Ryals, 1999, p. 7) in a specific firm; management of relationships should therefore form an important part of supply chain management.

Mentzer et al. (2001) assert that the field cannot progress without a single definition. They propose that supply chain management should be defined as:

> The systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole. (p. 18)

This single definition encapsulates the actor-, process-, and relation-orientated definitions that Vaaland and Heide (2007) explicate. From the definition provided by Mentzer, et al. (2001) the most important elements for this research are:

- The purpose is to improve the long-term performance of both individual companies and the supply chain as a whole; there are stakeholders in the chain other than those organisations focusing on supply chain management (Lambert, 2004).
- There is systematic coordination over functions within a company and between companies in the supply chain.
- The coordination between firms must, by necessity, involve some form of relationship management in order to govern the relations.
- These points are vital considerations when examining the phenomenon of interest in this research.

2.1.2. Major processes of the supply chain

The conceptualisation of the supply chain as the management of the sourcing, flow, and control of material over multiple tiers of suppliers (Monczka et al., 1998) closely resembles the core processes of a supply chain outlined in the Supply Chain Operations Reference (SCOR) Model: plan, source, make, deliver, plan, and return (Council, 2009; Huan, Sheoran, & Wang, 2004). These processes are conducted down a vertical chain of companies, logistically linked, with the objective of delivering products to the end customer (Figure 2.1). The first of these processes is the sourcing of raw materials, extracting, acquiring, and refining them into a useable state as an input into manufacturing. The second process is the making or manufacturing of the product, combining and transforming the inputs to create the products desired by the customers. The third

process is the movement of products through the distribution channels so that they may be delivered to the end-user (Ballou, Gilbert, & Mukherjee, 2000, p. 9).

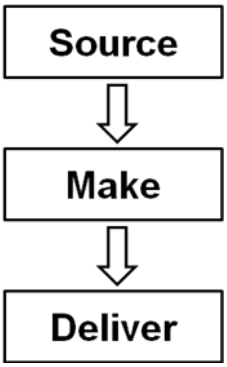

Figure 2.1: Processes in the supply chain showing vertical links between segments of the supply chain

Many of the firms based in New Zealand act in the sourcing and processing of raw materials in order to prepare them for export. New Zealand maintains a commodity-based economy with limited addition of value to raw materials, firmly placing many New Zealand companies in the 'source' process of the supply chain.

2.1.3. Vertical and horizontal relationships

Despite the acceptance that modern supply chain management should encourage greater integration or coordination between firms in a chain, vertical cooperation between these firms may prove challenging. The relationships may be fraught with problems, particularly as the misalignment of incentives and priorities drives individual firms to act in ways that benefit themselves at the expense of the SC in full (Ballou et al., 2000). Such vertical cooperation is the most commonly researched relationship in supply chain management and it fits the general conception of the chain as the flow of materials from source to customer, with a flow of products and information between the firms engaged in these sequential stages of production (Simchi-Levi, Kaminsky, & Simchi-Levi, 2000). These chains sit between the concept of vertical integration and disparate firms (Ellram, 1991). Vertical integration is "the functional co-ordination of one or more units in each of the several successive stages of production, so that they are all operated as a single, unified industrial process" (Frank, 1925, p. 179) while the supply chain has separate firms that cooperate together.

The term supply chain and this conceptualisation create an illusion that there is only one firm involved at each segment of the chain. Generally, each stage of the chain has several suppliers; a manufacturer usually sources several different components from different suppliers and may even source the same component concurrently from different suppliers. The tangle of suppliers and

customers indicate that it may be more accurate to view a supply chain as a network and use terms like supply network, supply web (Chopra & Meindl, 2007), or netchains (Lazzarini, Chaddad, & Cook, 2008). Such a network may involve not only vertical but also horizontal relationships between firms at the same stage in the supply chain (Lazzarini et al., 2008). The very definition of a network is also debatable. Some authors, following the Industrial Networks Approach, define a network as being a "macro, industry-level or cluster-level network"; a net "is developed by intention and formed by a limited number of actors for a specific purpose" (Svahn & Westerlund, 2007, p. 369). The examples of horizontal coordination examined in this research fall into the second category, as they are formed from a limited number of actors and with a specific purpose. However, throughout the remainder of this document they will be referred to as 'networks' rather than 'nets' to avoid any confusion. The presence of networks of companies is particularly pertinent in a cluster of companies that cooperate closely and develop horizontal relationships (Christopher, 2004, *inter alia*) which can be crucially important in some industries (Kishimoto, 2004). For the purposes of clarity in this document, only the term 'supply chain' will be used as this has become the conventionally used phrase in extant literature, although it must be borne in mind that there is, in fact, a web of relationships in the network contained within the chain.

The preponderance of research has been on the vertical links in the supply chain, because of the conceptualisation of the chain being on a continuum nearer vertical integration than separate companies (Cooper & Ellram, 1993; Ellram, 1991). In other disciplines, such as network analysis, there is greater emphasis on horizontal links (Lazzarini et al., 2008). As a result, an exploration of networks will provide greater understanding of these links. They are also more prevalent in clusters, where there is a mixture of vertical, horizontal, and diagonal relationships (Nooteboom, 1999, p. 92-93). As the focus of the present research is on such horizontal relationships, both network analysis and literature on clusters must be more closely examined. This is important as Krugman (1991b) notes that in a country like the USA, which has a relatively low population density, there is still a clustering effect driven by urbanisation, as manufacturers cluster together. The clustering effect deserves greater attention in the SCM literature which the present research seeks to provide.

Working as a cluster often involves coordination across the horizontal dimension (Christopher, 2004), with other firms that produce competing or complementary products. Under these circumstances the firms have an alignment of interests, with regards to strategic objectives, with other firms at the same level of the supply chain. Frequently this is in relation to the reduction of costs associated with sourcing, manufacturing, and distribution, improving their performance in these areas. This alignment of interests, with the potential risks and rewards of cooperation, is the

subject of the present research. These horizontal relationships, between "parties engaged in similar activities, that is, located at the same stage of the value chain" (Nassimbeni, 2004, p. 52), are distinctly different from vertical relationships along the chain. Noteboom explains that "linkages can be 'vertical', constituting flows of products (goods or services) from suppliers to users, in intra firm value chains or interfirm value systems" (1999, p. 92). In contrast, however, there are also the horizontal linkages "where similar, competing products (substitutes in consumption) are pooled to share a common resource of production or distribution, in a scale strategy" (Nooteboom, 1999, p. 92). Even within one of these categories of linkages the relationships will be dissimilar as they will exhibit "different strengths, in terms of size (volume), type, frequency, and durability of exchange, and in terms of force of control" (Nooteboom, 1999, p. 93).

In clusters these horizontal relationships can provide positive benefits. Phyne, Hovgaard, and Hansen (2006) identified that the horizontal relationships in a seafood cluster helped to provide greater resilience in the face of change in the buyer-driven marketplace. The case demonstrates the ability of the horizontal relationships to reduce risk to members. As risk management is a critical component of the supply chain management discipline (Quinn, 2006) such relationships deserve greater attention. Improved supply chain agility and good risk management can reduce financial loss when disaster strikes (Papadakis, 2006). Where the products from a cluster are substitutable, through increasing the sources of supply available, the incidence of successful order fulfilment for the customer of the cluster should be increased. Where products are complementary, the use of techniques such as cross-selling can help distribution and marketing efforts for firms within the cluster (Akçura & Srinivasan, 2005; Barnes, 2007; Crawford, 2007; Gallagher, 2007). Where there are common materials that need to be sourced, collaboration can aid in reducing the risk of supply for the cluster and gaining economies of scale. These new combined supply chains, developed through clustering, should be better able to meet supply challenges than individual supply chains. As Porter notes, "A cluster allows each member to benefit *as if* it had greater scale or *as if* it had joined with others formally – without requiring it to sacrifice its flexibility" (1998b, p. 80; emphasis retained from Porter). In this manner the cluster forms a quasi-enterprise or a quasi-firm (Bruce & Jordan, 2007; Eccles, 1981). Thompson (1967) states that complex organisations generally "assume interdependence of organizational parts" (Thompson, 1967, p. 54). In a cluster the firms will have 'pooled interdependence', a situation where "each part renders a discrete contribution to the whole and each part is supported by the whole" (Thompson, 1967, p. 54). The firms involved engage in joint utilisation of resources which requires them to engage in similar activities in their operation (Dubois, Hulthén, & Pedersen, 2004).

The linkages within a cluster provide advantage, yet internal linkages of firms are also important, as acknowledged in the definitions of supply chain management explained earlier. Internal collaboration mediates the relationship between external collaboration and the performance achieved (Stank, Keller, & Daugherty, 2001).

When working with external partners, collaboration incurs costs of the ownership and operation of the system, as well as the opportunity cost of intense interactions with a partner that can create inflexibility in a system. However, the benefits include improvements in service levels, market intelligence and cycle times, coupled with reductions in inventory, process, and product costs (McLaren, Head, & Yuan, 2002). Collaboration in food supply chains through forming horizontal alliances can balance power between parties when dealing with powerful food manufacturing firms (Bourlakis & Bourlakis, 2004).

Understanding and leveraging the connections between firms in a supply chain is important in the modern business environment. As Christopher and Towill (2000) note:

> There is a growing recognition that individual businesses no longer compete as stand-alone entities but rather as supply chains. We are now entering the era of "network competition" where the prizes will go to those organisations which can better structure, co-ordinate and manage the relationships with their partners in a network committed to better, closer and more agile relationships with their final customers. (p. 209)

Transportation decisions can be largely strategic before devolving to a tactical level (Stank & Goldsby, 2000). Transportation providers and infrastructure contribute to a clustering effect (Takeda, Kajikawa, Sakata, & Matsushima, 2008), and both vertical and horizontal links between firms are critical to improve performance (Mason, Lalwani, & Boughton, 2007). Collaborative transportation management can improve supply chain management over a global chain by improving delivery reliability for manufacturers, while also increasing revenue (Tyan, Wang, & Du, 2003). The interactions between a cluster and the transportation providers may be important in the context of the infrastructure required by the cluster. Such boundary spanning capabilities are important in supply chain management (Tracey, Lim, & Vonderembse, 2005) as the logistical links between firms and over boundaries are critical to the success of the supply chain (Ballou, 1999).

Investigation of a supply chain requires a certain focus and standpoint from which the supply chain is viewed, to unify language and comparisons throughout the study by providing a fixed perspective from which to study the relationships (Nassimbeni, 2004). The supply chains in the present research will be viewed from the perspective of clusters, allowing examination of both members and the greater supply chain.

2.1.4. Consolidation of supply

Through collaboration within a cluster, firms can consolidate the supply base their customers deal with. This consolidation allows customers to more easily manage relationships with the single supplier (Chen & Paulraj, 2004), as is indicated in Figure 2.2 that illustrates that a firm with fewer relationships can engage more closely in the relationships. Multiple sourcing can be a risk-reduction method (Shin, Collier, & Wilson, 2000); clusters, rather than a series of independent firms, can reduce risks in sourcing. A large number of vendors may increase administration costs that outweigh benefits of having many suppliers (J. H. Dyer, 2000). Clustering can reduce the number of vendors (treating the cluster as a single entity) while maintaining advantages associated with multiple suppliers, located within the cluster.

2.1.5. The research questions defined

The research questions outlined in earlier sections require further definition and clarification in order to allow the research to proceed. Returning to the definition provided by Mentzer et al. (2001), we see the importance of coordination between firms in the supply chain in improving the performance of individual companies and the chain as a whole. Bearing in mind that the chain should add value for customers as well as stakeholders (Lambert, 2004, p. 19), we begin to receive clarification of how specific firms should be working with the others. In supply chain management literature there is generally confusion between the terms ‘cooperation’, ‘collaboration’, and ‘coordination’ (S. Min, 2001a).

Cooperation is “similar or complementary coordinated actions taken by firms in interdependent relationships to achieve mutual outcomes or singular outcomes with expected reciprocation over time” (Anderson & Narus, 1990, p. 45). Anderson and Narus (1990) also note that when trust has been established, firms may be prepared to postpone the receipt of outcomes until a later time, bearing in mind the importance of reciprocity in the supply chain.

Coordination is seen as bringing together, harmoniously, different units to achieve common goals (S. Min, 2001b). Coordination, as a concept, does not describe or prescribe what methods may be used by these different units to coordinate; Day and Klein (1987) are careful to differentiate between coordination and cooperation. They argue that tight coordination is possible through strict controls in the absence of cooperation, mutuality, or goodwill. Coordination can be achieved through tight controls or cooperative arrangements. Day & Klein (1987) have also suggested that there will be a congruence of cooperation and coordination over time. Coordination may be arranged or agreed upon by parties, providing contractual coordination with a partner surrendering

some rights in order to gain others through the relationship. Actual coordination is not achieved through these contractual mechanisms, as what "gets traded is determined day to day, often by engineers and operating managers" (Hamel, Doz, & Prahalad, 1989, p. 134); actual coordination is what the individuals involved create that may be shaped by, but is not limited to, the contractual coordination. This procedural coordination is concerned with how the previously arranged institutions and contracts are employed in the partnership (Sobrero & Schrader, 1998).

Collaboration is "the means by which companies within the supply chain work together towards mutual objectives through the sharing of ideas, information, knowledge, risks, and rewards" (S. Cohen & Roussel, 2004, p. 139-140). This involves "the goal of working together in some mutually defined ways by a formal agreement" (Stadtler & Kilger, 2008, p. 275), so that the companies in the supply chain are "actively *working together as one* with common objectives" (Mentzer, 2004, p. 67; emphasis retained from original). The extent and intensity involved in working together can vary, as Cohen and Roussel (2004) note that "collaboration is a continuum, not a set of clearly delineated management practices" (p. 143), as illustrated in Figure 2.2. This indicates that cooperation is a more limited form of coordination, although it may still be seen as a mechanism of governing coordination, in contrast to control (G. S. Day & Klein, 1987). Coordination can be seen as a form of extensive collaboration, with cooperation as a mechanism to achieve this; conversely, cooperation may be viewed as a less intense form of collaboration. However, Spekman, Kamauff Jr, and Myhr (1998) consider that firms may coordinate activities but still not behave as true partners, which is the hallmark of a collaborative relationship.

The present research stands as a complement to that of Fawcett, Magnan, and McCarter (2008) which looked at vertical integration. When a supply chain begins to coordinate vertically they become increasingly like a large vertically integrated firm serving a single purpose, making the term 'integration' appropriate. In the present research the firms remain competitors as well as cooperators; with this dual nature they cannot help but remain 'disintegrated', making the term 'integration', used by Fawcett et al. (2008), less appropriate than the term 'coordination', which I have chosen to use throughout this research.

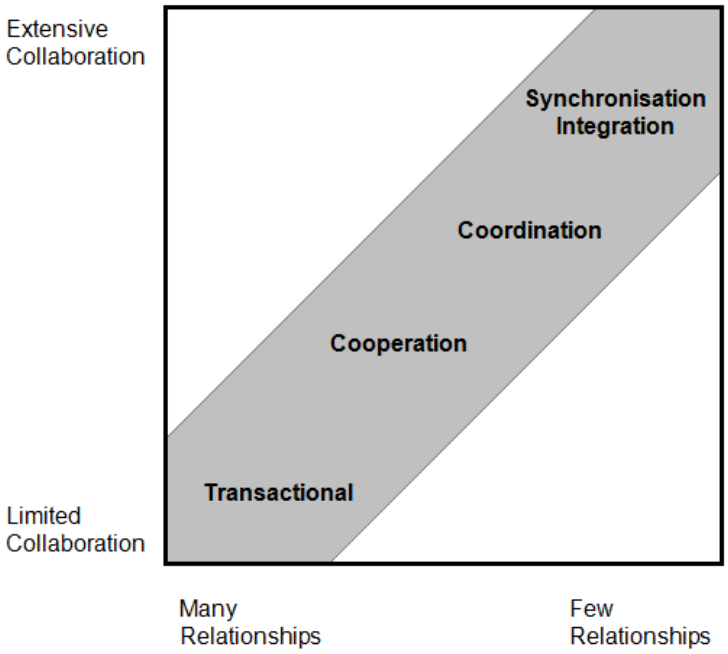

Figure 2.2: The continuum of collaboration (based on Figure 4-4, Cohen and Roussel [2004, p. 143])

The transactions and flows of material throughout the cluster require governance. Two commonly accepted methods of governance are through the use of markets or hierarchies (internalised within a single entity); the conception of 'transaction costs' in the dichotomous split posited by Williamson allows the selection of the more appropriate of these two structures, using 'transaction cost economics' or 'transaction cost analysis' (Williamson, 1975, 1985, 1991, 1994, 1999). Jones, Hesterly, and Borgatti (1997) propose a third method of governance: the use of network governance. These concepts will be investigated in greater depth and detail in §2.6.

When we revisit RQ1 we now have a clearer picture concerning what is being asked and how the question may be answered. Reiterating, Research Question One is:

What are the barriers to improved horizontal coordination, between the members of a cluster, to improve supply chain management?

Coordination between multiple firms seeking a common goal may be effected through two broad forms of governance: either cooperation or control; or possibly a third form: network governance.

Working with other firms in the cluster may help a firm secure access to capabilities or resources which they do not themselves possess (Porter, 1998b, 2003). These resources may be used to improve the competitiveness of the individual firms, as well as the group. To understand these perspectives, and what barriers may exist to firms seeking access to resources or capabilities in

this manner, we will require a greater understanding of the resource-based view of the firm and dynamic capabilities. These concepts are investigated in greater detail in §2.5.

2.2. Theoretical underpinnings of SCM

In this relatively new field there is currently a weak theoretical underpinning for the discipline of supply chain management (Halldorsson et al., 2007). Many scholars have called for theories from other disciplines to be used and applied with greater frequency in supply chain management (Halldorsson et al., 2007; Halldorsson et al., 2003; Holweg & Pil, 2008) and logistics (Stock, 1997). As recently as 2007 it was asserted in the *Journal of Operations Management* that "researchers interested in operations management in general and supply chain management (SCM) in particular have made limited use of organizational theories" (Ketchen & Hult, 2007, p. 455), and that "theories that are currently guiding organizational inquiry can shed significant light on SCM research thought and practice" (Ketchen & Hult, 2007, p. 455). It is hoped that ultimately the use of theory may invigorate debate and prise open new areas for supply chain management researchers to investigate (Ketchen & Hult, 2007), or provide new insight into supply chain research (Holweg & Pil, 2008).

In the present research, theories from other disciplines have been employed to help in formulating areas and lines of inquiry, and in understanding the results of the investigation. Using theories from other disciplines supplements the traditional supply chain management approach.

This research focuses on horizontal coordination between firms as an aid to competitiveness. There must be a focus on the relationships and how they are governed. The theoretical perspective of transaction cost economics, refined by Williamson (1975), examines the market or hierarchy as governance modes. The development of the network governance mode (Jones et al., 1997) is also examined as a complement that employs a hybrid approach. Resource dependency theory (Pfeffer & Salancik, 1978) provides insights into the role of power in relationships. To understand the role of horizontal coordination in enhancing competitiveness, the resource-based view of the firm (Barney, 1991) is employed along with the value price cost (VPC) framework (Walker, 2007).

2.3. Barriers and facilitators of integration

Fawcett et al. (2008, p. 44) list key barriers to effective supply chain integration in two distinct areas using a dichotomous division proposed by Park and Ungson (2001): inter-firm rivalry and managerial complexity. While integration is not the same as coordination the concepts are similar; a primary objective of an integrated supply chain is to act in a coordinated fashion, aided by high

levels of integration. A high level of coordination can be seen as equivalent to integration and thus the barriers to supply chain integration, identified in extant literature, can be seen as being relevant to the barriers of coordination, as the list likely overlaps the list of barriers to horizontal coordination in a cluster.

2.3.1. Previously identified barriers

Inadequate information sharing, inconsistent operating goals, and a lack of willingness to share risks, rewards and information are barriers related to rivalry. Barriers linked to managerial complexity include a lack of alliance guidelines, processes being poorly appraised in terms of cost, issues around organisational boundaries, measurement of contributions to the effort, and measurement of customer demand. Fawcett et al. (2008) found that it "is people that gather, process, share, and interpret the information, write and uphold the alliance guidelines, and determine and adhere to the goals of their operations" (p. 44), indicating that greater managerial focus should be placed on non-technical aspects of collaboration. Whipple and Frankel (2000) conclude that trust (in the other actors and/or the competence) of partners, senior management support, the ability to meet performance expectations, clear goals, and compatibility of partners are key factors in successful strategic alliances. Ballou (2007, p. 344) states that effective collaboration requires:

- Information sharing and a spirit of cooperation;
- A boundary-spanning information system;
- Inter-organizational metrics;
- A means for benefits identification; and
- Ways for sharing the spoils of cooperation.

Cooperation and trust are required to realise benefits from collaboration and these benefits must be distributed equally, requiring metrics to identify benefits, information sharing to build trust, and fair sharing methods. Such collaboration may require new skill sets that existing logisticians do not frequently possess (Ballou, 2007).

While these previous studies focused on vertical relationships it seems reasonable to expect many of these same barriers to also prevent development of horizontal relationships. The findings from Fawcett et al. (2008), Whipple and Frankel (2000), and Ballou (2007) converge on several issues surrounding inter-firm rivalry and managerial complexity. The term used by Fawcett et al. (2008) for the solution to overcome barriers is 'bridge'; thus a solution bridges the barrier and helps the firms involved gain benefits. The term 'bridge' is adopted in the present research to continue this convention.

2.3.1.1. Competitive pressures as a barrier

As the horizontal relationships between competitors may be strained by competitive pressures in the marketplace, it seems reasonable to assume that barriers relating to inter-firm rivalry will be more pronounced. The sharing of information, which may otherwise give individual firms advantage in the marketplace, is likely to be strained in a coopetitive relationship. A firm is likely to be unwilling to share information with another, particularly if they are competitors. The member firms of a cluster are likely to be hesitant and more competitive over the sharing of any rewards relating to their collaboration, since sharing rewards with a competitor is likely to be an unpopular. Yet there should be mutual sharing of benefits between partners in a relationship (Carlisle & Parker, 1989). Perhaps the only barrier relating to inter-firm rivalry identified by Fawcett et al. (2008) that is less likely to be pronounced in clusters is that of inconsistent operating goals. With each the member of the cluster based at a similar phase of the supply chain they are likely to have similar aspirations and objectives which in turn indicate that they are likely to have consistent or congruent operating goals. In cases of limited cooperation and coordination between a pair of firms it is possible to demonstrate that the interactions can create surplus value for the supply chain and that the benefits are distributed to all parties (Jain, Nagar, & Srivastava, 2006).

2.3.1.2. Information technology and other barriers

Information technology is not considered an insurmountable barrier (Fawcett et al., 2008; Fawcett, Osterhaus, Magnan, Brau, & McCarter, 2007) yet information can substitute for inventory throughout a supply chain (Constant, Kiesler, & Sproull, 1994). Frequently there is "[A] particular need [for] an information system that is inter-organizational in scope" so that members can identify opportunities to improve their supply chain management and discover where the benefits from cooperation flow (Ballou, 2007, p. 344). However, Grover and Saeed (2007) caution that information visibility alone does not improve SC performance; the visibility is useful only when the information can be utilised by flexible firms. Allmendinger and Lombreglia (2005) agree that the ability to dynamically manage the performance to match customer needs provides an advantage. However, Fawcett et al. (2008, p. 44) note that "one of the main reasons for inadequate information is not that companies lack ability but lack desire and willingness. Inter-firm rivalry creates vulnerability and impedes information sharing." Relationships within clusters should therefore be expected to have reduced information sharing due to the presence of intense rivalry between competitors. Fawcett et al. (2007, p. 365-366) found that there are four barriers to better information sharing: cost and complexity of implementing advanced systems; systems incompatibility; different levels of connectivity up and down the chain; and managers not

understanding the importance of willingness to share information. Different types of information require different technologies or organisational approaches to enable effective sharing (Constant et al., 1994). Greater levels of information systems integration relates to greater supply chain integration and improved customer service in the chain (Vickery, Jayaramb, Drogea, & Calantonea, 2003). Improved cooperation can reduce the technology gap between members; sharing of planning and control systems can enhance member outcomes (Vaaland & Heide, 2007).

Very often barriers may include the perceived inadequacies of information systems, requirements of greater commitment from management, a lack of personnel with the right skills, clearer goals, and the overall alignment of SCM initiatives with extant corporate priorities (Tummala, Phillips, & Johnson, 2006). 'Managerial inertia' is also an important barrier in collaborative supply chain management. The source of this inertia is the structure of the individual companies, aggravated by misalignment of incentives between members, inappropriate measures of performance, outdated policies, and asymmetric information (Simatupang & Sridharan, 2002, p. 17). These sources of inertia appear specific enough to indicate the types of bridges that may be required to overcome the barrier or managerial inertia. Such resistance to change has long been acknowledged to hinder success in logistics collaboration (Bowersox, 1990).

Alignment of processes over several firms can be challenging. Standardisation of materials and purchasing procedures can lead to improved performance in an intraorganisational setting (Sanchez-Rodriguez, Hemsworth, Martinez-Lorente, & Clavel, 2006). Such alignment could be more difficult to implement in a multi-firm setting, presenting a barrier to greater integration.

2.3.1.3. Conclusions about barriers previously identified

The most significant barriers to supply chain collaboration appear to be related to management of people and willingness to change and evolve, and attitudes towards ongoing partnerships. Sharing information may also be important but in many cases difficulties are not found in the technical aspects, but are sourced in the relationships and perspectives of the human actors in the various firms. By perceiving the resistances to change, held by the actors, as being layered, it is contended that the process of helping members understand the need to mutually understand problems is reduced. Using layers, the members are more able to develop on-going improvements in their joint supply chain management.

2.3.2. Coopetition and operational issues

Barriers outlined in the previous section relate specifically to vertical relationships, differing from the horizontal in a supply chain, which may be between competitors. Under these circumstances

coopetition emerges (Brandenburger & Nalebuff, 1996). "The dyadic and paradoxical relationship that emerges when two firms cooperate in some activities [. . .] and at the same time compete with each other in other activities is [. . .] called 'coopetition' " (Bengtsson & Kock, 2000, p. 412), existing as horizontal supply chain relationships. Such relationships require different management to the vertical linkages (Bengtsson & Kock, 2000). Bonel and Rocco (2007) note that "a wide array of research has concentrated on the strategic level of coopetition issues versus the operational level that is still under-researched" (p. 71). They further make a case that "research on coopetition should delve into the execution stage [. . .] focus on the issues stemming from operationalizing coopetition, particularly at the intra-firm level" (Bonel & Rocco, 2007, p. 72). Operationalisation means that the ideas and concepts of a theory are formalised into more specific models, able to facilitate decision making in organisations (Ford & Mahieu, 1998).

Formation of alliances, including supply clusters, are not simple endeavours since they seek to balance control and the mutuality of power in the relationships, the needs and trust of the members, and the risks and rewards received by members (Bengtsson & Kock, 2000). Certainly if a member stands to benefit from cooperation with rivals there should be reciprocation of benefits to them (Soubeyran & Weber, 2002). Yet mechanisms for these functions remain poorly explored in extant literature. It is important that "[I]ndividual behaviors leading to maximum joint payoffs do not necessarily result in the maximum individual payoffs. If both partners try to maximize their own payoffs, however, then neither the individual nor the joint payoffs reach a maximum" (Luo, 2004, p. 105). This structuring for the sharing of benefits indicates the presence of a significant barrier. Luo asserts that:

> Cooperation can be achieved by altering the incentive structure in such a way that the behavior that maximizes the individual payoffs also maximizes the joint payoff. Promises from cooperation and threats from control are devices that modify the incentive structure. This should lead to coopetitive [. . .] behavior because what is in the interest of the first party will also likely be in the interest of the other party if control and cooperation are currently in play
>
> Luo (2004, p. 105)

Members must have heterogeneity in the information, skills, and knowledge they bring to the table (Gulati & Gargiulo, 1999). Such resource interdependence in the cluster increases the requirements for structure that supports long-term cooperation (Luo, 2004). Some scholars have noted that "firms may be motivated to form, or reluctant to exit [coopetitive] relationships to gain or preserve control over resources" (Dowling, Roering, Carlin, & Wisnieski, 1996, p. 159), positioning the resources or capabilities as being critical to the coopetitive relationship. Members must withhold some capabilities and resources to enable effective competitiveness and "at the same time have other unique resources that enhance and develop both firms simultaneously"

(Bengtsson & Kock, 2000, p. 421). This split personality of the firm will require separate management, an additional overhead that generates a barrier of additional costs that must be overcome and justified (Bengtsson & Kock, 2000). Effective management means that coopetitive partners "can achieve collaborative advantages by identifying strategic opportunities for realizing positive-sum gains and making resource commitments necessary to realize strategic goals of the partnership" (Luo, 2004, p. 105). In such relationships control over the partners' resources, or capabilities, is critical, not ownership (J. H. Dyer & Singh, 1998).

Unstable environments and greater heterogeneity in the culture, organisational systems, and logics of the parties will generate greater competitive pressures amongst the members (Padula & Dagnino, 2007). Where environmental changes precipitate the venture, managers must be "sufficiently flexible and willing to modify their mental models and cognitive maps according to the new environmental conditions" (Mariani, 2007, p. 120). There needs to be enough similarity and common ground between participants, particularly in their mental models and cognitive maps, for effective cooperation without extraneous environmental change, demonstrated in DeWitt et al. (2006), Nassimbeni (2003), Beckeman and Skjöldebrand (2007), and Perez-Aleman (2005), *inter alia*.

Coopetitive relationships have been said to fail for many reasons. These include distrust between members, differing objectives between the partners, one of the parties feeling that they are not receiving an equitable return, or competition becoming predominant in the relationship (Meyer, 1998; Park & Russo, 1996). The level of cooperation between firms should be driven by customer requirements (von Friedrichs Grangsjo, 2003).

The balancing of competitive pressures within a group need not be ascendant; Hausken (2000) demonstrates that cooperation within a group of competitors may evolve when the group competes with another group. This cooperation may also force genesis of trust, developed through shared successes. However, other scholars note that trust must be present at the start of collaboration (Blomqvist, Hurmelinna, & Seppänen, 2005). Working with competitors may require both trust and contractual arrangements as they "may both be used as tools to build mutual understanding, adaptations and commitment" (Blomqvist et al., 2005, p. 502) in a collaborative effort, particularly as "contracts may create a common ground and future expectations, further generating trust" (Blomqvist et al., 2005, p. 502).

The challenges surrounding the nexus between rivalry and cooperation found within coopetitive relationships indicate that barriers relating to inter-firm rivalry identified by Fawcett et al. (2008) are particularly pertinent to effective coordination over horizontal linkages in clusters. The

implication of these strands of research is that the most challenging barriers to bridge will be those relating to the inter-firm rivalry that has been enhanced through attempting to work closely with competitors. Issues surrounding coopetition and coopetitive relationships have been underdeveloped in traditional supply chain management literature.

2.3.3. Conclusions about existing barriers

Throughout this research three theoretical perspectives were used: transaction cost economics (TCE), resource-based view of the firm (RBV) and the closely related dynamic capabilities, and network perspective. These perspectives are explored in later sections (2.5, 2.6, and 2.7). The use of theoretical perspectives that are not traditionally used in the supply chain management or logistics discipline has received greater support in recent years, with several scholars calling for such research (Halldorsson et al., 2007; Stock, 1997). Using these theoretical perspectives it is possible to identify barriers to horizontal coordination in the present research and how they have been bridged.

Barriers relating to the tensions existing in coopetitive models, as may be found in a cluster, are expected to be significant. Since the firms are working with competitors, the class of barriers identified as being related to inter-firm rivalry are expected to be most significant.

2.4. Clusters

The present research is concerned with the development of horizontal coordination within a cluster. In this context it is sensible to investigate the extant literature on clusters to isolate relevant material. When the academic literature on clusters is studied it emerges that there are several intersecting strands of thought. This section begins with a short history of the study of clusters in an attempt to give a firm basis for understanding the role of clusters in the present research.

Following the example of Newlands (2003, p. 522), who notes that “terms such as ‘clusters’, ‘industrial districts’ and ‘new industrial districts’, ‘new industrial areas’ and ‘milieux’ will be used almost interchangeably despite the awareness that they often emerge from very different theoretical contexts,” this literature review will also use these terms interchangeably. This is because of the wide range of different disciplines that the concepts of clusters overlap with, each with extensive histories and varied streams of research. Throughout the body of this dissertation the term ‘cluster’ will be used. In the context of the present research in the cluster there are a

number of organisations that coordinate their activities at that phase of the supply chain. This involves coordination of inputs and outputs as a group (Figure 2.3).

We first discuss Marshall's seminal work on industrial districts, the research on the 'Third Italy', the contribution of Post-Fordism, and finally Porter's work.

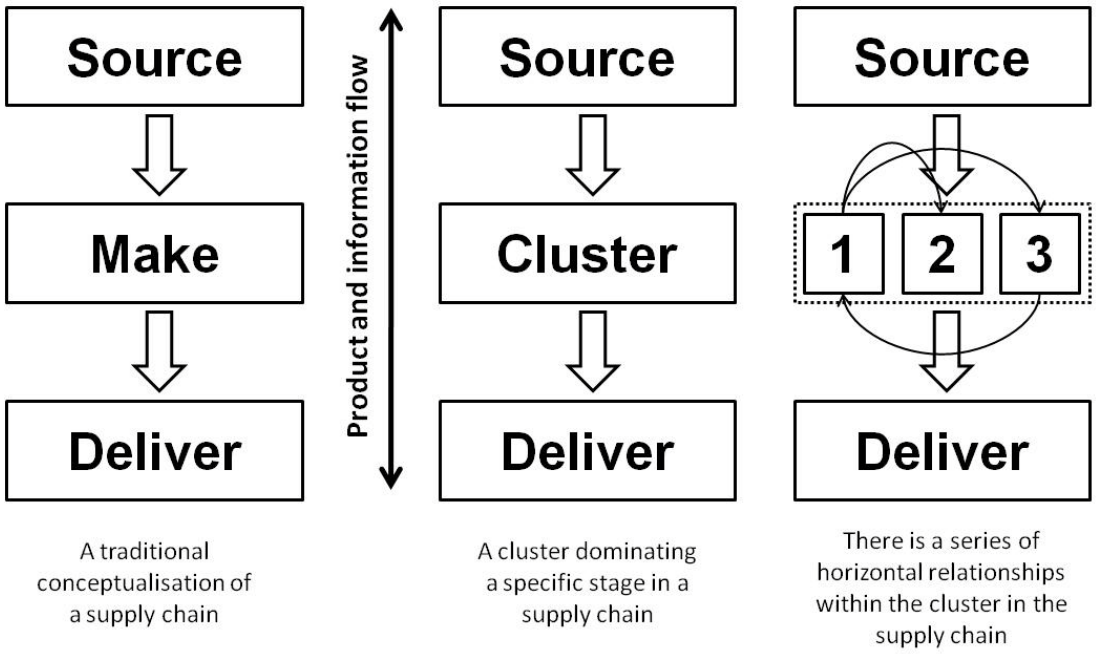

Figure 2.3: Viewing a cluster embedded within a supply chain (Source: adapted from Fig. 4, Ballou [2007] and Fig. 2.7, Coyle et al. [2003]).

The largest body of literature on clusters was initially contributed by scholars with a background in economic literature (Nassimbeni, 2003). Clusters were well researched in this discipline because of the demonstrated importance of clusters in small economies; clusters were recognised as assisting smaller firms to gain economies of scale in research and development, manufacturing, and marketing that they might otherwise not achieve. The terms used in the various streams of research differ, however, in that earlier researchers investigated what they called 'industrial districts'.

The seminal work on clusters was carried out by Marshall (1920) and focused on English industrial districts in the late nineteenth century. These districts are described as a territorial concentration of a number of small enterprises. In this environment the firms exhibited a dense network of both social and economic ties with one another, creating both competitive and cooperative relationships. Marshall's research led to the belief that competitive advantage arose from the presence of external economies, those economies linked to the external environment in which the enterprises were operating. In industrial districts these economies included rapid

dissemination of ideas and experience due to the close physical proximity, cultural homogeneity, low costs of transportation and transactions between themselves, improved access to services or capabilities which complemented their own, and a common manufacturing tradition. In the 1990's and 2000's there was growing belief that location and clustering can be a very strategic consideration for firms (Schiele, 2008). While external effects are often used to explain the advantages of a region or a cluster, they do not explain their emergence or development (Bresnahan, Gambardella, & Saxenian, 2001; Guerrieri & Pietrobelli, 2006). Throughout this research we are not focusing on the emergence or development of a cluster.

2.4.1. The Third Italy

There are numerous later studies on the Third Italy area, a region noted for the presence of many strong and generally successful clusters. The most commonly studied region is that of Emilia-Romagna (see, for instance, Lazerson, 1988; Pyke, Becattini, & Segenberger, 1990; Sabel, 1982, *inter alia*). Some researchers have noted that the "regions of the so-called 'Third Italy' are heralded as bastions of flexible specialization" (M. Day, Burnett, L Forrester, & Hassard, 2000).

However, there are considerable differences in the models of labour division between areas and the social variables, such as the embeddedness, trust, familiarity, and shared values, which have an importance much lower than that expected from the traditional description of districts provided by Marshall. Many of these characteristics of industrial districts, especially those of a social nature, appear to be more significant in theory than in practice. Some researchers find little evidence of the traditional, canonical, characteristics of the Marshallian District present in the Italian clusters (Paniccia, 1998, 1999; U. Staber, 1988).

Many of the difficulties of clusters to adapt to changes are due to their self-organising structures. The distributed intelligence and decision-making capabilities lead to an inability to act and organise through joint planning and thus being ill-equipped to manage the changes together ((Corò & Micelli, 1999), cited by Nassimbeni (2003)).

2.4.2. The Post-Fordist era

During the second half of the twentieth century, in what many authors refer to as 'the Post-Fordist era', many researchers re-invigorated the field with subsequent research into (the then) modern clusters. In these clusters many small enterprises alternatively competed and co-operated with one another, in a range of different contexts, while creating improved regional focus and advantage (Coyle, 1998; Krugman, 1996; Ohmae, 1995; A. J. Scott, 1998; *inter alia*). Increased global economic integration has led to falling transport costs and reduced trade barriers. As a result this

has allowed and encouraged agglomerations of firms to benefit from localised external economies of scale (Fujita, Krugman, & Venables, 1999; Krugman, 1991a). This led to discussions about the apparent "re-emergence of regional economies" (Sabel, 1989) where clusters, or local manufacturing systems, play an important role.

Perhaps the most important work near the end of the twentieth century on the concept of a local manufacturing system was Piore and Sabel's (1984) work *The Second Industrial Divide*, the key concept of which was the rise of flexible manufacturing systems embedded in a network of SMEs in the industrial district. Through utilisation of a dense web of many horizontal and vertical connections and cooperative relationships these firms were perceived to be able to gain a collective efficiency. One such example is given as northern Italy. In this case cooperation is promoted by "establishing an ethos of interdependence among producers in the same market" (Piore & Sabel, 1984, p. 272). Meanwhile competition is encouraged and yet partially controlled through the use of mechanisms of social cohesion in the communities.

Using a local manufacturing system approach, or clusters, means that "small firms can compete when organized in the appropriate way" (Pyke & Sengenberger, 1992, p. 27). It is also important to note that the more successful industrial districts compete on a range of dimensions, not just price. While the flexibility of such districts may be most often associated with them (as evidenced by the use of the term "flexible specialization" by Piore and Sabel (1984) when comparing the districts to 'Fordist' enterprises), the districts actually compete with a mix of "differentiated high quality products, flexibility of adjustment, and the ability for innovation" (Pyke & Sengenberger, 1992, p. 5). In this manner a cluster forms a quasi-enterprise, or quasi-firm, where the production is organised over more than one single firm (Bruce & Jordan, 2007; Eccles, 1981). In many cases such cooperative actions can improve efficiency over multiple firms (Nielsen, 1988). Best (1990) notes that clusters are able to adjust and increase economic performances when entrepreneurial attitudes are let loose to enable innovation; working in a cluster can present both risks and challenges to individual firms.

There are several methods that may be used to govern transactions between firms and markets. Contractor and Lorange (2002) assert that:

> between the two extremes of spot transactions undertaken by two firms, on the one end, and their complete merger, on the other hand, lie several types of cooperative arrangements. These arrangements differ in the formula used to compensate each partner (the legal form of the agreement) as well as in the strategic impact on the global operations of each partner. (p. 5)

The post-Fordist concept of local manufacturing systems is essentially clusters, or modern industrial districts. They share features in common with the traditional Marshallian districts, as listed in Table 2.1.

Table 2.1: The main features of industrial districts and clusters.
Based on Table 1, Nassimbeni (2003, p. 153).

- High proportion of small and very small firms
- Clustering of firms in a geographical location
- Firms engaged at various stages of production – intense specialisation
- Dense networks of a social and economic nature
- Blend of competition and cooperation between firms
- Rapid and mainly informal diffusion of information, new ideas, experiences, and know-how
- Adaptability and flexibility

Governments have become increasingly aware of the concept of clusters and their regional benefits. There has been renewed interest in the concept at a policy level, much of which has been driven by Porter's writings.

2.4.3. Porterian Clusters and Policy

Since the 1980's, many economic geographers have been studying localised industrial specialisation, related agglomeration, and regional development, and attempting to identify the processes involved and linked to successful outcomes. Such work is exemplified by Amin and Thrift (1992); Harrison, Kelley, and Gant (1996); and Scott (1988, 1998), *inter alia*. However, much of this earlier work was sidelined, ignored, or unnoticed by the establishment. By contrast, Porter, whose ideas on the cluster concept have had a significant impact on policy makers, took a different approach to the study of clusters to that taken by economic geographers (Martin & Sunley, 2003). In essence, Porter (1998c) sees clusters in a similar fashion to other scholars, but uses a very broad and general definition of the term:

> A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities. The geographic scope of a cluster can range from a single city or state to a country or even a network of neighboring countries. (p. 199)

Much of Porter's work has heavily influenced policy makers; many believing his concept to be important to success in the increasingly globalised world, in part because of Porter's use of terms such as 'competitiveness'. When material is framed in terms of raising productivity and innovation it is more likely to gain the attention of policy makers (Martin & Sunley, 2003). Porter's emphasis on the geographical industrial clusters and their use to promote competitiveness

has attracted a good deal of sustained interest. Porter's stated objective was to "develop both rigorous and useful frameworks for understanding competition that effectively bridge the gap between theory and practice" (Porter, 1998c, p. 2). He then links this to policy development through arguing that cluster theory is "not only a tool for managers, but also a microeconomic-based approach to economic development for governments that is closely tied to actual competition" (Porter, 1998c, p. 7). Clusters involve and encourage the development of related and supporting industries, a key factor in the 'Diamond of National Advantage' developed by Porter (Porter, 1990), which contributes to theory on economic development for policy makers to follow. In contrast, the work on clusters generated by the economic geographers has not been packaged and sold this way as they had broader objectives and were less concerned with the issue of productivity and competitiveness of firms or regions. The desire and objective of influencing public policy was not the foremost goal of the economic geographers' research agenda (Markusen, 1999; Martin, 2001).

A key difference between work by Porter and economic geographers has also been in the definition of the cluster. The cluster concept utilised by Porter is indeterminate and vague, it is generic and can be applied to many industrial groupings and specialisations. It was not presented as an academic model, or theory, that was to be rigorously tested by academics, but as a template which could be used to think about national economies and the decomposition of industrial-geographic groupings to help improve competitiveness (Martin & Sunley, 2003). Perry (1999) notes that it is this incompleteness in the definition which is at the heart of the popularity of Porter's cluster concept; a cluster can be defined to include many different situations and examples. Many scholars express doubt that it would be possible to conceive of a 'universal theory' of clusters which would allow understanding of their dynamics, formation, and evolution, while being applicable to the range of different types and processes that have been observed. Attempts to do so would be likely to generate increasingly trite theory, similar to the overly superficial theories currently associated with clusters (Amin, 2000; Paniccia, 1998).

While much of Porter's work was indecisive on the specification of spatial proximity, it was also noted that technologies are reducing the need for this proximity. Other scholars note that integration in the global economy coupled with new technological paradigms is pushing towards increasingly important functional integration as opposed to geographical integration. These new technologies, particularly in the ICT domain, mean that much of what was once possible only in the cluster may now be performed over a greater distance (Guerrieri & Pietrobelli, 2006). Using technology in this manner to achieve functional integration is a perfect example of a

geographically dispersed supply chain, with disparate companies operating in unison despite the distances between them.

Newlands (2003) indicates that there are significant challenges still facing policy making for the development and nourishment of clusters. Not all clusters have similar attributes and merely applying a generic policy based on 'Porter-type' cluster may not be suitable; there is no "one size fits all" model for cluster policy (Bathelt, 2005). Instead there are significant industry sector effects which influence the success and abilities of the various clusters to grow. The indications are that manufacturing clusters, those dealing with tangible goods, face challenges that are more difficult to overcome than other industries (such as creative industries, etc.), as shown by the manufacturing clusters in the study underperforming in comparison to clusters in other sectors, in terms of contributing to growth in their regions (McDonald, Huang, Tsagdis, & Tüselmann, 2007). The causes for these apparent difficulties to extract greater value from the manufacturing clusters were not developed in detail in that study as they were outside its scope.

However, as Nassimbeni (2003) points out, little research has been performed on supply chain management issues and challenges faced by these clusters when faced with globalisation. Previous research, particularly that focusing on New Zealand clusters, has focused upon the mode of the network, the way in which the internationalisation occurs (Chetty & Campbell-Hunt, 2003a, 2003b), and how the cluster markets together and works together, or the social capital is formed and used in the cluster (Chetty & Agndal, 2007). In contrast, this research aims to study the New Zealand clusters from the perspective of supply chain management, looking at how they are able to coordinate their activities and what prevents more extensive coordination. Working in a supply chain in this manner means that the organisations will coordinate in planning, sourcing, making, and distributing their products – issues which are only touched on briefly and in passing in the extant literature. One of the few existing studies that looks at clustering and supply chain management is DeWitt et al. (2006) which focuses upon an Amish furniture building cluster, which found that the benefits proposed by Porter (1998a) were evident in the cluster, providing a compelling business case to consider the immediate business environment outside the firm. This examination and leveraging of the supply chain can be the source of considerable competitive advantage. However, clustering does not automatically lead to effective supply chain management, as Brown shows in his comparative study of an automotive and aerospace cluster (Brown, 2000). Other studies have shown little support for policies designed to encourage growth of generic 'Porter-type' clusters, claiming that there are significant differences between different types of clusters, or industries in which the clusters are embedded, which need to be addressed in government policy (McDonald et al., 2007).

When industries have a divisible production process, with multiple distinct competencies and a transportable product, there will be greater potential to cluster (Steinle & Schiele, 2002). Benefits identified in the literature, confirmed by DeWitt et al. (2006), indicate that clustering can be very advantageous for SMEs. A convergence of operational activities and competencies is necessary for success; differing stages of development and levels of competencies possessed make clustering a challenge for SMEs (Barclay & Porter, 2005).

Clusters have been observed in a range of industries, such as computing, multimedia (Brail & Gertler, 1999), biotechnology (Barley, Freeman, & Hybels, 1992; Baum, Calabrese, & Silverman, 2000; Casper & Murray, 2005), aerospace (Emiliani, 2004; Waits, 2000), financial services (Pandit, Cook, & Swann, 2008), automotive manufacture (Brown, 2000), and broadcasting (Cook, Pandit, & Swann, 2001). Benefits can be seen in both high technology industries as well as in non-high technology industries (Cook et al., 2001).

2.4.4. The impact of globalisation on localisation and location as a basis for competiveness

Many studies on clusters are part of a wider movement of research that examines whether or not a globalised economy would lead to the demise of local production systems. The general consensus is that it will not (Becattini & Rullani, 1996). The argument for this perspective is two-fold. The first point is that globalisation does not necessarily imply uniformity of processes and knowledge across the globe, let alone products. Indeed, globalisation will be able to reward variety and differences between locations. The second point they make is that there must be a physical location where value and variety are generated, even in this increasingly connected and globalised world, where relations and interactions with respect to the various production processes can be exchanged effectively (March, 1988). Thus, the competitive advantage may be rooted in the area where these loci of production processes are located.

However, other researchers note that while local systems will remain competitive, globalisation is changing their traditional territorial forms. Increasingly, the forces of globalisation are changing the nature of inter-firm ties and requiring firms and regions to open up to the rest of the world (Amin, 1993). The external linkages are important to the success of a cluster, for both emerging and established clusters (O'Riain, 2000; Saxenian & Hsu, 2001). When the cluster is composed of owner operators, more commonly found in smaller organisations, they are more likely to participate in wider business networks if they have more experience or have a background with larger organisations (Watts, Wood, & Wardle, 2006).

2.4.5. Failure of clusters

Clusters are not a panacea for regional development and can stumble once formed. It is well documented that regional economies in developed countries can lose their dynamism, drive, and their competitiveness (Herrigel, 2000). Other difficulties may abound also as "the industrial district model integrates conception and execution less well than others do because it continues to rely on the permanent fragmentation and division of knowledge and capacity in production" (Herrigel, 2000, p. 290). Such fragmentation means that an industrial district, as a self-organised organism, may be ill-equipped to deal with rapid changes in its environment. Overspecialisation can lead to clusters experiencing more severe economic downturns (Desrochers, Sautet, & Hospers, 2008). Being embedded in a wider business network does not prevent a cluster from failure; business difficulties in large organisations on which the cluster depends may have severe implications for the smaller businesses (Young, Francis, & Young, 1994).

Stagnation is not necessarily a pre-determined outcome as clusters can promote diversification. Rosenfeld notes that the most successful clusters are capable of seeding new clusters or ventures through strengthening capacities in related sectors or shifting core competencies into new products or markets (Rosenfeld, 1997). Even in Italy, home of many successful clusters of small companies, the nature of clusters is changing. There is increasing heterogeneity, both between and within clusters, and medium-sized firms are playing an increasingly important economic role. Some clusters are becoming more diversified while others focus on improving quality or developing stronger brands and distribution networks (Rabellotti, Carabelli, & Hirsch, 2009). The shape of clusters and of the economic landscape appears to be changing.

2.4.6. The knowledge and innovation perspective of clusters

While earlier work on clusters by economic geographers had a heavy focus on location, more recent research emphasises innovation and knowledge management. It is generally accepted that greater innovation will occur when there is a strong technological infrastructure in the area; greater concentrations of industrial or university research and development imply greater synergy (Feldman & Florida, 1994).

While studying social capital Staber (2007) notes that there are different types of organisations, working with analytic, synthetic, or creative knowledge. The type of work being performed will influence just how effective the clustering approach is. Those in the creative arena will require more buzz and constant communication in and around the cluster. On the other hand, analytic knowledge can be easily communicated (and is often done so) through codified knowledge, such

as academic journals, so that experiments can be replicated and confirmed. In this case the face-to-face abilities of a cluster may not appear to be necessary, yet there is evidence that there is increased use of patents by firms in close physical proximity to the location of the patent holder. This is because cooperation with other firms is capable of greatly enhancing an individual firm's capacity to innovate (De Propris, 2002). Some scholars find that innovation within a cluster is higher when other firms in the same industry are present (Baptistaa & Swann, 1998).

Synthetic knowledge is the most relevant to supply chain management. There is much that can be codified but there is also a great deal offered by experience and tacit knowledge. In this case, clustering and the concomitant sharing of knowledge through face-to-face communication can be useful and valuable. However, this does not explain the challenges that the manufacturing firms faced in the study by Newlands (2003). Asheim, Coenen, and Vang (2007) assert that:

> face-to-face interaction can be very helpful [. . .] by allowing for multidimensional and simultaneous information and knowledge exchange, it can make it easier to identify the specific problems that have to be solved in a swift and concise manner, the needs required for the solution, and the exchange of partly tacit experience of when and what has been done to solve the problems. (p. 663)

Such face-to-face interactions can be more easily facilitated by close physical relationships, whether this occurs intra-firm (Wood, 2007; Wood & Lu, 2008) or inter-firm, as in clusters.

Learning in clusters occurs most frequently with smaller or medium sized buyers of the cluster output, as there tends to be more frequent communication and "tutelage" (Schmitz & Nadvi, 1999). Harrison, Hitt, Hoskisson, and Ireland (2001) assert that it is more effective for a firm to access complementary resources through alliances, rather than through acquisition, because of reduced investment costs.

2.4.7. Types of interactions in clusters

In early studies on the industrial districts of Italy it was recognised that automatic occurrence of external economies was not guaranteed, even with proximity, induced trust, and cooperation. Such observations have led to a fruitful investigation of the methods of governance of clusters, investigating the ways in which the activities within the clusters are coordinated.

Brusco (1992, p. 196) noted that industrial districts "when they are successful, are creative, display originality, are often able to discover new markets, continuously introduce incremental innovations, some of which may prove important, and enhance social mobility and worker participation." This occurs when the bottlenecks are removed, allowing public action to resolve issues which the private sector would be unable to resolve independently (Brusco, 1992). A common theme emerged from the Italian literature: the presence of public institutions, able to

produce 'local collective competition goods', was critical to the success of the cluster (Crouch, Le Gales, Trigilia, & Voelzkow, 2001). Public assistance frequently enabled the collective goods to flourish, which in turn fuelled growth in the cluster. These collective goods include local technical skills to enable training in required skills; networks of local banks willing to lend to the communities cheaply, based on a knowledge of the clients' trustworthiness; credit cooperatives which allowed artisans to underwrite each others' loans so that they can collectively obtain lower interest rates and reduce the default risks; and associations which provide services to their members, whether entrepreneurial, artisan, or worker associations (Brusco & Righi, 1989). The districts are becoming increasingly reliant upon a different model, with a medium sized "lead firm" which is able to control groups of companies through cross-shareholding or other ties (Cainelli, Iacobucci, & Morganti, 2006).

There are different types of clusters (identified and discussed further in §2.4.8); however, there is a trend towards a networked firm where hierarchy takes a leading role towards generation of collective goods, often working in tandem with associations (Crouch et al., 2001). Within each of these types there are a range of alternatives as to how they are governed. Some researchers believe policy may be based on an oversimplification of clusters, based on a generic conceptualisation (Lovering, 1999). Yet, Zeitlin (2007, p. 9) notes that clusters tend to form a "public deliberative forum or policy network open to the full range of relevant local actors within which effective solutions to common problems can be jointly discovered."

While there is consensus that some form of collective governance over the cluster is necessary to ensure success, this may not be easily established. In the case of emerging clusters, busy entrepreneurs may see little need to spend time organising and seeking political support. In contrast, larger and well established mature industries may be more interested in maintaining the status quo than capturing opportunities elsewhere (Glassman & Voelzkow, 2004; Meyer-Stamer, Maggi, & Sieibel, 2004; Whitford & Enrietti, 2005).

There is not one single model of governance which has been applied successfully to clusters, as "[T]here is no such thing as one model of local economy upon which one may base a grand theory" (Le Gales & Voelzkow, 2001, p. 23). The formation of clusters is often contextual and may rely on accidents of history which caused the organisations to evolve in response to competition and the surrounding environment.

Much of the earlier work in industrial districts was confined to a comparison between cooperative models with competitive elements embedded within, to market-driven models. In a similar fashion transaction cost economics, as originally formulated, is based on a dichotomous view between

transaction costs on the open market and the internalisation within a firm's hierarchical structure (Williamson, 1975). Looking over the full spectrum of different forms of governance observed in literature, it appears that such a narrow view does not allow the full range of subtleties observed within clusters to be easily understood. Instead, it is proposed by Hollingsworth and Boyer (1997) that a more complete categorisation of governance modes would involve a two dimensional split between a motivation for action on one axis and the mode of coordination (or the distribution of power) on the other. In TCE there is a difference in the mode of coordination observed, between markets and hierarchy (internal to a firm). On the other hand, with the action motivation axis there is a shift between self-interest of actors as demonstrated in the market, to the obligation relationships observed within communities. This introduces a range of possibilities of different institutional variants (or structures) which can be used to produce "collective competition goods" (a function of the cluster); (Le Gales & Voelzkow, 2001).

Through the careful selection and consideration of a variety of cases, Crouch and Trigilia (2001) identify three distinct continua on which a cluster may be positioned: the Endogeneity/Exogeneity Continuum, the Continuum of Procedure/Substance, and the Continuum of Formality/Informality. On the Endogeneity/Exogeneity continuum the source of rules, which define the behaviour of the participants, is altered. On the endogenous end of the continuum there is growing importance in cooperation and self-imposed rules; on the exogenous end there is increasing importance in rules imposed from an external source. Issues relating to the governance of clusters are discussed in greater detail in a later section (§2.6).

2.4.8. Typologies of a cluster

Hirst and Zeitlin (1991) distinguish between two primary types of industrial districts. The first is "geographically-localised networks of small firms that sub-contract between one another and share services that are beyond the economy or productive capacity of the single firm." The second form of cluster develops following the fragmentation of a larger firm into decentralised productive units, which retain benefits from the marketing and finance divisions of the parent company.

There are various typologies that have been developed for clusters (Iammarino & McCann, 2006; Markusen, 1996; St. John & Pouder, 2006, *inter alia*.). Focusing on one of these, Markusen (1996, p. 296) notes that there are four main forms of clusters based on the inter-relations between the firms within them: Marshallian industrial districts, hub-and-spoke districts, satellite platform districts, and state-centred districts. The second and fourth of these, the hub-and-spoke district and the state-centred districts, revolved around a key organisation acting as a major buyer/supplier in the region, effectively becoming a magnet to smaller firms. The role of hub companies in clusters

has importance in the location decisions made by the smaller firms (Takeda et al., 2008). Such models are dissimilar to the focus of the present research, which focuses on the development of horizontal coordination between comparable firms within clusters; the clusters under study will represent Marshallian industrial districts or clusters.

In some ways these typologies correspond with what Loveman and Sengenberger (1990) present as the "two principal choices" that confront small firms seeking to compensate for inadequate resources. Small firms may either "benefit from the power and resources of large companies," or they must turn to the other solution: "a communal organisation under which the small firm looks for other small firms to associate with and to build a more permanent, mutually constructive network of joint support and resource sharing, possibly with the co-ordinated specialisation of each firm in the network" (Loveman & Sengenberger, 1990, p. 59). These options appear to resemble either hub-and-spoke or state-centred districts, or the traditional Marshallian districts, respectively.

Using the taxonomy provided by St. John et al. (2006) we can see a clear distinction between types of clusters. The first of these evolves from an industry focus (an industry cluster) while the second is associated with new technology developments (a technology cluster). An industry focused cluster "evolves over time in line with the industry life cycle" (St. John & Pouder, 2006, p. 162) while technology focused clusters "give rise to new product classes and whole new industries" (St. John & Pouder, 2006, p. 162). An industry focused cluster develops deep expertise in the specific industry. These clusters frequently build up large amounts of skilled labour that consist of technical and scientific personnel with industry-specific knowledge pertaining to the technologies employed and the markets targeted. There will usually be associated and specialised business service providers involved in the cluster. Such a mix of resources provides the cluster with advantages that will become available to the firms that choose to locate there, reducing the friction and costs of doing business (St. John & Pouder, 2006). The ability to work with competitors and other firms in a cluster enables individual firms to access resources that would otherwise be unavailable to them (Chetty & Wilson, 2003; Gulati, 1999; Shaw, 2006; Szarka, 1990).

Research indicates that the different types of clusters may vary in terms of performance and output. Albino et al. (2007) used a multi-agent system simulation approach to uncover some of the key differences between diverse types of industrial districts (IDs): a Marshallian ID and a leader-firm ID. They found that the advantages of supply chain cooperation tended to be greater in the leader-firm IDs. Furthermore, performance (measured by the capacity utilisation) increases in the

leader-firm ID when the relationships are characterised by cooperative relations, most likely to be present when there exist incentives and encouragement to the leader firm to engage in cooperation with the other members of the ID. This improved performance may be a prime driver of the changing nature of the Italian clusters observed by Cainelli, Iacobucci, and Morganti (2006), who note a greater presence and activity of medium sized enterprises in the traditional clusters in the Third Italy, where the clusters had previously been dominated by small sized enterprises. The character of clusters may evolve with time.

2.4.9. Global Commodity Chains

Global Commodity Chains (GCC) is an area of research that seeks to understand the impact of globalisation on the local manufacturing (Burke & Phyne, 2008; G. Gereffi, Humphrey, & Sturgeon, 2005; Gary Gereffi & Korzeniewicz, 1994; Gibbon, 2001, *inter alia*.). There is overlap between GCC and the present research. Local production, the focus of GCC research, frequently relies on an agglomeration of smaller producers. Thus, the local manufacturers often work as contract manufacturers or in loosely integrated clusters. Several examples are provided by Stringer (1999, 2002) of commodity based clusters of companies in the Hawkes Bay region of New Zealand, which opened up and became integrated into GCCs, demonstrating fragmentation of production between regional economies.

GCC focuses on the role of social aspects of supply chains, such as trust and power. The imbalance of power between larger multinational firms and local manufacturers is investigated in GCC. Research is concerned with the examination of the power relationships along the vertical links in global supply chains relating to manufacturing (Gibbon, 2001), which is in contrast to the focus of the present research, on horizontal links of the supply chain within a cluster. Embedded in GCC research is implicit acknowledgement of the importance of localised supply networks based in a region supplying the global market.

2.4.10. Supply clusters

Clusters appear to frequently exist in the ‘source’ or ‘make’ phase of a supply chain (Figure 2.1). “Cluster areas can improve both supply chain and firm performance” (DeWitt et al., 2006, p. 307), showing synergies between clustering and supply chain management. Frequently, “a cluster allows each member to benefit as if it had greater scale or as if it had joined with others formally – without requiring it to sacrifice its flexibility” (Porter, 1998b, p. 80). It is coordination across the horizontal dimension of the SC which generates this “virtual scale” (Christopher, 2004).

Since a cluster may be focused on one phase in a supply chain the investigation of the concept may be valuable in the present research. Wu et al. (2006) define a 'supply cluster' as the organisation of the sourcing and manufacturing portion of a supply chain (p. 47). Critical to the concept is information, which "plays a vital role and deeply affects every part of the supply cluster" (*ibid.*, p. 50), and trust, which "facilitates the flow and accumulation of extensive market, technical, and competitive information leading to further value creation for the producers and consumers" (*ibid.*, p. 50). These horizontal linkages, granting greater scale of production, have been accepted to be important in many industries (Kishimoto, 2004). Using a supply cluster, sourcing and manufacture can be concentrated in geographically similar areas, relative to the distribution to customers that may be large distances away from the supply cluster. The members of the cluster are much more proximate to one another than they are to the customers that they serve.

When working within a cluster of firms there are important advantages, in terms of supply chain management, to sourcing from the local firms in the cluster as opposed to external firms. These include reduced costs, reduced lead time, improved quality, improved communication, improved new product and process development. Other advantages to firms that are members of clusters include increased clout with both local and state governments and having increased influence on education and training institutions (Patti, 2006). The case study presented by Patti (2006) illustrates that many of the advantages of clustering, identified by Porter (Porter, 1998b), are realisable. However, Patti also notes that an interesting future research question would be *what causes clusters to fail?* This research question could be reframed to ask *what are the challenges facing clusters that prove to be insurmountable?*; a question that is identical in intent to the first Research Question of the present research.

It is not always an easy task for a cluster to break into international markets. Some firms are able to rely on existing networks, while it is more common for entrepreneurial firms to need assistance in developing the networks and linkages that they require to be successful (Loane & Bell, 2006). Through working in a cluster, individual firms can access networks of other firms and potentially leverage them to their own benefit. These networks can help individual firms in their internationalisation and accessing of new markets for their output, particularly in the New Zealand context (Chetty, 2004; Chetty & Agndal, 2007, 2008; Chetty & Campbell-Hunt, 2003a, 2003b; Chetty & Wilson, 2003). The introduction of a network to an established supply cluster may be a method to unsettle a cluster and prevent it from being "stuck" or "locked in" to an undesired state (Z. Min, Feiqi, & Sai, 2008).

2.4.11. Implications from literature relating to clusters

From the review of literature pertaining to clusters we find that there is a long and rich history of research on clusters, dating from the early work by Marshall through to the more recent work by Porter, in particular, that re-popularised the concept. There is general agreement that a cluster is a group of related firms operating in proximity to one another. There is agreement that many social aspects are important, such as trust and cooperation. The research also highlights the fact that in many clusters the member firms not only cooperate, but they also compete, with one another. Cluster literature does not delve into this apparent paradox in great detail, which is why the concept was discussed earlier, in §2.3.2, as a form of coopetition.

While the term 'cluster' has been used in the sense of a coalition within this research, and is not necessarily reflective of what is traditionally associated with clusters, there have been four key areas of research in the study of clusters:

- Economic geography: economists have focused on trade and geography and how increasing returns may be associated with clustering of firms in a region.
- Policy and business clusters: Porter argues that competitive advantages may derive from local factors, such as strong supplier networks, improving competitiveness of regions.
- Industrial districts: growing from the modern focus on the clusters of Italy the emphasis is on the local region as a point where learning and innovation occur, creating advantage for firms involved.
- Innovation studies: focuses on individuals, firms, innovation and the diffusion of innovation.

Of these streams of research on clusters, the stream of research on industrial districts has the greater history, commencing with Marshall's seminal work. The innovation stream is increasingly seen as important in knowledge-based societies and represents a growing body of work, which is less relevant to this research. The present research contributes research within the area of policy and business networks.

There are other concepts and strands of research related to clusters, such as global commodity chains, which have a different emphasis to that which is being pursued in the present research.

While clustering has been shown to benefit members, there is little research showing that firms that decide to be non-members of the cluster are disadvantaged (Karaev, Koh, & Szamosi, 2007).

While firms in clusters are doing well, there is little evidence those firms not in clusters are not doing equally well; the cluster itself may not be a factor in their success. However, recent research is indicating that the small scale of firms in an cluster may be "an obstacle to FDI, to participation in global value chains, to successful outsourcing, to innovation and adoption and use of ICT" (Rabellotti et al., 2009, p. 35). Acting in a cluster is much more likely to allow smaller firms to meet these challenges than if they were operating independently to others.

Clusters are able to enhance the ability of firms within to be more innovative (De Propris, 2000, 2002), break into new markets (Chetty & Campbell-Hunt, 2003b), and to increase their competitiveness (DeWitt et al., 2006; Porter, 1998b). These perspectives concerning clusters have bearing on the present research as they influence the willingness and requirements for the member firms to consider clustering as an option.

Within clusters there are many types of interactions. These are related to the way in which the firms coordinate activities between themselves, and have bearing on the governance of the cluster. The impact of the various firms on coordination within the cluster will differ, with many forms of governance possible (Hollingsworth & Boyer, 1997). Since there is no generic cluster there can be no grand theory of clusters (Le Gales & Voelzkow, 2001); however, there are broad similarities between clusters. One of the most common is the presence of both competitive and cooperative pressures as a form of coopetition, along with the apparent challenges relating to the coordination of a flow of goods (McDonald et al., 2007). Some of the concepts from clusters may ultimately inform supply chain management research, as this seeks to understand how modern networks operate and the role that different forms of control may play in the network (Hayes, 2008).

2.5. Competitiveness

Increasing competitiveness is a key concern that drives firms to collaborate with others in clusters. The drive to improve competitiveness would see firms forming clusters in order to take advantage of pooled resources and capabilities as a means of enhancing their competitiveness. The resource-based view of the firm (Barney, 1991; Peteraf, 1993) posits that resources and capabilities determine the homogeneity in firm competitiveness. The Value, Price, and Cost (VPC) framework is an alternative explanation of competitive advantage (Besanko, Dranove, Mark, & Schaefer, 2007; Walker, 2007). Both of these frameworks will be investigated to highlight how clustering can improve the competitiveness of small firms. Understanding these perspectives and frameworks aids the present research through providing different lenses through with to examine the barriers and bridges to horizontal coordination.

2.5.1. The Resource-Based View of the firm

The resource- and capabilities-based perspective (Barney, 1991, 1996; Conner & Prahalad, 1996; Peteraf, 1993) perceives a firm to be a repository of knowledge and capabilities and seeks to use this in order to explain heterogeneity in competitive positioning. Using these (generic or particular) capabilities enables a firm to create competitive advantage. In seeking to create these advantages the firm will be constrained by their access to knowledge and capabilities: if they do not have what they require they will need to either nurture or acquire them. This can prompt a collaborative effort, to synergistically combine complementary resources and capabilities, from different firms, in a way that will generate greater returns for the partners. These returns must be greater than those offered using a market transaction (arms-length), or a complete internalisation (using hierarchies); (Loasby, 1994; Madhok & Tallman, 1998; Richardson, 1972). The answer sits somewhere between the two extremes, as a nearer-to-optimal solution.

The RBV perspective suggests that it is the valuable and firm-specific resources that allow firms to achieve superior performance (Hunt & Morgan, 1995). RBV contends that the firm's core competencies lead to sustainability of a competitive advantage (Barney, 1991; Hunt & Morgan, 1995). Each firm builds these competencies around resources that they possess which are inimitable (or difficult to imitate), rare, valuable, and not easily substitutable (Barney, 1991). The firm enjoys organisational advantages, enabling it to organise acvitities in ways that markets cannot (Conner, 1991; Ghoshal & Moran, 1996; Madhok, 1996b; Teece, Pisano, & Shuen, 1997, *inter alia*) due to "the distinctive ways that things are accomplished within the enterprise" (Teece et al., 1997, p. 528).

The presence of certain resources may be influenced by the existence of other resources within the firm. Dierickx and Cool assert that, when speaking of a stock in place of a resource, "the difficulty of building one stock is related, not to the initial level of that stock, but to the low initial level of another stock which is its complement" (1989, p. 1508). These relationships indicate that the order of development of resources may constrain or provide opportunities to firms; there is a path dependency in the development of resources and opportunities.

Hunt and Morgan (1995) extend the concept of RBV slightly into the resource advantage theory, which acknowledges that relationships with other firms influence the individual firm.

In many ways the members of a cluster are looking to gain advantage through resources that lie outside the firm but still within their cluster. Whereas in the RBV paradigm of the firm focuses on the assets, skills, abilities and knowledge (read: the resources) within the firm, Porter (1998b)

suggests that capabilities can be increased through looking outside the firm – at the other members of the cluster. As Gulati et al. (2000) suggest:

> the image of atomistic actors competing for profits against each other in an impersonal marketplace is increasingly inadequate in a world in which firms are embedded in networks of social, professional, and exchange relationships [. . .] such networks encompass a firm's set of relationships, both horizontal and vertical, with other organisations. (p. 203)

They further point out that such a set of relationships can be considered as an inimitable resource that can be exploited, along with a means of accessing other resources. McEvily and Zaheer (1999, p. 1152) find that "sources of competitive capabilities can be embedded externally in firms' network resources – their network of bridging ties and linkages to regional institutions." They also find that firms with greater 'redundancy'[2] in their relations tend to acquire fewer competitive capabilities. This is aligned to the claim by Uzzi (1997) that with greater diversity between partners, the strengths of one member may compensate for the weaknesses exhibited by another; the group, together, enables a wider range of actions to be taken than if the members were acting autonomously. The complementariness of the members strengthens and reinforces the clustering.

These findings suggest that the investigation of supply chain management practices in the context of these networks in the cluster (as a resource of the firm) is a valuable study using the RBV paradigm. This theoretical lens is able to offer a different perspective in the examination of a supply chain management problem. The resources within a firm, or available to a firm through a cluster, provide incentive to collaborate by clustering to increase the competitiveness.

2.5.2. Organisational capabilities

The RBV offers a relatively static understanding of competitiveness; the dynamic capabilities perspective expands the dimensions of analysis by incorporating time. The evolution and change in the capabilities, which are a key resource for the firm, can be investigated and understood by expanding the analysis to incorporate the element of time. In the organisational capability perspective of the firm it is considered to be "a bundle of resources and capabilities linked together through firm-specific routines which can behave both as a competitive constraint as well as the source of sustainable value" (Madhok, 1996b, p. 578). This notion, of a firm being a bundle of knowledge, with the support of underlying processes (Barney, 1991; Conner, 1991), is

[2] In this context the term 'redundancy', as used by McEvily and Zaheer (1999) refers to a series of relationships which 'overlap' in their context – they have multiple relationships with various entities which are not contributing new competitive capabilities to the firm. The multiple relationships may be with entities of similar types or with similar skills, meaning that there is a focus on these skills, hence there is a redundancy, a repetition of similar relationships, or relationships that contribute duplicated or replicated competitive capabilities, to the firm.

important in understanding competition. “Firms in the same industry compete with substantially different bundles of resources using disparate approaches. These firms differ because of differing histories of strategic choice and performance and because managements appear to seek asymmetric competitive positions” (Rumelt, 1997, p. 132), indicating the importance of choices and the history associated with these choices.

Dynamic capabilities drive the creation and recombination of resources in new ways to secure competitive advantage (Teece et al., 1997). Eisenhardt and Martin (2000) define dynamic capabilities as:

> The firm’s processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets collide, split, evolve, and die. (p. 1107)

It is through the accumulation of past experience, the clear articulation of knowledge, often gained through the codification process, that organisational routines and capabilities can be developed and enhanced (Zollo & Winter, 2002). Others scholars say a capability “generally implies a set of resources and knowledge of their usage” (Möller & Svahn, 2003, p. 219). In this light “a dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness” (Zollo & Winter, 2002, p. 340). There may be intra-firm replication over a given network, even without inter-firm replication by all parties; the replication of capabilities may not be linked to the resources controlled but by managerial competency and effort (Knott, 2003).

Ordanini and Rubera (2008) report on their research in the capabilities associated with procurement; process efficiency and process integration are identified as being key capabilities in procurement. They note, however, that there may be no complementary impact between capabilities; the presence of one capability may not stimulate or provide advantage in gaining others. Development of a specific capability “requires the development of distinct sets of resources and capabilities, where being excellent in one dimension does not provide shortcuts (in terms of time and resources invested) to achieving excellence in the other dimension” (Ordanini & Rubera, 2008, p. 44). The ability of a dynamic capability to influence further capability development may occur with some capabilities, but there is limited opportunity for this to occur. Instead, capabilities are more likely to develop along their lifecycle, or be shifted to a new trajectory, without the intervention of extant dynamic capabilities (Helfat & Peteraf, 2003). However, Soosay, Hyland, and Ferrer (2008) indicate that working effectively with partners can allow firms to improve internal capabilities for continuous innovation. It may well be the case that

the resources, and knowledge how to use them (the capabilities), are related to the ability to influence the trajectory of the development of other capabilities, although this potential may be contextual.

The presence of complementary resources and capabilities in a cluster or a network is important. Kogut (2000) asserts that:

> networks are more than just relationships [. . .] networks constitute capabilities that augment the value of firms. These capabilities, e.g., speed to market, generate rents that are subject to private appropriation. It is through an understanding of networks as knowledge encoding coordination within and between specialized firms in specific cooperative and competitive structures that "missing" sources of value can be found. (p. 423)

Similarly, Christopher and Towill assert that "in today's challenging global markets, the route to sustainable advantage lies in being able to leverage the respective strengths and competences of network partners to achieve greater responsiveness to market needs" (Christopher & Towill, 2000, p. 209). Working in a network, or cluster, and being able to access and leverage the resources or capability of partners in the cluster, can therefore provide advantage to members of the cluster. Joining these networks to access resources and capabilities is a well recognised behaviour of small firms (Gulati, 1999; Shaw, 2006; Szarka, 1990).

The capabilities do not reside within any given firm, but are synthesised by the knowledge of how to coordinate among those in the network, with a history of cooperation between them. Kogut (2000, p. 422) claims that "to remove a firm from this network would be to deprive it of important capabilities that it could not immediately recreate, even if it could access equally capable suppliers." Even if two firms possess the same knowledge, or have access to the same people, the conditions that they start with, coupled with decisions made during the process, will impact on their abilities to develop and transfer capabilities internally (Maritan & Brush, 2003). Particularly with SMEs, there need to be capabilities in external reconfiguration, integration, path alignment. A "vision of the future is created to give a picture of what the firm will look like in the years to come" (Borch & Madsen, 2007, p. 116).

Working effectively in a network or supply chain may require specific capabilities amongst the member firms. Traditionally, these were labelled in broad terms, specifically relational partnering and alliance management (Eisenhardt & Martin, 2000; Spekman, Isabella, & MacAvoy, 2000) and also to the management of relationships in supply chains (Tracey et al., 2005). Further research can break network capabilities down to a finer level, indicating that capabilities such as network orchestration, network visioning, net mobilisation, and net management are critical and must be developed (Möller & Svahn, 2003). The importance of different capabilities may alter with time;

those required in a decision stage will be likely to differ from the preparation stage and the operational stages in partnerships, as different concerns become more prevalent (Knoppen & Christiaanse, 2007). The existence of the right resources and capabilities to operate effectively in a cluster may depend on the 'right person', which is a reflection on the mode of operation of the cluster. The right person, with the possession of, or potential to develop, the right capabilities may be required. The ability to switch between different modes of cluster or network operations may be a core skill for future CEOs (de Man & Roijakkers, 2009). When firms have developed procedures and capabilities for forming and working in networks, future opportunities, even where specifics of control and governance differ, may be more easily capitalised on (Gulati, 1999).

The organisational capability perspective has important implications for studies on clusters. Member firms will be able to cluster to obtain the advantage of the capabilities of others in the cluster, rather than developing these capabilities themselves, which may prove challenging. In addition to the capabilities of individual firms, being able to effectively work within the cluster is itself important. Working together effectively coordinating activities may become a shared capability. The presence and ability to utilise resources and capabilities allows identification of a source of competitiveness amongst firms, and potentially, clusters.

2.5.3. The Value, Price, and Cost (VPC) framework

The Value, Price, and Cost (VPC) framework (Besanko et al., 2007; Hoopes, Madsen, & Walker, 2003; Walker, 2007) can also be used to determine and explain competitive advantages. Buyers wish to acquire products because they perceive the products will contribute value (V) to their operations. They seek to acquire the products at a certain price (P) from the supplier. The supplier expends resources at a given cost (C) to generate the product. Thus the buyer receives value of (V-P); the supplier receives a profit of (P-C). Hoopes et al. (2003) note that "the supplier's resources and capabilities, in turn, influence the value of the good to the buyer and/or the cost of producing it" (p. 891). They further note that "the V-C profile of a member of a cluster likely differs from that of a close rival who is not a member" (Hoopes et al., 2003, p. 892). This suggests that through working in a cluster firms can alter their VPC profile, utilising and leveraging their capabilities, to seek a better competitive position, through increasing value to customers or by improving their cost competitiveness.

Clusters can change their profiles through leveraging capabilities of member firms and enhance the value of their product to their customers. These changes in competitiveness can be generated through additions in value or through reductions in cost. Fawcett et al. (2008, p. 44) assert that "although cost reduction is a prime motivator to strategic SC collaboration, customer satisfaction

and service is perceived as more enduring by managers, and should therefore be brought to the fore as the leading goal for SC managers." The strategic objectives of supply clusters, whether to focus on cost leadership or increased value, is an important consideration and may be examined using the VPC framework.

The VPC framework indicates that careful consideration of both costs and value is required as they will play an important role in the competitive profile and competitive positioning of firms and clusters. For many supply chain managers the concept of cost may be well understood; the concept of value, however, may be foggier and less well understood. To increase the understanding of how a cluster may increase the value for customers, the concept of value must be examined more closely.

2.5.4. The concept of value in competitiveness

The concept of the value received by the customer is open to debate but Chopra and Meindl (2007, pp. 26-27) indicate that different market segments will vary according to the:

- quantity of product needed in each lot;
- response time that customers are willing to tolerate;
- variety of products needed;
- service level required;
- price of the product; and
- desired rate of innovation in the product.

Considering that most scholars maintain that firm competitiveness is decided by a bundle of capabilities aligning with competitive priority (Ward, McCreery, Ritzman, & Sharma, 1998) which is similar to Skinner's (1969) writing on the need to develop key capabilities, these are generally accepted to share four basic components of competitive positioning:

- cost;
- quality;
- delivery; and
- flexibility.

Boyer and Lewis (2002) note that some conceptual studies have also suggested 'innovativeness' and 'service' as priorities to expand this list; consistently the empirical research has focused on the four dominant components.

Walker (2007) notes that "there is no complete list of value drivers [. . .] nor should there be" (p. 36). However Walker notes that there is "a common set of value drivers that can be identified across a wide range of markets and discussed in general terms" (p. 37). These value drivers include:

- technology;
- quality;
- delivery;
- breadth of line (variety in product lines);
- service;
- customisation;
- geography and location;
- risk assumption (through warranties, etc.);
- brand/reputation;
- network externalities ;
- environmental policies; and,
- complements (between products, such as extensive road systems making motor vehicles increasingly useful.).

These value drivers "have a direct influence on the firm's market position and therefore its degree of competitive advantage" (Walker, 2007, p. 35). Cluster members will seek to enhance the cluster value drivers to improve the competitive positioning, creating the opportunity to generate greater returns.

As more value drivers are in turn more intensively exploited by the cluster, the amount of value customers receives increases, enabling an increase of price while maintaining the same difference between value and price for the customer. In this way the cluster can receive higher returns.

The creation of value for the customer, or the reduction of cost, requires coordination between members in the cluster. This is achieved through governance of the activities of the cluster, explored in the following sections.

2.5.5. Competitiveness and capabilities in clustering

Clustering and cooperating enables individual firms to access resources or capabilities that they would not otherwise be able to exploit (Chetty & Blankenburg Holm, 2000; Chetty & Campbell-Hunt, 2003a; Chetty & Wilson, 2003). This is similar to Cohen and Levinthal's (1990) assertions

that while firms are able to absorb capabilities from partners, this need not be so if they can be accessed through the cluster. Utilising, rather than absorbing, means that there need be no investment specifically in absorption, cited as a cost (W. M. Cohen & Levinthal, 1990). Leveraging other capabilities or resources in this manner enables a firm to be more competitive and improve their VPC profile.

Managers can realise benefits by finding firms that possess complementary resources or capabilities that they are able to partner with (Madhok, 1996a), as a

> sensible strategy would be to recognize that there are limits to their and other firms' capabilities, and consequently focus on what they are able to do well, build upon it, and, if need be, complement this through collaborations with others who focus accordingly on their strengths. (p. 362)

Working in this manner a firm can improve their own competitiveness and the group of firms is able to improve their competitiveness as a body. Each cluster is able to possess a unique set of resources and capabilities (Hervas-Oliver & Albors-Garrigoacutes, 2007). This enables clusters to increase their competitiveness, particularly through a focus on either cost or value leadership for their customers. Understanding the drivers of competitiveness using tools such as the RBV and capabilities, and frameworks such as the VPC framework, can assist in the examination of supply chain management relationships and how or why these relationships work or do not work to improve competitiveness.

2.6. TCE and governance

Transactions need to be coordinated and governed. Traditionally, the two methods of governance of transactions were internal to a firm, utilising hierarchy, or through the markets (Williamson, 1975). More recently, the hybrid form of network governance has been proposed (Jones et al., 1997). Understanding the mode of governance amongst firms in a cluster helps to determine the barriers to effective horizontal coordination and how these barriers may be bridged. This section explores the concept of transaction cost economics or theory, proposed by Williamson (1975), before shifting the focus to network governance.

Firms need to understand which activities to internalise and which to source through market systems. Transaction Cost theory, or Transaction Cost Economics (TCE) (Williamson, 1975, 1985, 1991, 1994, 1999) focuses on the role of transactions between partners. This line of research extends back seventy years to the time when Ronald Coase grappled with the nature of production and markets in his volume *The Nature of the Firm* (Coase, 1937). There is, Coase argues, “a cost of using the price mechanism. The most obvious cost of ‘organizing’ production through the market mechanism is discovering what the relevant prices are” (Coase, 1937, p. 370). These are

referred to as transaction costs (TC) and drive internalisation of activities within a firm. While Coase's purpose was to understand why activity was organised within firms, Williamson's drive was to make the theory developed by Coase more predictive. Approaching the firm as a governance structure allows a scholar to employ a more analytic approach, particularly when identifying the characteristics of transactions, such as asset specificity.

There are three main classifications of transaction costs: information costs, negotiation costs, and monitoring, or enforcement, costs (Hobbs, 1996). Information costs arise as firms must discover information about products, buyers or sellers, and prices. The costs of negotiating and writing contracts, or the payment of an auctioneer or a broker, are examples of negotiation costs. After a transaction occurs there are costs of enforcement associated with monitoring the behaviours of exchange partners to ensure that all terms of the transaction are being met.

Transaction costs may be seen to have two components: coordination costs and transaction risks. A simple way of considering how firms do business is through perceiving that they seek to minimise transaction costs, explicated in the following fashion (Clemons, Reddi, & Row, 1993, p. 14):

Transaction costs = coordination costs + transaction risks

TCE lies on a foundation consisting of behavioural and environmental factors, specifically bounded rationality, opportunism, and asset specificity. When transaction costs are minimised, there are multiple dimensions over which the transactions differ, including frequency, uncertainty, and asset specificity. The dimension of asset specificity is acknowledged to have the greatest explanatory power when examining the governance of transactions. Asset specificity is "the ease with which an asset can be redeployed to alternative uses and by alternative users without a loss of productive value" (Williamson, 1991, pp. 79-80).

After characterising the transaction, alternate governance structures are evaluated in terms of transaction cost minimising capabilities. Transactions are matched with governance structures in a structured manner, enabling the formulation of hypotheses that may be empirically tested (Groenewegen, 1996).

2.6.1. Bounded rationality

Bounded rationality recognises that there are limits on the ability of people to behave entirely rationally when undertaking purposeful activities. In many cases people will satisfice, accepting a solution considered to be "good enough" rather than seek an optimal solution to their situation

(Simon, 1982). Herbert Simon (1957, p. xxiv) also noted succinctly that humans are "*intendedly* rational, but only *limitedly* so." However, as Dequech (2001) articulates, many human behaviours are the result of habits, or tacit knowledge, which may not be considered entirely rational. Similarly, bounded rationality binds and constrains the activities of groups of people, including firms (W. R. Scott, 1987). In the presence of uncertainty, two firms may incur transaction costs in their relationship as they seek to continue negotiations on prices and specifications of contracts between them (Grover & Malhotra, 2003).

2.6.2. Opportunistic behaviour

The key concern of TCE is the potential for opportunistic behaviour in these economic interactions. Opportunism is when a firm engages in self-interested activities with a degree of guile when these activities may hurt others involved in the transaction (Williamson, 1975). The rules that impede these behaviours, relating to discrete transactions, will largely determine the governance structure (Williamson, 1991). Systems can be designed, at a cost, to prevent such behaviours from occurring. Thus the emphasis is on seeking efficient methods to minimise these activities designed to prevent opportunism from occurring; the transactions can then occur and bring benefits while incurring low costs of preventing opportunistic behaviours. The governance of these characteristics will lie on a continuum between pure markets (price-based activity between separate entities) and hierarchies (internalised to one organisation only) (Williamson, 1991). Transactions incur costs: those incurred when the exchange relationship is considered. Examples of specific costs include those of monitoring contracts, negotiating, settling disputes, and enforcing settlements, in addition to the opportunity costs of inefficient administration of the transaction (Dayasindhu, 2002, p. 552).

2.6.3. Asset specificity

Asset specificity occurs when one partner develops and invests into a resource that is intimately linked with the exchange under consideration but has little alternative value. If Firm A develops resources that are highly specific to the relationship, Firm B may be able to renege on the previous arrangements and reduce the benefit that they share with Firm A, secure in the knowledge that Firm A is locked into the relationship due to the asset specificity. Such behaviour is termed 'post-contractual opportunistic behaviour' (Hobbs, 1996, p. 18). Joint action requires some control such as when a firm makes an investment that is high in asset specificity, they will frequently seek to become involved in activities otherwise considered to be the other party's exclusive domain, in order to reduce their own risks (Heide & John, 1990). Firms that create asset specificity in their

investments may also find that there is improvement of the coordination of activities in the relationship (Claro, de Oliveira Claro, & Hagelaar, 2006).

2.6.4. Conclusions about TCE in a cluster

Generally TCE will investigate a dyad, as the unit of analysis is a transaction between two parties. Few firms deal with only one other party. If the relationships, and governance of the relationships, with multiple parties are interdependent, there may be an impact on any one set of transactions with a specific party (Wathne & Heide, 2004). This has been recognised by proponents of TCE; Williamson (1985, p. 393) explains that as TCE examines each dyadic trading relationship separately, "interdependencies among a series of related contracts may be missed or underevaluated as a consequence." An example of these interdependencies is provided by Antia and Frazier (2001), who caution that the contract enforcement within any particular dyad will be influenced by factors external to the dyad itself. These factors may be present at a chain or a network level, indicating the necessity to perform a comprehensive analysis that investigates all levels at which the firm operates in order to understand how contracts at any specific level are enforced (Antia & Frazier, 2001).

TCE deals with a significant issue that may become a barrier for firms developing horizontal coordination with partners in a cluster: opportunism. When a partner firm behaves in a way that damages the relationship and the ability to achieve long-term goals, how is a member firm able to respond? What structures may be put in place to prevent this from occurring? Is it sensible for a member firm to develop capabilities or resources within the partnership? These questions highlight the fact that the potential for opportunism, in part driven by asset specificity, can form a significant barrier for firms engaging in horizontal coordination.

As firms regularly conduct transactions with several other organisations, the sociological concept of embeddedness, as outlined by Granovetter (1985), also determines firm competitiveness and governance. Economic behaviours will be impacted by the structure of the overall social relations of the firm in a continuous process. The results of continuous interaction differ, much as the results of an expectation of continued games presents the opportunity for different levels of cooperation between firms (Axelrod, 1984). Firms will be shaped by the overall industry structure of these ongoing social relationships, even as they help to shape the structure itself (Jones et al., 1997).

2.6.5. Network governance

Network governance stands as an alternative to the market and firm governance structures that TCE is used to assess. As a governance structure, network governance is the "coordination characterised by informal social systems rather than bureaucratic structures within firms and formal contractual relationships between them" (Jones et al., 1997, p. 911). The use of network governance has been observed in a myriad of industries, such as fashion (Uzzi, 1996, 1997), financial services (Eccles & Crane, 1988; Sydow, 2004), biotechnology (Barley et al., 1992; Casper & Murray, 2005), and film (Faulkner & Anderson, 1987; Robins, 1993), among others.

Network governance differs from TCE, upon which it is based, as it also includes task complexity and structural embeddedness in the network as factors in the framework, while including factors held in common with TCE. The framework is also extended from the traditional dyadic perspective to allow it to focus upon a wider system, as acknowledged to be important by Wathne and Heide (2004). There are four conditions that Jones et al. (1997) posit are necessary for network governance to emerge: demand uncertainty with stable supply, customised exchanges high in human asset specificity, complex tasks under time pressure, and frequent exchanges among parties in the network.

When there is demand uncertainty, firms in a network are more likely to disaggregate into separate, autonomous, units. This allows greater flexibility and specialisation. Resource bundles, previously owned and strictly controlled, may be reallocated rapidly at low cost. This enables the network to meet changes in the demand with greater ease. In the textile industry in Prato, Italy, the firms' ability to respond to changes in fashion was enhanced through the use of a network structure (Piore & Sabel, 1984).

Higher levels of customisation in an exchange, a service or product, require an increased coordination between members of a network because if a buyer decides not to purchase a customised product, it is difficult to transfer the product to another buyer (Williamson, 1985). Greater customisation also requires transfer of tacit knowledge using information-rich methods, such as face-to-face communication (Lengel & Daft, 1988).

The frequency of exchange is a key determinant of governance (Williamson, 1985); specialised governance structures require expense which may be recovered only through extensive exchanges. Reciprocity in transactions "transforms a unilateral supply relationship into a bilateral one" (Williamson, 1985, p. 191); greater mutual interest ensues and a sense of shared destiny.

In terms of embeddedness, Granovetter (1992) identifies that there are two types: structural and relational. Relational embeddedness is concerned with the depth and quality of relationships between two firms. Structural embeddedness refers to the way in which two firms have shared relationships with other parties and is a function of how many participants are involved, the likelihood of future exchanges, and how much communication is invested in the exchanges (Granovetter, 1985, 1992). Structural embeddedness enables networks to use open-ended contracts to enhance the ability of members to work under demand uncertainty (Jones et al., 1997). A greater intensity of the structural connections also promotes the formation of more strategic capabilities (Pavlovich & Kearins, 2004).

As the parties' mutual contacts either know one another, or know of one another, because of the structural embeddedness in the network, they will be more likely to share information. As the embeddedness grows, parties will have more knowledge of each other and will find greater constraints on their behaviour (Burt, 1992).

The use of contracts may be an inadequate governance mode in many alliances. "Social control is an important dimension that only thrives in a trusting relationship and enhances satisfaction between exchange partners" (Şengün & Nazli Wasti, 2009, p. 60). Network governance proposes the use of "social mechanisms, rather than authority, bureaucratic rules, standardisation, or legal recourse" (Jones et al., 1997, p. 925). The four forms of social mechanism are the restricted of access to exchanges within a network, development of a macroculture, collective sanctions, and reputation. These social mechanisms need examination in greater detail to understand their relevance to the present research.

2.6.5.1. Restricted access to exchanges

Through the reduction in the number of partners available for exchange within a network, status maximisation and relational contracting become important. Status maximisation reduces access as firms seek partners only of similar or greater status, with the result being that exchange occurs amongst firms of similar status. Status may depend on the known history of quality or through the association with high-status partners (Podolny, 1994).

Relational contracting also reduces access to exchange as there are fewer partners that are traded with (Bolton, Malmrose, & Ouchi, 1994). Relational contracting strategies are most prevalent in Japan. An example is given by Dyer and Ouchi (1993, p. 54), where they draw attention to the fact that US auto manufacturers had a network of 20 suppliers for electrical wiring, in contrast to the Japanese auto manufacturers that used only two suppliers.

With fewer potential parties to transact with there will be reduced variation in the expectations and goals that the different firms bring to the exchange. Frequent exchanges may also enable partners to learn from one another (Faulkner & Anderson, 1987), while establishing routines for working together.

A reduction in the number of relationships also means that a firm may do a better job of monitoring any relationships in which it is engaged. Transaction costs should be reduced by the reduced need to monitor relationships and transactions. The firms are more likely to perceive that their interests and needs are aligned with other parties, reducing the incentive for opportunism (Provan & Gassenheimer, 1994). In relational exchanges the frequency and on-going nature of the exchanges creates the necessary conditions for an iterated prisoner's dilemma game; when the firms expect that they will be interacting repeatedly they find it rational to cooperate while the other firms cooperate (Axelrod, 1984).

2.6.5.2. Macroculture

A macroculture is a culture that is embodied in all participants in the inter-firm setting, not only top-level managers. It is a shared knowledge and understanding that firms derive from assumptions about the society, competitors, customers, and suppliers (Gordon, 1991). These macrocultures "evolve from webs of direct and indirect relationships, including the institutional environment and the culture within which the organizations exist" (Pavlovich & Kearins, 2004, p. 199). Firms based in close physical proximity will tend to share values, idiosyncratic beliefs, and assumptions (Abrahamson & Fombrun, 1994; Bell, Tracey, & Heide, 2009; Iammarino, 2005).

Macroculture increases coordination among firms in three key ways: (1) through ensuring that there is a "convergence of expectations", (2) by allowing for argot that is specific to the group, enabling the summarisation of information and/or routines, and (3) by specifying broadly understood rules that determine appropriate actions under various circumstances (Jones et al., 1997). The presence of the macroculture provides a cluster with "a set of general organizing principles that guide behavior and promote (as well as constrain) particular forms of joint action" (Bell et al., 2009, p. 628). Through increasing the ease and simplicity of exchange, a macroculture is able to reduce coordination costs among firms in a network.

The term 'macroculture' is very general and it has been proposed that it may be divided into at least two broad types: a relational macroculture and a hierarchical macroculture (Bell et al., 2009). A relational macroculture involves cooperation and bilateralism between firms in a cluster. There are high levels of trust, reciprocity, and mutual sharing of information with shared values between

the members (Gelfand, Smith, Raver, Nishii, & O'Brien, 2006). In contrast, a hierarchical macroculture can be perceived as having shared patterns of rules and regulations, with stricter lines of authority, over the firms in a cluster (Bates, Amundson, Schroeder, & Morris, 1995). While these are distinct modes they are not mutually exclusive; the aspects of the two modes of macroculture can be seen to exist within a single cluster at a single time. The analysis of the Silicon Valley cluster during the 1970's and 1980's by Saxenian (1996) portrays a cluster where both modes coexist, although the coexistence is uneasy at times.

2.6.5.3. Collective sanctions

Collective sanctions are mechanisms by which group members are able to reprimand others for the contravention of existing values, norms, or goals of the network. A network may exercise collective sanctions as a form of governance through the use of gossip, shaming the offender and impacting on reputation (Levinson, 2003), through to ostracism, the exclusion from the network, whether for a short period of time or indefinitely. An example is the experience surrounding the film *Heaven's Gate*; after cost overruns and failure at the box office, there was "at least temporary unemployment for almost everyone associated with the picture" (Balio, 1987, p. 339).

Collective sanctions are able to define the parameters of acceptable behaviour through demonstration; collective sanctions can be used by groups to "monitor and control the conduct of their members" (Levinson, 2003, p. 373). Activities or behaviours which breach acceptable parameters suffer the consequences. In this way the collective sanctions support the existence of shared norms and standards of behaviour in a network. Smaller, closely-knit, groups are more likely to rely on social norms to help self-regulate behaviour of members, in contrast to the use of contracts, due to the cost of creating and enforcing the contracts (Levinson, 2003).

There is the danger that collective sanctions may not be appropriately applied, particularly in situations involving high levels of uncertainty (Jones et al., 1997). When it is difficult to tell if parties have met all their obligations to one another, the use of collective sanctions involves a measure of judgement. This is because, as Bhide and Stevenson (1992) assert, an "aggrieved party must not only prove that a contract was breached but also the fact that there was even an agreement (a meeting of minds). There is, in fact, a great potential for genuine misunderstandings" (1992, p. 196). Misunderstandings can trigger an inappropriate use of collective sanctions.

2.6.5.4. Reputation

Reputations are able to safeguard exchanges as they both deter behaviour that is deceptive, and increase the likelihood of detection of such behaviours. In this way reputation can enhance

cooperation between parties (Parkhe, 1993). Undoubtedly, the events surrounding the film *Heaven's Gate* impacted on the reputation of the individuals associated with the film, contributing in part to their difficulty in finding employment afterwards (Balio, 1987). In the film industry directors will frequently research and investigate potential crew members before hiring them (Jones & DeFillippi, 1996). The role that reputation plays in the selection of trading partners is well accepted in supply chain management literature (Choi & Hartley, 1996; Eltantawy, Fox, & Giunipero, 2009; Pidduck, 2006). Reputation is an asset that many guard carefully as "it is the intangible assets, such as [. . .] corporate reputation [. . .] that are the most difficult for competitors to copy and are the foundation for long-term success" (O'Keeffe, 2001, p. 12). Over time, as an individual member in a network operates effectively with others they are "likely to build up a reputation as a dedicated and committed partner" (Duysters, Heimeriks, & Jurriëns, 2004).

However, reputation is a double-edged sword. Jones et al. (1997) point out that over-reliance on reputation can restrict the pool of participants in the network, leading to a small range of partners in an increasingly 'in-bred' group. Over time this will serve to reduce heterogeneity by shutting out firms that are different. Furthermore, reputation may be distorted over longer chains of links.

2.6.5.5. Conclusions based on network governance

While the network governance perspective is valuable we are reminded by Borgatti & Li (2009, p. 19) that "collecting the kind of data needed for a proper full network analysis is certainly a daunting prospect." Despite this drawback, using the network governance theory allows analysis of governance within a cluster that is more suited than either a hierarchy or market approach to the challenges and opportunities that the firms will face in a cluster. The social mechanisms most likely represent opportunities for member firms in a cluster to help themselves overcome barriers to closer coordination, opportunities that are more valuable than those presented by the TCE perspective.

2.7. Resource dependency

The resource dependency theory (RDT)[3] characterises the links between firms as power relationships based on the exchange of resources (Pfeffer & Salancik, 1978; Ulrich & Barney, 1984). The model rests on two key assumptions: (1) environmental resources are scarce due to

[3] Despite the similarities in name and the common emphasis on resources, the RBV and RDT differ significantly. RDT perceives firms as being a bundle of coalitions to secure resources; RBV sees firms as being a bundle of resources. RDT proposes that firms need to secure a flow of resources to their control to leverage greater power; RBV says that a firm must possess the right type of resources and focus on the development and enhancement of these resources to provide competitive advantage (Olavarrieta & Ellinger, 1997).

competition, and (2) enterprises thrive through acquisition of these scarce resources or by ensuring other firms are dependent on resources controlled internally. Specialisation between firms is likely to lead to partnerships as firms find that they require interorganisational dependencies to secure access to desired resources (Aldrich, 1976). This conception of transactions between firms is more expansive than that offered by TCE as it assumes greater complexity and depth to the relationship which is also context dependent (Pfeffer & Salancik, 1978). As the environment becomes increasingly uncertain firms become more dependent on others and will be encouraged to seek close partnerships to enhance exchange stability and information exchanges (Fink, Edelman, Hatten, & James, 2006). As firms become more interdependent there is increasing emphasis on the control structures that are in place (Trienekens & Beulens, 2001).

Horizontal coordination is possible within a given tier of a supply chain, given that the members are located in equivalent positions and can become interdependent (Galaskiewicz, 1985). For such a group to be successful it "must provide selective incentives, it must build consensus, and it must coordinate the actions of member organizations. In other words, to lessen their resource dependency on others, individual actors must now strategically behave as a collective actor" (Galaskiewicz, 1985, p. 299).

The asymmetry in power, based on RDT, indicates that the creation and sharing of gains from supply chain management may share this asymmetrical distribution, with the stronger firms securing greater gains from coordination than weaker firms (Crook & Combs, 2007). However, RDT has yet to explicitly address the role of trust between firms (Ireland & Webb, 2007). RDT can be seen as providing incentive for a firm to join with others in a horizontal relationship in a cluster, in order to secure greater access to resources. This suggests that where there is greater heterogeneity in the resources between firms in a cluster there will be greater incentive to coordinate activities. The corollary derived from RDT is that there will be increased power differentials in successful clusters that may create a significant barrier to the cluster operating successfully.

2.8. Considering both governance and competitiveness

Governance and competitiveness are both critical for understanding how firms structure themselves and how they relate to one another in a cluster. This section seeks to examine the possibilities for concurrently considering both perspectives, drawing on the observations presented by Madhok (2000). Madhok (2002) notes that half a century after the publication of his seminal work Coase (1988) comments that:

> As a consequence of this concentration on the firm as a purchaser of the inputs it uses, economists have tended to neglect the main activity of a firm, running a business. And this has tended to submerge what is to me the key idea in 'The Nature of the Firm': the comparison of the costs of coordinating the activities of factors of production within the firm with the costs of bringing about the same result by market transactions or by means of operations undertaken within some other firm. (p. 38)

Coase (1988) makes two key points: the main activity of a firm is running a business (of which buying or selling and costs is a small part), and the comparison is not about costs, but achieving the same result, since this may be achieved by attaining a similar output at lower cost or superior output at the same cost (Madhok, 2002). This highlights the fact that there are differences among firms that must be recognised in order to understand how they may effectively achieve the same result. Advantage lies in the fact that a firm is able to conduct activities superiorly to others, and these activities are difficult to imitate quickly and cheaply. These differences determine whether activities are conducted within a particular firm or obtained through the market (indicating the activity occurred in another firm), equivalent to the RBV argument that the competitive advantage is the outcome of a superior cost positioning to achieve the same result; cost is a tool to attain this competitive advantage (Madhok, 2002). As a result, Coase (1990) asserts that:

> the dominant factor determining the institutional structure of production will in general no longer be TC but the relative costs of different firms in organizing particular activities. This does not mean that TC will not be important in particular cases nor that they will not be important in determining the form of the contractual arrangements made by firms. What it does mean, if I am right, as I put in my Yale lectures, 'to explain the institutional structure of production in the system as a whole', it is necessary to uncover the reasons why the cost of organizing particular activities differs among firms. (p. 11)

The competitive positioning is critical, as is the role that clusters play in enhancing competitiveness. The explanations for the structure of production, whether firms act autonomously or in a cluster, will be determined by the fact that the costs of organisation of various activities, resources, and capabilities differs amongst firms or clusters of firms. This can be seen as being analogous to the RBV perception of the source of competitiveness amongst firms. Understanding resources alone is inadequate to furthering an understanding of firms and structure; payments and transactions must also be considered (Lippman & Rumelt, 2003a, 2003b).

Madhok (2000) investigated a method and measure for combining these two perspectives, building on the concept of transaction value presented by Zajac and Olsen (1993). Transactions not only generate costs; transactions have the potential to create value, which may be the reason for inter-firm collaborations (J. H. Dyer, 1997). Investments made in collaboration are comprised of two parts: a cost, spent on building the relationship, and an investment in a potential value-bearing asset, perceived over a longer time period.

From the capabilities based perspective the collaboration will be attractive if it will support the search for competitive advantage; the collaboration is viewed as a potentially value-bearing asset over time. Through collaboration the firm must be able to create a synergistic combination of resources or capabilities which they cannot develop in-house (constrained by budget and time) or purchase through the market.

TC aims to minimise costs, assuming opportunism. Once a transaction is undertaken and investment made, firms are locked in, because of switching costs, at the mercy of the opportunistic behaviour of partners. From the TC perspective the firms collaborate while attempting to reduce the costs of collaboration. Costs of controlling the rights to resources are also a TC that must be considered (Foss & Foss, 2004).

Firms will collaborate if this is perceived to be more attractive than the alternatives. Each of these perspectives perceives the benefits of the collaboration differently. Rather than economising on TCs the focus may be on generating greater value through collaboration. TC economics focuses on a static concept of value, assuming that outcomes are fixed, or given; there are a series of barriers to obtaining this outcome, each a cost to overcome. In contrast, if collaboration is perceived as having the long-term potential to generate value, that value must be dynamic in nature as it takes time to develop and change.

Madhok (2000) proposed combining the TC perspective with the RBV or capabilities perspective by defining and comparing Type I and Type II TC.

Type I TCs deals with a poor selection of partners, unwilling to provide required resources, or having misrepresented the resources they can contribute, along with their probability of opportunistic behaviours. Even beyond these costs, associated with opportunistic intent, firms will still struggle to combine resources because of organisational and process differences between them (Parkhe, 1991; Tallman & Shenkar, 1994). Associated with the single event of the selection of partners and evaluation of resources, these costs are static and can be determined when collaboration commences.

Type II TCs are aligned with creating value over a longer period of time and are dynamic. Different firms have different histories and perspectives that colour their views of identical events. The intention to cooperate can be derailed by these frictions (Beije, 1996; Conner & Prahalad, 1996; Dietrich, 1996). The costs of coordinating actions and resolving these differences, to create greater value, are the Type II TCs.

Dietrich (1996) posits that issues related to opportunism and those related to conflicting cognitions and cognitive distance (arising from bounded rationality) should be separated. When cognitive distance is minimised there is alignment of mental categories, enabling them to understand one another, achieve common objectives, and to utilise complementary capabilities (Nooteboom, 2000). In a cluster the cognitive distances and conflicts should be minimised, reducing TCs of collaboration; there should be evidence of Type II TC in clusters.

Similarly, Type II TCs are related more to the cognitive alignment between the firms, requiring rich communication and information flows to enable knowledge transfer and absorption between firms. This may be achieved through joint cross-functional teams at partners' sites. Closer cognitive distance enables smoother flow of information and better communication (through shared values, history, etc.). Greater cognitive distance indicates friction between firms, and interaction costs will be greater, although the complementariness of knowledge will be greater. There must be balance between these two forces. Cognitive distance must be present for benefit from collaboration, yet not so great that the collaboration becomes difficult.

The ratio of these costs depends on the time and relative cognitive distance between the two parties. Initially, high Type I costs would be required, in addition to Type II costs to generate value. Type I TC may be expected to reduce as trust is gained. Greater cognitive distance gives greater potential for value, but would require higher levels of Type II costs to unlock it.

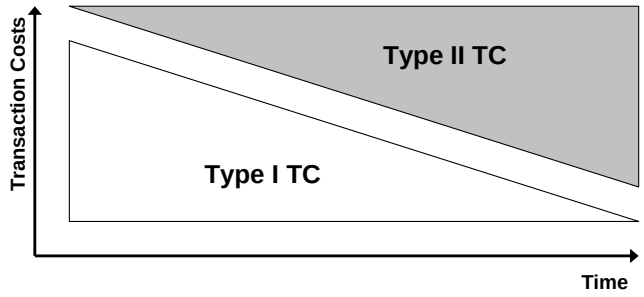

Figure 2.4: Changes in the Type I and Type II TCs over time

Clusters may initially expect lower levels of Type I TC and higher levels of Type II TC. This weighting is due to the minimal cognitive distance between the members of the cluster. With time the ratio of Type I : Type II TCs will change. Initially, the ratio will be higher, representing greater efforts to reduce opportunism and guard against poor choices made in the selection of the partner, effectively increasing Type I TCs. As Type I TCs reduce as trust rises and Type II TCs emerge to seek greater value, the ratio between the costs should reduce.

There is heterogeneity over the levels of analysis (between individuals, the firms, and the network); the presence of capabilities at one level will impact on the ability to form dynamic capabilities at other levels (Rothaermel & Hess, 2007).

The synthesis of both the TC and capabilities perspectives, of both governance and competitiveness, by Madhok (2000) presents a novel method to comprehend how and why firms collaborate. These combined perspectives aid the analysis of the barriers to effective horizontal coordination clusters and how these barriers may be effectively bridged. Of particular interest is the role that Type II TCs may play in the development and generation of value creation opportunities by the collaborating firms.

2.9. A systems perspective

Senge (1990) asserts that the behaviour of actors in a system will be strongly influenced by the structures within which they are operating. This systematic structure is the set of interrelationships among the key variables of an overall system. To model the structures and variables uncovered in the present research, rich with feedback loops and reinforcing structures, causal loop diagramming (CLD) is a suitable tool. This is because "[S]ystems thinking [. . .] acknowledges the *messiness* of the world and views a problem in the context of its environment" (Maani & Cavana, 2000, p. 37). Towill (1996) claims that Jay Forrester should not only be considered as the "father" of System Dynamics, "but also as the originator of many of the techniques of modern supply chain management" (Towill, 1996, p. 24). Despite a long period of time when this approach was underutilised, system dynamics (SD) modelling is beginning to see a resurgence in popularity in supply chain management research (Angerhofer & Angelides, 2000). Recent examples include Sarimveis, Patrinos, Tarantilis, & Kiranoudis (2008), Geary, Disney, & Towill (2006), and Martínez-Olvera (2009).

CLD is a qualitative technique that is based on principles of SD (Sterman, 2000). The diagrams include both reinforcing and balancing loops in one integrated system. In this manner the impact of behaviours and tensions within a system can be understood in the context of the way in which the variables in the diagram evolve dynamically. Changes in one part of the system alter other components; the linkages between variables mean that changes may impact on variables that are distant in time or space from the area where the initial change was made. In this manner a process, such as a marketing signal or a managerial action, is capable of having unexpected results. These diagrams perform an important role as the construction helps us to "understand the multi-

dimensional relationships among processes, people and the environment" (Ellram, Tate, & Carter, 2007, p. 323) and by doing this the diagrams help make sense of an otherwise messy world.

In the CLDs a positive link (indicated by a '+' symbol on the link) means that if the cause or initiating variable increases, the effect on the subsequent variable will be greater than it would have otherwise been. A negative link (indicated by a '–' symbol on the link) means that if the cause decreases, the impact on the subsequent variable will be below what it would otherwise have been (Sterman, 2000). When the sequence of variables is formed into entire loops the flow of effects around the loop means that the loop will either be reinforcing (indicated with a '+' symbol enclosed in a circle) or balancing (indicated with a '–' symbol enclosed in a circle). A reinforcing loop demonstrates that the change in the initial variable will be enhanced or amplified by the change that flows around the loop. A balancing loop means that the initial variable will be subdued by the change flowing around the loop.

Scholars have previously applied a systems dynamic perspective to the study of clusters; Lin, Tung, and Huang (2006) note that "the complex relations involved in the industrial cluster effect can be observed through SD analysis, which is a deficiency of other methodologies" (Lin et al., 2006, p. 482). It is these complex relations in clusters, particularly those relating to the tensions in each member between the urge to compete and cooperate, that make a systems perspective particularly useful in the present study.

2.10. Conclusions

Previous work on barriers to collaboration explores supply chain management as a whole, while this research focuses on horizontal relationships. Literature on coopetition is used to shine more light on issues of rivalry, and indicate that barriers relating to inter-firm rivalry (viz. inadequate information sharing, inconsistent operating goals, lack of willingness to share risks, rewards, and information) identified by Fawcett et al. (2008) are areas critical to effective horizontal linkages in clusters. These barriers must also be considered in relation to objectives and goals set by the clusters to improve their competitiveness. The literature does not address methods of effectively overcoming these barriers.

The literature on clusters is diverse and is comprised of many disciplines with different foci. It is generally accepted that clusters can act as an extended enterprise, providing SMEs with advantages over operating autonomously. Firms have the ability to specialise at the firm level while achieving flexibility at the cluster level. There is greater innovation and knowledge sharing in clusters. The lack of a clear and limiting definition of clusters creates issues for policy makers,

as they struggle to keep particular regions competitive in an age of globalisation. The formation and leveraging of clusters has been recognised to be positively correlated to successful supply chain management, through enhanced competitiveness.

Within clusters there exist many types of governance of activities while individual firms, and the cluster itself, seek to enhance their competitiveness. This requires investigation that is sensitive to both the issues of competitiveness and governance. Understanding these perspectives may help shine light on both the barriers to closer horizontal coordination and how firms may bridge these barriers.

Chapter 3. Research Methodology

". . . a man cannot accept ideas at random and count them as knowledge merely because he feels like it."

Leonard Peikoff (1993, p. 37), American Philosopher

In the first chapter the background to the research and the phenomena of interest were outlined. This was followed in the second chapter with a discussion surrounding the extant literature. These discussions have enabled a clear identification of gaps in the literature and a formulation of the research questions. The preceding chapters have addressed the question of what has been studied and why it was studied. The intention of this chapter is to address how the research was conducted. First, the assumptions underlying the research and researcher are identified and appropriate methodologies are discussed. The focus then turns to the methods used to analyse the data gathered.

3.1. The philosophy of science

Driven by the specific research questions concerning what the barriers to horizontal coordination are, and how firms overcome these barriers, the research design was constructed and planned. Habermas (1988) suggests that it is the nature of the research question that requires the researcher to examine the boundaries of the world about which the question is being asked. The present research seeks to explore the social world of the supply clusters; the focus is not on the technical, objective facts that would typify a positivist approach (Collis & Hussey, 2003). To understand the barriers to effective horizontal coordination cross-organisational activities must be investigated. This type of question and focus suits an interpretive approach that both acknowledges and manages multiple perspectives (Collis & Hussey, 2003), as there are multiple stakeholders in the organisation building dynamic (Mingers, 2001).

Understanding the philosophy of research and science strengthens the research design through placing constraints and boundaries that simplify the process. A full discussion on the philosophy of science is beyond the scope of this work and it has been better discussed elsewhere, such as by Guba and Lincoln (1994), Kuhn (1970), Morgan and Smircich (1980), and Popper (1974), *inter alia*. Instead, a brief rationale is provided in this chapter for the approach utilised in the present research and the concepts that underpin this approach.

Crotty (1998) outlines four key elements in the research process: the theoretical perspective, determined by the philosophic stance taken by the researcher; the epistemology, closely linked to the researcher's theory of knowledge; the methodology, the plan of action; and the method, how the researcher intends to gather and analyse the data. The ontological and epistemological decisions will be connected as the philosophic stance on the nature of reality will determine how the researcher will gain knowledge about the world that they are investigating; these decisions must be congruent. Following these decisions Collis and Hussey (2003) acknowledge that the assumptions made in each of the remaining elements are interrelated and tend to be complementary to ensure congruence in the approaches applied.

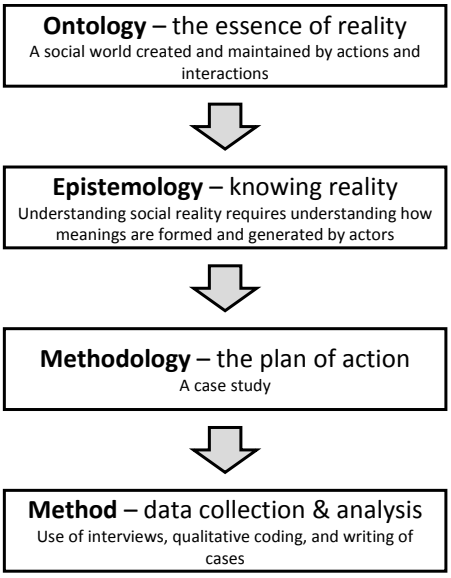

Figure 3.1: The research process. Adapted from Crotty (1998) and Orlikowski and Baroudi (1991)

The following subsections will be used to explore the methodology applied in the present research. First the ontological elements will be explored, followed by a discussion on the interpretivist approach to research since this is determined by the ontological elements. The case study methodology is then outlined, before a discussion on the research design ensues with attention paid to the reliability, validity, and the generalisability of the results. The rationale for the selection of the cases is discussed, along with discussion on the data collection techniques, and specifically, the interview process. Following this, the data analysis techniques are discussed in depth, with an emphasis on the use of coding to assist with the creation of case studies.

3.1.1. Ontological elements

Guba and Lincoln (1994) assert that ontological and epistemological considerations inform the selection of methodology for the research, indicating a precedence and logical order when

approaching the research design. Scholars must first answer the question: "What is the form and nature of reality and, therefore, what is there that can be known about it?" (Guba & Lincoln, 1994, p.108). In answering this question we note that the social reality of business clusters is locally constructed by the actors; it is a social construction with "meanings sustained through a process of human action and interaction" (Morgan & Smircich, 1980, p. 494). Based upon this perception of the world reality must be bounded by time and is contextual. This ontological stance puts this research in the phenomenological, or interpretivist, camp (Collis & Hussey, 2003).

To understand the related epistemological issues the research must answer the question: "What is the nature of the relationship between the knower or would-be knower and what can be known?" (Guba & Lincoln, 1994, p. 108). This question must be answered in a fashion consistent and congruent with the previously declared ontological stance. Thus, the stance taken in terms of epistemology is that "findings are literally created as the investigation proceeds" (Guba & Lincoln, 1994, p. 111). To understand the realities under study the practices and meanings, informed by the language and norms, of the actors who are working towards the common goal of enacting horizontal coordination in the clusters must be understood (Orlikowski & Baroudi, 1991).

3.1.2. The Interpretivist approach

The present research utilised an interpretivist approach. Such research is characterised by a subjectivist view of organisations (Burrell & Morgan, 1979). In this perspective reality is seen as a 'social product' and it cannot be understood without first understanding the social actors involved in the creation (Berger & Luckmann, 1967; Geertz, 1983). As Rosen (1991) puts it: "understanding social process involves getting inside the world of those generating it" (Rosen, 1991, p. 8).

Interpretivist research seeks to understand how the actors interact and enact their own realities. During interactions the actors provide and imbue their realities with meaning (Rosen, 1991). When a researcher uses an interpretivist perspective they must become close with the subject matter to correctly understand it and interpret events. An interpretivist approach is useful when the conceptualisations (from the literature review in the previous chapter) of clusters are considered as being comprised of dynamic social processes, with activities diffused throughout different organisations as well as between alternate levels within an organisation (Boxall & Purcell, 2003; Romanelli, 1991).

Interpretive research generally employs inductive reasoning. Inductive logic means the researcher is "moving from individual observation to statements of general patterns or laws; it is referred to

as moving from the specific to the general" (Collis & Hussey, 2003, p. 15). The researcher collects data while attempting to preserve the actors' representations of the problems and situations. To do this, researchers must account for the phenomena with few a priori ideas and beliefs about the phenomenon of interest (Gioia & Pitre, 1990). During subsequent analysis, concepts are induced, or drawn, from the data.

Through the previous discussions of extant literature it is obvious that there is a paucity of understanding of both the nature of horizontal coordination in clusters and how barriers to effective horizontal coordination can be overcome. The lack of understanding eliminates a positivist approach as there is no previously defined framework to help the researcher understand the problem (Collis & Hussey, 2003; Creswell, 1998). Through the interpretive approach a well-established theoretical framework is not required as the researcher seeks to understand the personal and subjective world of the research participants (Habermas, 1988). Throughout the research process the barriers to horizontal coordination, and how they can be bridged, were elucidated; the approach required data collection and data analysis techniques capable of eliciting meanings from participants.

As there is no set paradigm for understanding this phenomenon, an interpretive approach was used in the research. This allows selection of the appropriate methods suitable to examine the phenomena of interest. The methods used are discussed in the following sections.

3.2. The Case Study Methodology

The act of research generally progresses through five key phases. With the ontological and epistemological issues addressed, the methods used in the research must be considered.

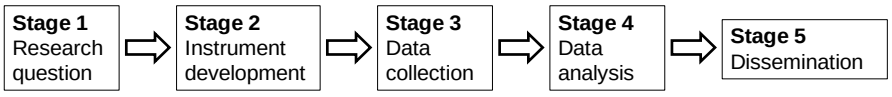

Figure 3.2: The five phases of research, based on Fig. 1. in Stuart, McCutcheon, Handfield, McLachlin, & Samson (2002)

The case study methodology has been offered as a valuable inductive tool for the generation of theory in management (Eisenhardt, 1989) and may also serve other purposes such as being a tool for exploratory investigation, or to confirm the findings of other studies (Bryman, 1989). Yin (2003) asserts that the type of research question drives the selection of an appropriate type of methodology. Research questions that ask 'why' and 'how' are best answered through qualitative approaches, and in particular case studies, as these questions are exploratory in nature (Yin, 2003).

Case studies allow involvement within the investigation to map concepts relevant to the questions posed. A narrow focus on the how and the why can force examination of many possible explanations. The research questions in the present study require attention to both the thinking of the various actors as well as the behaviour of the organisations they are embedded in. Understanding how these barriers can be overcome requires an in-depth understanding of the reasons why the actors behaved as they did. The reasons must be analysed and understood and reintegrated from a supply chain management perspective. The use of case studies in the New Zealand context is also promoted by Chetty (1996), in part due to the small size of the market and resistance to survey methods.

Yin (2003) also argues that the case study method is well suited when the researcher is conducting an empirical inquiry investigating a phenomenon within the real-life context. Such studies can provide critical insights when boundaries are blurred between the phenomenon and context. Many powerful research findings in management have come from extensive case studies, such as Dalton's *Men Who Manage* (Dalton, 1959). Management is strongly social and Dyer et al. (1991) show the case study approach to be valuable in such a social context. Stake (1994) concurs, and states that the case study approach helps orientate the researcher "to complexities connecting ordinary practice in natural habitats to the abstractions and concerns of diverse academic disciplines" (Stake, 1994, p. 239).

The determination of the unit of analysis is critical in case study research. The focus of most case studies is a series of actions rather than an individual or a group of individuals (Yin, 2003). This is true in the present research, where the focus is on how the barriers towards effective horizontal coordination in clusters are bridged. The actions of interest are those taken to develop effective horizontal coordination between the firms by overcoming the barriers. This focus indicates that the unit of analysis should be the cluster itself as this embodies a series of actions. However, the firms have actors who are involved in these decisions, who make decisions that impact on the actions relating to horizontal coordination, indicating that the firm is another potential unit of analysis. Using multiple units of analysis can provide stronger claims of causality as causal mechanisms can be claimed and examined at different structural levels (Frankfort-Nachmias & Nachmias, 2000). To understand how organisations can overcome the barriers, various levels of analysis become useful, allowing emphasis on intra- and inter-organisational events in the cluster. The present research presents analysis of clusters but does not explicitly allow analysis at the firm level.[4] However, in broad terms the behaviours of individual firms may be discernible. The

[4] To preserve the anonymity of respondents.

individual could not be used as a unit of analysis since there was only a single respondent in most organisations.

Using a single case can be useful to theory building and understanding the phenomenon investigated. However, multiple cases, rather than a single case, have been advocated by some researchers (W. G. Dyer & Wilkins, 1991; Yin, 2003; *inter alia*). When using a multiple case design, Yin (2003) asserts that the evidence presented can be more compelling than that from a single case and that a multiple case design can increase the robustness of the findings. The presentation of results in multiple case research provides a comparative analysis between the cases that is useful in theory building as it presents compelling evidence for the proposed theory (Eisenhardt, 1989; Stake, 1994). However, there is a trade-off: a single case means that more data can be gathered for an in-depth case, while multiple cases can generate more compelling results. Resource constraints may limit research to a single case study (Stake, 1994).

The main limitations of the case study approach are argued to be the lack of rigour attributed to loose guidelines for the analysis of qualitative material (Miles, 1979). Yin (2003) has several recommendations that help researchers to maintain a high degree of scientific rigour while conducting their research. The issues of reliability, validity, and generalisation are addressed in subsequent sections.

3.2.1. Reliability

Reliability is frequently associated with replicability, or repeatability, of the research (Collis & Hussey, 2003). Many scholars believe the concept of reliability, in the context of qualitative research, to be a tenuous and an inappropriate focus (Taylor & Bogdan, 1984). The key objective of the scientific standard of reliability may not be appropriate to social research as this is often contextually driven. Furthermore, distortion can be created by the researcher's interpretation of the data, bias that may not be present in that of other researchers. The researcher must ask themselves: "Will the evidence and my conclusions stand up to the closest scrutiny?" (Raimond, 1993, p. 55). Were another researcher to repeat the research the same results should be obtainable. The ability to repeat research to test the reliability of results is replication; in positivist studies where reliability is usually high, replication is important.

In phenomenological research, reliability is frequently described as being achieved when observations, or interpretations, can be made on different occasions by different observers. Using set procedures that different researchers can follow ensures higher reliability, and ensures

authenticity of findings. One strategy used to ensure greater reliability is to utilise an a priori list of concepts or variables that form the basis of interviews with participants.

Another method to ensure consistency is through adopting a consistent coding process post hoc. This approach has traditionally been used with documentary data but it may be used when transcriptions have been prepared. Still, some researchers criticise this approach by claiming that there is little consistency in coding over various studies. Many case studies have little, or no description of how the analysis is performed and the process is inadequately reported (Eisenhardt, 1989; Miles & Huberman, 1984). "One cannot ordinarily follow how a researcher got from 3600 pages of field notes to the final conclusions," note Miles and Huberman (1984, p. 16), highlighting the need for explication of the analysis process. In addition, systematic bias can occur where there is a high level of interview input. When methodologies employing interview data are used there must be documentation on how the cognitions of the researcher have been separated from those of the respondents. Some scholars suggest that when the researcher remains true to the natural language of the subjects they remain close to the conceptual usage of the subjects, reducing bias as "the frequent use of subjects' discourse reflects a concern to forge interpretations in terms of their own natural language" (Bryman, 1989, p. 137).

In the present research the design of the project was structured so that there was an a priori list of concepts, from the literature review, informing the discussions and interviews. Furthermore the coding process, performed post hoc, is outlined in detail in a later section (§3.5). Reliability has been considered using these approaches.

3.2.2. Validity

"Validity is the extent to which the research findings accurately represent what is really happening in the situation" (Collis & Hussey, 2003, p. 58). Put another way, validity is a measure of how greatly the "instruments measure what it is intended that they should measure," and is also judged to be a measure of the "extent to which a research effect can be trusted" (Coolican, 1999, p. 64). Validity may be undermined by errors in the process of research design. Faulty research procedures, poorly designed sampling procedures, or inaccurate measurements are examples of such research errors (Collis & Hussey, 2003).

The positivistic paradigm focuses on precision in the measurement process and ensuring the researcher can show the phenomenon has been reliably measured. However, there is a risk that the measurement process may be inaccurate, or that what is being measured is not the phenomenon of interest. In phenomenological research the focus is on understanding and capturing the essence of

the phenomena by extracting data which is rich in the ability to explain the phenomena. The researchers' objective is to gain a full understanding of what is involved in the phenomena – and this demonstrates high validity within this paradigm (Collis & Hussey, 2003).

Validity can be assessed in several ways. Frequently, the test of validity is the determination of whether the tests or measures used by the researcher do represent what they are supposed to represent. Construct validity is also important in business research. Where a number of phenomena are not directly observable, but explain or motivate behaviours such as satisfaction or ambition, these are known as hypothetical constructs. They are assumed to exist as factors that help explain the phenomena. For example, when a new speaker speaks in public for the first time, a keen observer may notice that they are shaking or sweating. What is being observed is not the concept of 'anxiety', but a physical manifestation of anxiety. If the observer measured the shaking and sweating this would not necessarily be a reliable measure of anxiety. When considering hypothetical constructs the researcher must be able to demonstrate that the observations and findings can be explained by this construct. For example, during an economic recession many employees may suddenly diligently perform their tasks and duties at work. When observing this behaviour the business researcher may believe that this is because the employees are highly motivated by the recession and are seeking to perform admirably in their jobs because of the recession. However, this increased attention to their work may not be because of positive motivation; an alternative explanation may be that the employees are afraid for the security of their jobs (Collis & Hussey, 2003, p. 59).

Perhaps the most important trade-off that affects reliability is that between saliency and comparability. To fully explore the case and make it salient much data must be gathered. However, this depth of data may thwart comparisons between cases where the researcher seeks commonalities between cases. The most frequently employed approach to ensure greater comparability is to use an a priori set of variables which are presented to the respondents. However, this leaves open the question of whether these questions and variables are representative of the participants' views of the world, or whether they force the respondents to work with a limiting framework which may not be central to their cognition. "Interviewers must try to avoid imposing their own interests on the experience of the participants" (Seidman, 2005, p. 77), and the use of an interview guide or schedule should "be used with caution" (Seidman, 2005, p. 77).

Presenting a series of questions can also create an atomistic approach as opposed to a holistic one. By presenting questions and issues the researcher could be creating partitions in the structure of

the interview. Despite these potential drawbacks the use of constructs and key concepts, drawn from the literature, were used to inform the interviews.

3.2.3. Generalisability

Generalisability is concerned with whether or not the results of the research pertain only to the situation examined or whether they may be applicable to other situations beyond the scope of the study. It is "the extent to which you can come to conclusions about one thing (often a population) based on information about another (often a sample)"; (Vogt, 1993, p. 99). Statistical generalisation is the generalising of the attributes of a population based on those observed in a sample. However, Gummesson (2000) argues that there are several types of generalisability. In a phenomenological study a researcher should be able to generalise from one setting to another. Normann (1970) argues that it is possible to generalise from few cases, or even one, but the analysis must capture the dynamics of the phenomena studied. A comprehensive study is required to "reach fundamental understanding of the structure, process and driving forces rather than a superficial establishment of correlation or cause-effect relationships" (Normann, 1970, p. 53). The research is concerned with how patterns, concepts, and theories generated within a particular environment may be applicable in another environment. Collis and Hussey (2003) argue that this requires that the researcher "must have a comprehensive understanding of the activities and behaviour [they] have been studying" (Collis & Hussey, 2003, p. 60). Comprehension must also be demonstrated in the material presented to readers as there must be "assurance that the target case is properly described" (Stake, 1978, p. 7). When this is accomplished the readers will be able to "recognize essential similarities" between the cases, enabling them to "establish the basis for naturalistic generalization" (Stake, 1978, p. 7).

3.2.4. Selection of the cases

The selection of cases is critical to the research design (Collis & Hussey, 2003; Miles & Huberman, 1984; Yin, 2003). This section outlines the strategy and reasoning behind the selection of the cases in the research. The use of polar cases has been employed, with cases that have successfully bridged the barriers to horizontal coordination and some that have been less successful. The differences in methods and reasons for success can be identified, with many other parameters held constant (Eisenhardt, 1989; Pettigrew, 1990). The first step is to identify clusters, as these have received little attention in New Zealand and are not well studied. Hanna and Walsh (2008) investigated cooperation among small manufacturing firms and note that: "the profile of these networks is extremely low and finding examples of cooperation (whether they be successful or not) can be difficult" (Hanna & Walsh, 2008, p. 315). Though their research involved a

different industry, their experience of difficulty in finding cases of cooperation was reflected in the present research.

Feasible research questions, and the shape of the research in general, may frequently be determined by access possibilities rather than by theoretical considerations (Easterby-Smith, Thorpe, & Lowe, 1991). Issues surrounding access possibilities have shaped the present research as the first two clusters identified were unwilling to participate, causing difficulty in finding suitable clusters in the study. This may impact on the generalisability of the study, as well as the reliability and validity of the findings.

The NZTE Cluster Development Programme, supported by the government, provided a list of clusters in New Zealand which had received funding to support development. This enabled rapid identification of clusters involving processing of physical items; when these are handled or manufactured, some form of supply chain management had to be evident in the cluster. Other clusters, such as those which focused on media or education, have reduced emphasis on supply chain management.

The initial motivation for the research was the case of JEMCO oysters. When the group that coordinates the JEMCO companies was approached about participation in the present research project they declined to participate. Assurances had been provided that pseudonyms would provide anonymity and company representatives would have the opportunity to vet reports before publication. Despite the lack of primary data, material in the public domain allowed a small case to be generated.

A similar aquaculture industry cluster was approached through a contact who worked with the members of the cluster. Several conversations were held with this individual discussing the research and what the aquaculture cluster had achieved. The contact then communicated with the organising committee for the cluster and extended the invitation to participate, which was declined. Again, assurances had been provided that anonymity would be provided and participants would have the opportunity to vet reports prior to publication. Despite the rejection, several conversations resulted with the contact in the accumulation of useful background information that honed future investigations by forming a small pilot case.

After approaching a central committee or organising group twice and being declined on both occasions the approach was deemed to be ineffective. It also meant that it would not be possible to work with any of the firms involved in the clusters. If one of the member companies was not interested in participation, for whatever reason, access to the entire cluster could be jeopardised.

To circumnavigate this problem a knowledgeable industry insider provided contact information and introductions to key contacts in the horticultural industry believed to be useful and who would be willing to help. Several potential participants agreed to participate but proved difficult to contact and displayed reluctance to complete the forms as required by the University's UAHPEC.[5] Potential participants beyond the initial list, who were identified and invited to participate, frequently declined to become involved.

Utilising existing contacts the regional association of winegrowers in a particular geographic area was approached regarding visits and the secretary made introductions to several key members. As many members as possible were met to facilitate understanding how the coordination within the cluster proceeded.

Several firms in the aerodynamics cluster in Hamilton were invited to participate and conversations ensued about the activities of the cluster and the member relationships within. The cluster was interesting as there was a recent collapse of a key member. While this would make a fascinating case, particularly in terms of the relationships with local firms and the implications for the firm that collapsed, it was not possible to find an employee or recent employee of the company prepared to discuss the case. The company that collapsed was involved in the manufacture of aircraft. The two remaining cluster members that were willing to participate were not involved in supply chain management as they were service providers to the aerodynamics industry. This involvement, coupled with the fact that the aerodynamics industry is substantially different to the horticulture or aquaculture industries meant that they were not pursued as serious participants in the research.

Two horticultural clusters, dealing with different fruits, and a cluster of companies in the viticulture industry, were the cases where primary data was gathered, in addition to the JEMCO case, based on secondary data only. Within the clusters each company was investigated and an appointment was made with a member involved with the horizontal coordination, who was usually a senior manager. This respondent had usually helped to set up horizontal relationships for coordination or was involved in the day-to-day operations involving the inter-firm coordination. There was generally only one respondent in each participating company as many companies had only a handful of employees. Where possible a site visit was made. Suppliers were also involved in the study where the findings indicated an important role was played by suppliers in the

[5] All research projects may only proceed following an application to The University of Auckland Human Participants Ethics Committee (UAHPEC); participants are generally required to read and return forms stating that they consent to partake in the research.

horizontal coordination of the clusters. A full description of each cluster as a case study, based on data gathered from each company, will be presented in the following chapters. Table 3.1 provides information on the clusters while details about the interviews are available in Appendix I.

Table 3.1: Participants

Case	Industry	Participants from the cluster
WineCom	Viticulture	9
NZBrand	Horticulture	5
HortCom	Horticulture	6

In summary, the sampling method used is a two-stage sampling using judgement, first involving selection of clusters and secondly sampling within clusters. Firstly, appropriate clusters were identified so that there were polar cases within similar industries, with some displaying effective horizontal coordination and others having an absence of this attribute of interest. Secondly, appropriate members were identified and approached separately, bypassing any central organising committee or executive (referred to as the Hub-Spoke Sampling Technique, which is discussed in greater detail in §8.6.2).

3.3. The research design – collecting and analysing data

Based on the ontological and epistemological assumptions of the study, a case study approach, investigating multiple organisations, was selected to capture as much data about the horizontal coordination as possible.

If only one organisation in a cluster was utilised in investigating the coordination within the cluster then the picture formed may be incomplete. Different perspectives, due to the plethora of relationships within the cluster, should allow for a clearer picture to emerge capturing all the perspectives and meanings that create the social reality. To increase the probability of understanding the coordination within the cluster it is necessary to use as many members as possible. If few participants are used there is the risk of reduced validity.

The focus is on supply clusters within New Zealand, selected, as much as possible, from a single industry sector. By limiting the inquiry to a single sector the market, industrial, and environmental conditions are controlled (Marchington & Harrison, 1991).

Primarily, interviews were used to collect organisational data. Additionally, there was the use of archival data, observation, and documentation. To increase understanding of the barriers, the data collection was focused on information on the evolution of the horizontal coordination through understanding the perspectives of the interview participants who were involved in the structuring of the horizontal relationships. This was accomplished using interviews that were semi-structured and open-ended. Due to the small size of firms involved usually only one respondent was selected from each firm. This respondent was the person most knowledgeable about the relationships; often the same respondent initiated the relationships and was engaged in day-to-day activities involving the horizontal relationship. Archival data was collected from private public documents, including emails, publications from the organisation, and articles from newspapers and periodicals.

The collected data was initially analysed with qualitative coding techniques, forming a base for a case study of each cluster. These coding procedures ensured "intimate familiarity" with each case and allowed unique patterns to emerge through understanding key issues (Eisenhardt, 1989). Individual case studies were compared and contrasted to elucidate key lessons about the barriers to horizontal coordination and how these barriers may be bridged.

3.4. Data collection techniques

When the case study methodology is employed multiple methods of data collection techniques are frequently accepted. In this research interviews were primarily relied upon. Archival data, in the form of written documents, could be obtained in some of the cases. Field notes were kept where possible and almost all interviews were recorded.[6] These recordings were subsequently used to generate transcripts of interviews. Written documentation collected included reports, formal documentation, and emails from participants. Access to such documentation varied over each company; some were more forthcoming than others about sharing documents or providing the researcher with examples of these reports while on site.

During the interviews there was enquiry regarding the organisations, their involvement with the cluster, and how they perceive the formation of the horizontal coordination in the cluster was achieved. Further details are provided in Appendix III. The interviews were designed to accommodate the participants' schedules and time constraints. In most cases this meant that a

[6] Equipment failure led to the failure to record a large amount of one interview. In many cases the participants continued to talk after the recording equipment was turned off; field notes capture the essence of the comments and narrative but do not capture the participants' own words as a recording can.

single interview was conducted, often over the telephone where participants were geographically distant to the researcher's location.

Several data collection techniques were used to maintain methodological rigour. Where possible interviews were recorded and transcribed verbatim. Notes were collected during the interviews as well as before and after interviews in order to capture the qualities of each interview (Denzin & Lincoln, 1994; Miles & Huberman, 1984; Yin, 2003). In some cases the documentation provided for viewing during the interview was not allowed to be removed or copied and brief notes had to be taken.

3.4.1. Interviews

As the interview process formed a substantial part of the research further comment on this process is warranted. The use of interviews is popular as a data collection method because it can provide accounts of what is important to the actor in an organisation (Collis & Hussey, 2003).

The interviews generally lasted for just under one hour. An interview schedule was used as a general guide to ensure consistency over the interviews and to reach the objectives of the research. This structuring ensured that the interviews remained focused on the exploration of certain phenomena. The schedule served to initiate questions and discussions around the horizontal coordination in the cluster, allowing the participants to express their own concepts, interpretations, and perceptions of the coordination in the cluster. Thus, the interviews were all different, not following the exact sequence as presented on the schedule. Not all questions were asked in the same way; while answering a previous question the participant may have touched upon another point that was scheduled to be asked later, whereupon the question scheduled for later was raised immediately to capitalise on the connection made by the participant. Sometimes a lengthy discussion would ensue over one point in the schedule, answering several later questions which were later crossed off the schedule.

As much as possible these semi-structured interviews were used to elicit a rich description of the issues surrounding horizontal coordination. Rapport and trust between the researcher and the participants in this type of data collection process is important (Collis & Hussey, 2003). As participants became more comfortable they often opened up and provided valuable information, while others were reluctant to divulge information and were not as forthcoming. In other interviews valuable material was discussed when the recording device was switched off; material not captured verbatim has been included in the analysis using field notes following the interview.

Many participants appeared to feel freer to make comments or observations when the recording device was switched off.

3.5. Data analysis

The main challenges in qualitative data analysis are the reduction of data, the structuring of data, and the detextualisation of the data (Collis & Hussey, 2003). The reduction of data is a process that "sharpens, sorts, focuses, discards, and organizes data in such a way that 'final' conclusions can be drawn and verified" (Miles & Huberman, 1994, p. 11). The data reduction process can also act to condense the volume of data that must be analysed (Tesch, 1990), preventing "death by data asphyxiation" (Pettigrew, 1990, p. 281). To achieve this summarised form "usually involves some form of coding" (Collis & Hussey, 2003, p. 253).

The analysis followed a general analytic procedure, recommended by Miles and Huberman (1994) and Collis and Hussey (2003). This involved seven steps:

1. Material (interview and field notes) is converted to a textual format for analysis.
2. Materials are thoroughly referenced so that a link may be made between a portion of data and the time, date, place, and participants involved.
3. Coding occurs as soon as possible and proceeds in an iterative fashion. Codes allow the storage, retrieval, and reorganisation of data.
4. The codes are organised into categories or groups according to themes or patterns that emerge. New data is collected and compared with existing codes and categories iteratively.
5. Summaries of findings should be created at various stages to help with analysis.
6. Summaries are used to construct generalisations for comparison with extant theory.
7. The process is continued until the researcher is satisfied that the generalisations are sufficiently robust in light of existing theory.

Grounded theory methodology involves a well-structured coding process which is adopted in this project to inform the coding process. The later stages of grounded theory, theorising based on the developed codes, was not be employed; the focus of the project is not the development of theory and draws on extant literature, making grounded theory an inappropriate methodology. However, using the coding procedures of grounded theory ensures that the coding procedures in this study are well-accepted and recognised, forming an important aspect of the design since "codes (and their associated analytic documents) add interpretation and theory to the data" (Gibbs, 2007, p. 4). The coding process was not restricted to codes relevant to horizontal coordination but was wider in scope to achieve a complete picture of the clusters.

Case studies were created for each cluster at the conclusion of the coding, informed by the coding and the process employed in the coding. The presentation of these cases enables readers to observe similarities, and differences, between the cases so that they can form generalisations independently of the written material (Stake, 1978; Yin, 2003). These case studies are structured in a similar manner, an approach where the repetition reduces the creativity inherent in the crafting of a traditional narrative but the structuring enables readers to "examine the answers to the same question or questions within each case study to begin making her or his own cross-case comparisons" (Yin, 2009, p. 171). Following the presentation of separate cases a cross-case comparison is presented. The range of actions taken by the clusters is presented with answers to the research questions.

The research process was largely iterative and as more data were gathered and coded the categories and codes formed were refined and formative case studies were written. The cross-case analysis (Chapter 7) helped identify barriers (answering research question 1) and how some had been overcome (partially answering research question 2). The other techniques and perspectives used to analyse the data (Chapter 8) helped identify methods to overcome the barriers (answering research question 2). A comparison of the contribution made between the different analytic techniques is presented in Table 8.1. These additional analyses included the use of systems dynamics (introduced in §2.9 with the additional analysis discussed in §8.3), TCE analysis (discussed in §8.2), and the analysis of the resources and capabilities of the firms and clusters (discussed in §8.2). During the research process these additional analyses occurred in parallel with the coding and case writing and analysis procedures. However, in the documentation and discussion of these additional analyses were separated from the cross-case analysis material, in order to provide a more structured presentation of the material and work. While these two distinct types of analyses occurred simultaneously during the iterative research process the cross-case analysis is presented in Chapter 7 while the additional analyses are discussed later in Chapter 8. Thus, while both cross-case analysis and the additional analyses were used to answer the research questions, they were separated to provide a structured and more manageable documentation of the research process.

Near the end of the research process the cases were presented to the participants and feedback was solicited on the representation of their words, the situations, and clusters. The cases were well received and the feedback resulted in some minor changes of details and an update of the HortCom and NZBrand cases to reflect recent events. The participants were positive and interested in understanding how their experiences equated with those of others, and how those other members perceived the relationships. The feedback indicated that the cases are accurate

representations of the clusters and horizontal coordination within the clusters, providing confirmation of the internal validity of the case studies.

3.6. Coding procedures

Grounded theory is a process whereby there is "the discovery of theory from data" (Glaser & Strauss, 1967, p. 1). Grounded theory is an invaluable tool when a researcher wants to "generate or discover [. . .] an abstract analytical schema of a phenomenon, that relates to a particular situation [. . .] in which individuals interact, take actions, or engage in a process in response to a phenomenon" (Creswell, 1998, p. 55-6). While this is not the focus of the present research, in grounded theory careful attention is paid to the analysis and coding procedures. Strauss (1987) states that "the focus of analysis is not merely on collection or ordering a mass of data, but on organising many ideas which have emerged from analysis of the data" (p. 22-23). The originators of the grounded theory approach have since split into two camps with differing opinions of how the analysis process should be performed.[7] Coding procedures are fundamentally different between the groups.

3.6.1. Coding procedure

Both camps in grounded theory concur on one point: coding is essential. Strauss (1987) states "the excellence of the research rests in large part on the excellence of the coding" (Strauss, 1987, p. 27). The coding uses "a bottom-up technique in relation to the data, and begins at the word or sentence level" (Urquhart, 2001, p. 105). As the research advances the acts of creating and assigning categories continues by exploring connections between them, and concludes by focusing on an integrating core (Dey, 1999, p. 146-7). Careful investigation of the transcripts and other qualitative data leads to labels being assigned to units of meaning by following the codification procedure. In this way the research proceeds from codes which have little interpretation behind them towards patterns which have higher confirmation power. This helps to differentiate and combine the gathered data. The codes assigned at any one point in the analysis were not absolute; codes could, and did, change as the research progressed, in order to secure a refinement of concept or category. This simultaneous coding and analysis procedure allows the researcher "to generate theory more systematically" (Glaser & Strauss, 1967, p. 102), relating the codes and concepts created. While performing the analysis analytic memos were also created since "memos are the theorising write-up of ideas about codes and the relationships as they strike the analyst while

[7] The rationale for the split is beyond the scope of this work and so the reader is referred to other publications, such as Kelle (2005) or Goulding (2002), for detailed discussion.

coding" (Glaser, 1978, p. 83), and prove useful at later stages in the analysis and during the reporting of the research.

3.6.2. Initial codes

The first step is known as 'open coding'; however other researchers use different terms; in this research the term 'initial coding' is used, as adopted by Charmaz (2006).

During the initial coding sequence the data were broken down analytically (Strauss, 1987; Strauss & Corbin, 1990), so that they were cracked open (Glaser, 1978, 1992) to perceive "actions in each segment of the data" (Charmaz, 2006). In order to do this the codes were selected when a complete idea, or concept, was apparent within the data. Using this process resulted in some portions of text being coded multiple times. "In fact, typically, text may be densely coded; not only will most text be assigned a code, but much will have more than one code attached to it" (Gibbs, 2007, p. 4). This contrasts with a rigid strategy of coding word-by-word, line-by-line, sentence-by-sentence, or paragraph-by-paragraph.

The initial "coding quickly forces the analyst to fracture, break the data apart analytically, and leads directly to excitement and the inevitable payoff of grounded conceptualisation" (Strauss, 1987, p. 29). After reading the transcripts, listening to the recordings, and reviewing notes constantly, I was able to capture the nuances of the participants' perspectives in order to understand the concepts encapsulated in each code.

Glaser recommends several questions that the researcher should ask themselves while analysing the data. Useful questions include: "What is this data a study of?", "What category or property of a category does this incident indicate?" and "What is actually happening in the data?" (Glaser, 1992, p. 51). Asking these questions allow concepts and categories to emerge, rather than being forced through constant comparisons used by more structured coding processes as advocated by Strauss and Corbin (1990).

In order to perform the coding and analysis simultaneously, the first round of coding was completed on the viticulture cluster case immediately after the interviews. The initial coding effort demanded a great deal of time. This is in line with what Creswell (1998) warns; the researcher who is conducting qualitative analysis needs to be prepared to "engage in the complex [and] time-consuming process of data analysis" (Creswell, 1998, p. 17). Urquhart (2001) warns that the researcher must "be prepared to live with your data a long time" (Urquhart, 2001, p. 131).

Subsequent cases were analysed more quickly after initial codes had been discovered. The pigeonhole analogy outlined by Díaz Andrade (2007, p. 76) may be accurate: codes that emerged from the first case formed a box, or a pigeonhole, which could be filled with data from subsequent cases. Having identified codes did not prevent the creation of new ones as they emerged from the data; as new codes became apparent new pigeonholes were created. However, this was done heeding the warnings of Glaser (1992) to not develop too many codes as this impacts on the core categories analysis. The constant comparison of the data forced repeated reference to transcripts and recordings, ensuring that participants' views were coded correctly. This required constant review of the data and listening beyond the words the participants spoke in order to see and understand the pictures and stories that they were telling, particularly where the language used was dissimilar to the academic terms used to describe related phenomena.

3.6.3. Focused codes

When the initial coding was completed a more abstract level of coding was required to discover the categories and subcategories – the conceptual elements that can lead to a greater understanding of the cases. Some scholars advocate selective and theoretical coding. Strauss (1987) proposes axial and selective coding. Dey (1999) affirms that the distinction between substantive open and theoretical coding is not very clear. Both Glaser and Strauss agree in principle that following the initial coding the researcher must reconstruct the fractured data to create greater focus in the analysis. This must be completed around significant variables in order to allow a small and parsimonious model, or picture, to emerge. The significant variables around which the categories and fractured data are gathered constitute the conceptual elements of the theory.

However, conceptual groupings can arise from the significant codes identified early on, since these may best explain the process that is being studied. As the categories emerge, constant comparisons are used to build upon these ideas. At this point previous knowledge and experiences and concepts from the literature help ensure that these groupings of ideas are theoretically sensible and are aligned with extant literature (Glaser, 1978).

Theoretical sensitivity is necessary as it "indicates an awareness of the subtleties of meaning of data. One can come to a research situation with varying degrees of sensitivity depending upon the previous reading experience with, or relevant to, that area" (Strauss & Corbin, 1990, p. 41). An extensive preliminary review of the literature helped develop theoretical sensitivity prior to coding.

3.6.4. Categories

Glaser (1978) recommends that the researcher seeks a core category that accounts for most of the variation in a pattern of behaviour. Strauss (1987) notes that the data represented by the core category appears frequently. However, other researchers, such as Dey, criticise the focus on a single core category as potentially misleading as "it excludes or underestimates the role of other important factors" (Dey, 1999, p. 111). They assert that this exclusion may remove alternative explanations or accounts of the pattern of behaviour under study (Dey, 1999).

As comparing and contrasting codes continued, similarities and differences became apparent, allowing categories to emerge. This was an iterative process as some codes, even initial codes, were elevated to categories while others were merged or downgraded. "Category membership becomes a matter of degree, not a dichotomy" (Dey, 1999, p. 70), with some members of a category displaying certain membership, while other members were less firmly linked to the category. As the category boundaries were indistinct, constant comparisons were required to ensure members were linked to the most appropriate category.

3.6.5. Themes

It is important to know when to cease coding and categorising data. Glaser and Strauss (1967) indicate that the researcher should continue to seek information until the categories have been 'saturated'. "Saturation means that no additional data are being found whereby the [researcher] can develop the properties of the category" (Glaser & Strauss, 1967, p. 61). This concept makes sense; however, Dey (1999) judges that the term saturation implies a stringent process: "saturation has connotations of completion" (Dey, 1999, p. 116) and this term "seems to imply that the process of generating categories (and their properties and relations) has been exhaustive rather than merely 'good enough' " (Dey, 1999, p. 117). Thus, theoretical saturation implies completion and exhaustion of options while theoretical sufficiency would seem to imply that adequate data of adequate evidence has been gathered. During the analysis Dey's lead was followed; theoretical sufficiency was attained. This was achieved when data created no new codes and the same types of answers emerged. As new interviews were conducted in each cluster, transcribed, and coded, with data falling within pre-existing codes and yielding no further increases or variance. This indicated that the coding associated with the cluster was sufficient. As the interviews were conducted, similar themes and types of answers emerged to questions, again with little variation in the data accumulating in the study. These responses indicated that theoretical sufficiency was attained.

Themes, representing the underlying meaning or patterns, began to emerge when theoretical sufficiency had been achieved. The themes represent underlying meaning or patterns found in the categories (Charmaz, 2006). As these themes emerged reflection helped to link them to the research questions. Coding outcomes may be found in Appendix V.

3.7. Chapter conclusion

The literature review set out the theoretical foundations for this research and this chapter has proceeded to outline the methodological foundations that have directed its course. The chapter started with the explication and analysis of my philosophical assumptions. These assumptions guided both my data collection process and my analysis. In the following chapters the guidelines provided are put to work to inform the research; these guidelines have provided illumination of my path through the journey of discovery in my data.

Chapter 4. The NZBrand Cluster

4.1. Introduction

The Fruit[8] industry under study has recently emerged in New Zealand. While the fruit has been available in New Zealand for some time, the industry has been commercially viable only since the late 1970's when large-scale planting began. In the Northland region large-scale planting began slightly later. In New Zealand trees bear commercially viable levels of fruit after a period of five to eight years; in some countries, with different climates, trees may bear fruit much quicker. Worldwide there is great interest in only a few major varieties of the fruit, although several varieties are available.

Initially, a large portion of New Zealand's output of the fruit was exported to Australia, which has a well-developed domestic market for it. One exporter worked with a major supermarket chain in Australia to create greater exposure for the New Zealand fruit. There is little overlap between the periods when the Australian and the New Zealand fruit are harvested; when the Australian season is ending the New Zealand exporters can begin to have New Zealand fruit placed on Australian supermarket shelves. This benefits Australian consumers as it extends the period of time that the fruit is available.

A major international market is the USA, which also grows a considerable amount of the fruit domestically. The entire New Zealand crop is equivalent to one week of output of the US domestic fruit. Because of the difference in size between the output of New Zealand exporters and the US market it was difficult for the exporters to break into some international markets. In the late 1990's several exporters banded together to create a collaborative venture to break into, and develop, several key international markets. It is this venture that is the focus of the case study, as the venture sees the exporters still competing in some markets while cooperating in others. The venture is known as NZBrand[9] and now exports primarily to Japan, although the firms that initiated it are also able to work together in other markets that they are developing.

[8] The type of fruit has been withheld to preserve the anonymity of firms involved.

[9] A pseudonym to preserve the anonymity of the firms involved.

4.2. The supply chain

The key steps in the supply chain for the fruit involve the growing, packing, exporting, importing, and the retail of the fruit. While the network that supplies this industry stretches beyond the growers, encompassing the supply of fertiliser or plants from a nursery, the focus of the present investigation is on the immediate supply of fruit through a given season from the orchard through to the plate of a consumer.

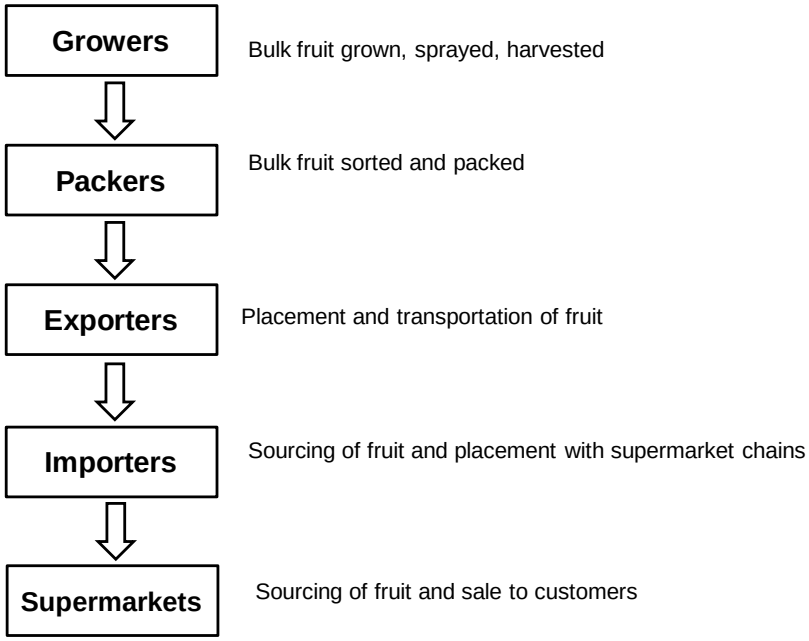

Figure 4.1: The typical phases in the supply chain for NZBrand fruit

There are distinct phases along a typical supply chain in this fruit industry (Figure 4.1). However, the structure of a specific supply chain may look considerably different because of the number of firms involved in each phase and the relationships between them. Packers, that run the pack houses, for example, tend to be set up to source from multiple growers ('contract packers'). However, some pack houses are set up to pack for a primary grower, with which they have strong historic ties, and may or may not accept fruit from other growers; in essence the grower and the packer are represented by a single, indivisible, organisation exhibiting vertical integration. Generally, the flow of products through the supply chain is similar to the flow in Figure 4.2 below. Multiple growers supply a packer and multiple packers supply an exporter. The exporter aggregates supply to satisfy the requirements of multiple importers, usually in different countries or markets.

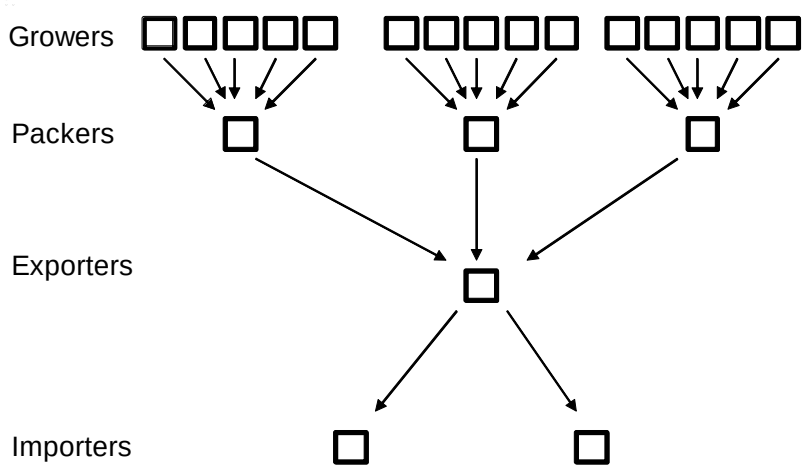

Figure 4.2: The typical supply base for a single NZBrand exporter

Depending on which target market is considered, the importers will usually supply a chain of retail stores. The small size of the crop from New Zealand relative to the demand in the export market means that the entire crop will often be sold through a single chain of stores.

There are several industry groups present in New Zealand and members describe it as being well organised. One manager (of World Fruit Ltd.) asserted that "the [fruit] industry has an advantage in that it is a very well structured, disciplined, industry. Which allows us a very good springboard to do something like [NZBrand]."

Two main industry groups existed when NZBrand was initiated. An industry-wide council oversaw many of its technical aspects. The findings and best practices that the council establishes are published as a manual. The council is an umbrella organisation, yet was constituted mostly of growers and exporters. There has been a strong and active growers association that met twice yearly, pre- and post-season. Information and knowledge from these meetings was pushed towards the packers. After the formation of NZBrand, the packers realised they needed a unified voice and formed another association composed of packers. At present there are horizontal industry associations for each phase of the supply chain as well as the industry-wide council.

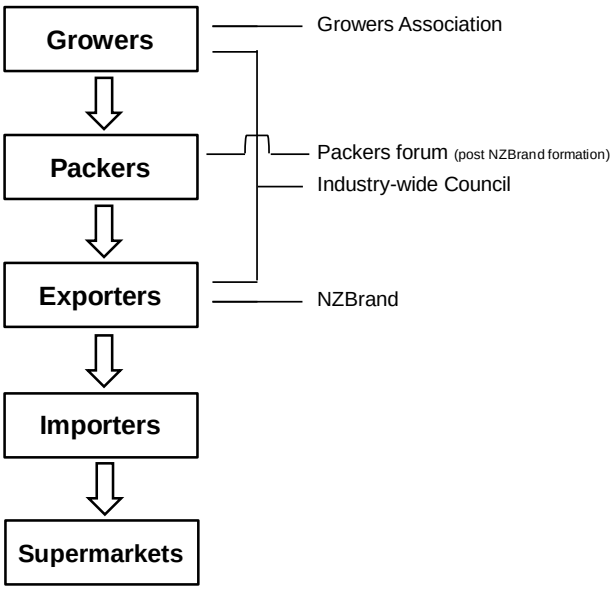

Figure 4.3: Multiple industry associations exist with horizontal and vertical linkages

In addition to the flow of products downstream there is a clear dissemination of knowledge and information both up and down the chain. The content and form of information flowing in each direction is different but the end result is the creation and modification of dynamic flow plans that the members of NZBrand work from. These flow plans determine the work of the packers, and, further up the supply chain, the flow plans influence the activities of the growers.

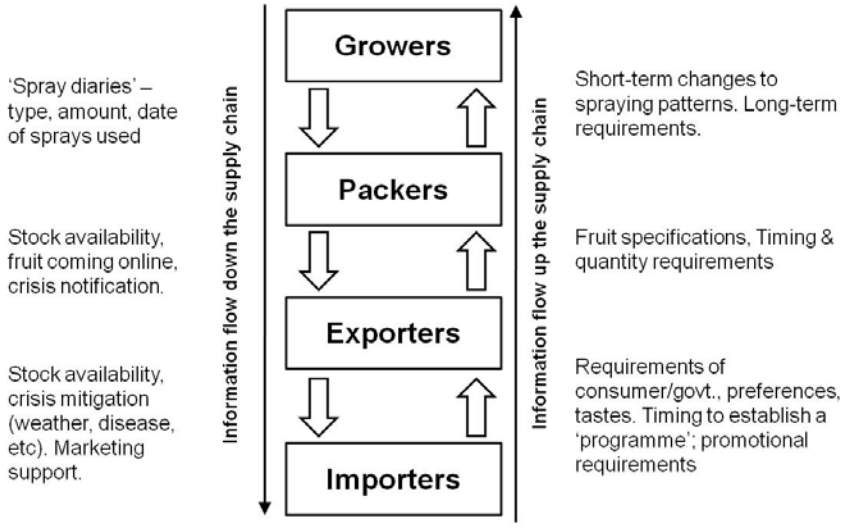

Figure 4.4: Examples of information flows up and down the NZBrand supply chain

The importers work with the exporters to establish a promotional programme for the market, determining the quantities and types of fruit that will be placed into the market. Some requirements are driven by consumer preferences, such as the size, shape, or dry-matter content. Some requirements may be driven by legal or political issues, such as the requirements for certain sprays to have been used (by the growers) at certain times to ensure that there is little residual

spray remaining on the fruit upon sale to consumers. The impact of these requirements is to create a complex basket of requirements over different time periods which cannot always be met as stock may not be available. Crises can reduce the ability of exporters to supply, or weather may delay harvest, impacting on getting fruit to the importers. The NZBrand initiative allows increased availability but it is not a panacea. Such events will impact on consumers' purchase of the fruit. Marketing and promotional support is provided by the exporter to the importer, particularly surrounding the benefits of fruit from "clean and green New Zealand."

Information-flows between exporters and packers are dynamic and frequent. The exporter communicates requirements from the importer, and advises how the packer can support these requirements. These are related to the timing of supply and quantities of product lines. Based in different geographic regions, two packers that supply the same exporter have different times when the fruit will be available. These variations are accounted for by the exporter as they devise the flow plan. The availability of the fruit from the packers, and from the growers, determines whether the flow plan will be deemed possible by the packer. Inability to supply according to the plan creates much two-way communication between the packers and exporters in order to determine a modified flow plan. If there are issues relating to a region or a source of supply the packers notify the exporters, who will then pass on the information to the importers if the situation is deemed important enough to potentially impact on supply. Together packers and exporters modify flow plans to meet the requirements of the importers.

Information-flows between packers and growers focus on the availability and the characteristics of the fruit, with emphasis on the sprays used and the information contained in the 'spray diaries'. The growers keep spray diaries recording the type, amount, and date of spraying. This helps the exporters and packers determine the suitability of the fruit for consignment to different markets. The relationship between the packer and the grower is important "because the [fruit] are harvested over [a period] the timing, that you pick if you wait for a month or six weeks, all of these things can create different market opportunities" (Chairman, Packer Group). This indicates that the packers are able to create a stock of fruit suitable for different markets by working closely with growers. The packers inform the growers of longer-term requirements that may impact on the growers' operations.

4.3. Challenges

There are several key challenges facing the exporters. These include the vagaries of weather and 'Mother Nature'; the nature of the product, which is similar to a commodity, creating strong

international competition; small supply relative to demand; legal and political restrictions; and wide variances in the product specifications.

4.3.1. Weather and uncertainties in supply

A key point made by the respondents was that they are not running a manufacturing organisation; they are impacted by Mother Nature and associated uncertainties. The members of the supply chain are not in complete control of the production. If demand increases rapidly they cannot quickly ramp-up production to meet demand since it takes five to eight years before new trees produce fruit in commercially viable volumes. There can be an abundance of fruit on the trees – which can be destroyed or damaged by bad weather immediately prior to harvest. At other times, the fruit may not be harvestable when required because of poor weather conditions. The ultimate availability of fruit is not known until it has actually been harvested and the times and durations of harvest periods change each year depending on the weather.

4.3.2. Nature of the product

It is accepted by members of the industry that it is very difficult to add value to fruit when many consumers simply demand the fruit as fruit, with no value added. In some cases fruit can be processed to create other products; however, this processing to add value may not always be possible. While there are different varieties of the fruit available, the bulk of the international demand is for one major variety, making it difficult to secure a niche with a specific variety that is grown in limited quantities elsewhere, which would otherwise give New Zealand growers an advantage. Unless the variety was created in New Zealand, and strictly controlled, the advantage gained would be short lived, as other growing regions around the world would rapidly switch production to the newly popular variety, eroding the advantage of the New Zealand industry. The New Zealand exporters must compete with lower-cost producers in other southern hemisphere countries, as many other fruit exporters in New Zealand also find themselves doing. With a fruit product, differentiation is difficult and price is frequently a major consideration for the buyers, or importers, in the destination countries. However, as a food product the source of supply can be an advantage; the exporters capitalise on the international perception of New Zealand as a good environment in which to grow food (the “clean and green” image), creating an advantage other lower-cost sources of supply cannot match.

4.3.3. Small supply relative to demand

One key challenge faced by the exporters is that they can access a small supply relative to the demand from the importers. In some cases the entire New Zealand crop is only a fraction of the

output from other key southern hemisphere producers. New Zealand exporters can service a small fraction of the demand from a large market, such as the USA. This, coupled with the commodity nature of the product, makes it challenging to find a pricing point low enough for the importer and high enough for the exporter. Many New Zealand exporters of other products find that they are required to deliver significant volumes to importers to interest them, which is not always possible when working from a limited supply base. The ability to get the right price may also depend on the ability of the supplier to guarantee adequate supply through control of an adequate supply base.

4.3.4. Political and legal

There is a long history of protectionism in many countries, particularly with respect to food sectors. The protectionism can take many forms, with the most overt tools being quotas or tariffs applied to food products. More challenging and difficult to deal with are other political barriers to free trade that are related to the health of plants or animals in the industry. These barriers can be raised to ensure the protection of the industry. If the country of origin is known to have a bug or a disease that would be detrimental to the destination country the government of the designation country may bar the import of the product to ensure that their domestic industry remains free of the potentially devastating bug or disease. If it is declared that the fruit is believed to harbour some pathogen that has the potential to damage the domestic fruit industry the fruit can then be barred from entry, providing a disadvantage to a country such as New Zealand that relies heavily on export of food commodities. A trade barrier can restrict the entry of produce from countries, giving opportunity to domestic growers.

It is possible for a government to disallow access of fruit due to concerns over sprays. The types of sprays that one country may allow can be different to other countries, to the extent that the sprays required by one market may be expressly prohibited by another. The acceptance of the timing of sprays, to ensure an appropriate and healthy amount of spray residue remaining on the fruit, can impact on the export of fruit to a specific market. A government could use requirements relating to sprays to restrict availability from specific countries. Given time the domestic New Zealand industry would adapt to ensure continued supply by changing the types of sprays used.

4.3.5. Large variety in product specifications

While fruit is a commodity product there are many different requirements relating to different dimensions. Market requirements differ, based on legal issues (relating to sprays or the presence of bugs) or consumer preferences (relating to the attributes of the fruit). The small volume of New Zealand output may be largely unsuited to a specific market if the profile of supply does not match

the demand. Some aspects of the profile, such as the use of sprays, can be adjusted given time and careful planning. This is particularly true with the involvement of the industry-wide council. Other characteristics of the fruit may be outside the control of the growers, packers, and exporters, being determined by climate and the growing region.

4.4. An initiative to gain competitiveness

The exporter firms decided to band together to create the NZBrand venture to increase their competitiveness in international markets. Some of the previously identified challenges were overcome, or mitigated, with this approach. In this section we explore the creation of NZBrand, how it was set up, what were the barriers to the development of the horizontal coordination, and how these barriers were overcome.

4.4.1. The cluster history and drivers

Ten years ago there were few exporters of the fruit of significant size in New Zealand, the bulk of the exported crop going to Australia. One of the largest exporters wanted to create and improve market share for the New Zealand fruit in new markets, specifically, the USA and Japan, then the two largest economies in the world. It was decided that a coordinated New Zealand programme was needed so the importer would essentially secure the entire New Zealand crop. It was envisaged that through control of the New Zealand output there would be greater opportunity for marketing potential and negotiation. Gaining support from the exporters would lead to control of a large volume of the crop to enable the group to meet their marketing objectives.

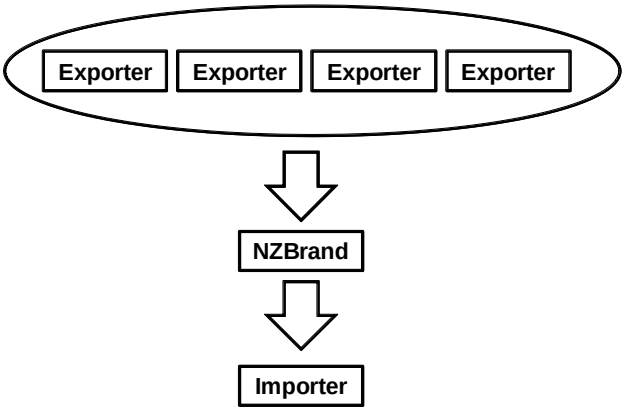

Figure 4.5: The structure of NZBrand

One manager who helped to initiate the formation of NZBrand recalled that:

> initially it was contact between myself and the other large exporter [. . .] saying "let's work together in some of the more difficult off-shore markets where as individuals we were potentially too small to be significant whereas together we can make some noise."
>
> Manager, World Fruit Ltd.

Over time the structure was expanded to include the other exporters, increasing the overall volume the exporters were representing in the international market.

NZBrand is most active in the Japanese market, which is a "very high cost market to service. It requires a level of expertise [to service effectively]"; (Manager, World Fruit Ltd.). NZBrand enables exporters to reduce individual costs, and pool their expertise, in order to service the market effectively. In Japan importers prefer to deal with a larger supplier, as this 'size' is frequently used as a proxy for business stability (Batt & Morooka, 2003). The NZBrand cluster presents a unified front, providing assurance of continued and stable supply.

Initial access to the Japanese market had to be made possible by meeting restrictions on the sprays used on the fruit. This was achieved through engaging with the industry-wide association to make necessary changes in the New Zealand industry. Prior to the changes, export to Japan was "impossible" due to the conflicting requirements between export markets; a necessary requirement for the entry of the fruit into another market was the application of a particular spray, which was not allowed on fruit in Japan.

4.4.2. The features of the cluster

The exporters generally see NZBrand as a marketing exercise. The export manager at Best Fruit noted that "from a marketing point of view [. . .] there's two functions. There's the logistics point of view and there's a marketing exercise." This indicates that the key benefits of clustering are closely interrelated. Firstly, the cluster can generate a common marketing and supply strategy to target specific markets. Secondly, specific exporters in the cluster can improve their overall logistics performance through drawing on supply from other members to improve outcomes, with the concomitant impact of improving stability of supply from any member of the cluster. The members note that, "as individuals we were restricted in our capabilities to successfully service new and developing markets", while at the same time, "we were creating duplications of costs for little reward" (Cluster literature). These two points highlight the dual focus of NZBrand: branding and marketing to develop new markets, and a rationalisation of costs in terms of the supply chain, such as allowing "better buying power with [shipping] lines" (Manager, Healthy Fruit).

4.4.3. A common marketing and supply strategy

A primary reason for the collaboration in NZBrand was to enable more effective marketing. The general manager of World Fruit explained that when approaching Japan, "as a group, we met four or five different companies and then we selected one," to act as the importer. The selection process was made carefully as the NZBrand managers wanted to realise a match of culture and ensure that they would be able to form a close working relationship with the importer. Using one importer gave NZBrand a single point of entry into the Japanese market and it was perceived that "being Japanese, having 100% [of the output] from a large organisation, which is quite unique, like [NZBrand], gave them pride, which made them keen to do it."

Through NZBrand the supply base of the cluster members is rationalised and expanded. In terms of marketing this has an important impact as it allows NZBrand to:

> band together and offer a parcel of fruit to our importer that was [. . .] more consistent, and a more marketable volume of fruit that would allow them to have [. . .] more ability to [. . .] service customers on a regular [. . .] consistent fashion. Whereas if we're all [supplying] different importers [. . .] you can lose some of that consistency.
>
> Export Manager, Best Fruit

Operating as a single supply chain allows greater certainty for importers and customers. Individually, each of the members of NZBrand may be small and unable to provide consistent volume and qualities to customers. Together, the combined supply base of NZBrand is expanded and stable. In terms of availability of supply, NZBrand can communicate information clearly to its partners. There is the potential to understand what is possible in the near future and relay this information to the downstream partners, resulting in effective planning of downstream operations. This ability to communicate confidently with downstream partners is important in the NZBrand approach. As the export manager at Best Fruit says:

> If we didn't operate as [NZBrand] it would be very much kind of a splintered kind of approach to the business. Whereas coming together under the one umbrella of [NZBrand] it allowed us to actually [. . .] talk confidently to our import partners, who could then talk confidently to their downstream customers about what volume of fruit we were going to have, when it was going to arrive, what size profile that fruit was going to look like, and how they were going to manage that once it arrived on shore. So all those sorts of things, from a marketing point of view, became very important.
>
> Export Manager at Best Fruit

Over time the marketing exercise has become extremely successful. The General Manager of World Fruit notes that others in the industry "heard immediately [. . .] that we started working with [the initial importer] and our reputation spread, because the horticultural marketing industry is very small. And the one company had [NZBrand] and the others wanted it." The Exporting

Manager of Best Fruit concurs with this point as "[NZBrand] is a house-hold name in [the specific variety of fruit] in Japan now. It is not in the USA, but it is in Japan." There is a clear indication that NZBrand has raised the profile of the New Zealand fruit in Japan and provided greater visibility of produce coming from New Zealand. One Manager asserted that "it is New Zealand fruit that they want. So we sold New Zealand" (General Manager, World Fruit Ltd.). The international image of New Zealand is very important to exporters (Cumming, 2010) and NZBrand have been quick to capitalise on the international perception of New Zealand. The well-structured industry, with homogenous practices enforced by the industry-wide council, enables this approach as all the fruit conforms to these specifications.

4.4.4. Cost saving measures and benefits through clustering

The combined NZBrand supply chain allows each of the exporters to source products from packers, providing an important benefit. An individual exporter, as part of NZBrand, can access the supply of a partner exporter's packers. This cooperation extends the scope and range of the supply that exporters can access. With greater supply comes greater capability to fill a shipping container. As containers are more completely filled the fixed cost of the transportation is spread over more units, reducing the unit costs.

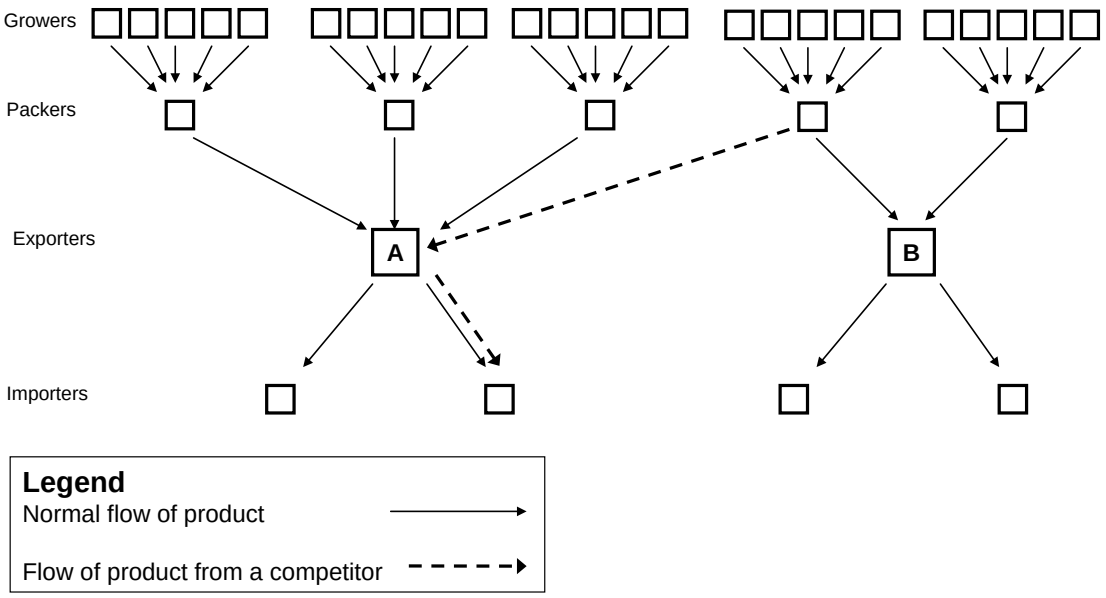

Figure 4.6: Use of supply from other members of the cluster

For example, with reference to Figure 4.6, if Exporter A requires a fruit with a profile that cannot be sourced through their own supply chain, they can contact Exporter B and attempt to source supply from that exporter's supply chain. This means that either Exporter A has enhanced ability

to provide the right quantity of fruit with the right characteristics to their customers, or they are able to fill up a container to reduce the unit costs.

An example is provided by the Packer Group Chairman who noted that "if Packer A and Exporter A find they are a pallet short [the exporter] will be on the phone to another [exporter] partner and say "can you do one more pallet" and they will because the boot will be on the other foot the next week or the next month." The Packer Group Chairman simply states that "by having a number of marketers and a number of packers the ability to get that volume is a bit easier."

The ease to create volume reduces costs in the supply chain. The Chairman of the Packers Group noted that, "so as far as the timing and the ability to put a container together, because you can't have three quarters of a container [. . .] so you got to end up with a full container, so the ability to manage [getting a full container] is easier." The more fruit in the container the greater the amount of revenue can be brought in for the same cost of the single container. The Chairman went on to note that there "have been times when we may have had an order for five pallets for [NZBrand] and then that exporter says: 'Look, can you do one more,' and as often as not to fill that container, [because] someone else is one short somewhere else."

The benefit of being able to fill containers more easily and readily is a source of cost savings. By forming a larger supply chain with NZBrand the participants can reduce duplication of resources. One manager explained that:

> Japan is a very high cost market to service. It requires a level of expertise and as individual companies [. . .] we were spending a great deal to create market share as individuals and because we were small and fragmented we couldn't make a major impact in the marketplace and we created competition for [our fruit] and destabilising of price, with the multiple suppliers.
>
> General Manager of World Fruit Ltd.

Previously, individual exporters were duplicating the marketing efforts and other activities that added cost, while also maintaining competition which was driving down the prices received from the importers. This pincer action, of higher costs and lower returns, has been mitigated through the NZBrand approach.

4.4.5. An expanded supply base providing logistical benefits

The cluster provides the logistical benefit of increased consistency of supply, of fruit that is of increasingly consistent quality. Overall, NZBrand is "a very useful force in terms of our ability to [. . .] allow the customers to [. . .] receive good volumes, in a timely fashion" (General Manager,

World Fruit Ltd). This is accomplished through expanding the supply base that individual members of NZBrand can draw upon. One NZBrand Manager asserted that:

> As a group we can [. . .] use our regional strengths as well. Like some of us have stronger relationships with growers in [a major growing region] than in the [another major growing region]. And sometimes the fruit size is a bit different out [of these two regions]; Japan has a specific preference [for the fruit characteristics], so you can harvest that fruit out of [one region], which is more suitable to that profile that the Japanese customers would like.
>
> General Manager from World Fruit Ltd.

The market mediation capabilities of NZBrand also increase with their high levels of coordination. As production cannot rapidly be increased or decreased to accommodate the market (as can occur in a manufacturing organisation), a wider supply base with greater volumes of fruit with various specifications allows different market requirements to be more easily accommodated. The vagaries of uncertain supply in the horticultural industry can be overcome. The General Manager from World Fruit Ltd. explains that when the NZBrand works this way "your tentacles are much more effective [. . .] as to how you might [. . .] work your way around the particular demands of the marketplace with matching that with production and weather issues, and regional issues, and all of those type of things." The expanded supply base available to an individual member increases the range of options available to them, in terms of where and when the supply is sourced and the profile of supply.

A storm in a major producing region would otherwise prevent an exporter, drawing solely from that region, from filling a customer order. This problem is overcome by NZBrand through having suppliers in other regions, able to "pick up the pace" and fill the demand materialising from Japan. This coordination enables a greater consistency of supply that is not possible if a firm was drawing fruit from one geographic region. Similarly, if there were a transportation issue from one region the demand may be filled from other supply regions. A manager explains the use of multiple regions as a benefit as:

> Some weeks, like if we're packing fruit in [region A], which we do, and some of the other guys are packing fruit in [region B], and it rains all week in [region A]. And we can't get fruit off the orchards; you can't pick [the fruit] when it rains. You know we can't pack, so, you know the message would go out as soon as you kind of recognise the problem, to the guys in the barn saying "Hey, can you crank out this work?" And, you know "Can you fill that order?" And if they can they will. And, you know we might pick it up the following week or something like that. So within any particular week you're going to have plenty of e-mails about "hey, I'm light on [a specific characteristic]," or, "I'm full on [a different characteristic]," whatever you can do to mix and match, and try and make it all work basically [. . .] Put the pieces of the puzzle together [. . .] which is very much what it's like.
>
> Exporting Manager of Best Fruit

Another important characteristic of horticultural products is that different supply regions have different climates, or microclimates, that will impact on when fruit may be harvested. Similarly to the JEMCO cluster, where different regions allowed a longer season of supply, NZBrand enjoys the same benefit of increased availability of supply due to different harvesting seasons in the different regions from which members draw. A NZBrand manager explains that there is a benefit regarding the:

> timing of fruit too [. . .] that the fruit in [a major growing region] generally speaking is about 2 or 3 weeks earlier in maturity than fruit in the [another major growing region, which allows us to get started in Japan a little earlier [. . .] And we can do that as a group.
>
> General Manager of World Fruit Ltd.

This is illustrated by considering just two suppliers (A and B) with slightly off-set distributions of produce availability. If their supply capability is combined the produce from A+B can be offered for a longer period than the supply from a single region can (Figure 4.7).

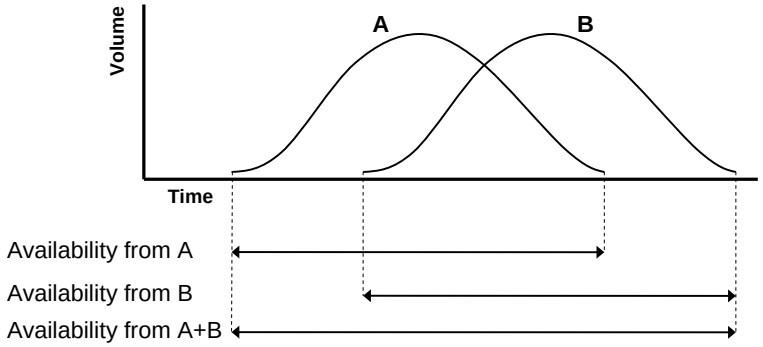

Figure 4.7: Increased availability using multiple suppliers

Clustering has reduced operational complexity and pressure on the suppliers within an individual supply chain of a member. With the existing structure the horizontal relationship between the exporters enables changes in requirements or other issues to be resolved using supply from other supply chains. Spreading responsibility to other supply chains within NZBrand reduces stress upon any one individual operation. “So just that [horizontal] cooperation at the exporter level, if that doesn’t happen there would be more pressure at a pack house level to deliver an extra pallet or not have packed the one extra,” explained the Chairman of the Packers Group. The individual pack house no longer has the responsibility to meet requirements by themselves as supply can instead come from the supply chain of another member, which may be in a better position to supply (as illustrated in Figure 4.6).

4.4.6. A summary of benefits

The general feeling of members is that "there are many things that we can do as a group that we couldn't do on a splintered kind of strategy" (General Manager, World Fruit Ltd.). However, the members still retain a competitive attitude to other export markets. They compete with one another domestically and in many international markets while they also cooperate as NZBrand in a few markets. There is tension within this strategy, the coopetition that NZBrand embodies. Many of these issues are related to the plague of uncertainty surrounding supply. Problems become apparent during each season and lead to a feeling amongst all members of the supply chain that "there has been an acceptance that this is the way the line of the fruit is. It is what it is. That's the other thing – fruit is what the fruit is" (Chairman, Packers Group).

4.5. Barriers to effective horizontal relationships

Initiating the cooperation meant that the organisations involved understood they had to coordinate and work closely together. NZBrand is now successful but it has not always been simple to maintain cohesive coordination. "I think the main barrier to overcome is lack of trust, this can be a major stumbling block," noted the Manager of Healthy Fruit. However, the lack of trust is not a one-time barrier that disappears permanently; it is omnipresent in coopetitive ventures. The General Manager of World Fruit Ltd. explains it by asserting that "we are competitors, so right up until ship side we are in competition. From shipside onwards we are not, we are one brand, or one desk." As NZBrand is an on-going venture, rather than a one-off exercise, the issue of trust is also a permanent concern for the coopetitive venture.

4.5.1. Coopetition and trust

Coopetition and the presence of competitive pressures between members is a key barrier. This issue is confounded by the related issue of trust and these issues will be discussed as an interrelated barrier. One manager highlighted this critical issue and asserted that "several exporters ([NZBrand] members) compete with exporting to other countries such as Korea and Australia, [so there] needs to be a level of trust within the group" (Manager, Healthy Fruit).

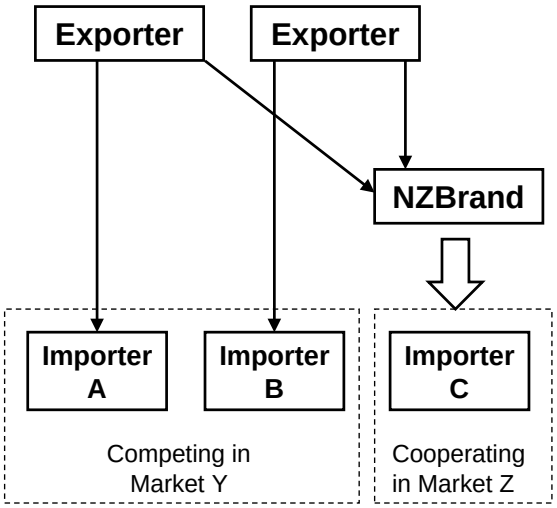

Figure 4.8: Exporters cooperating and competing simultaneously

The presence of competition and natural competitors (Figure 4.8) means that "at times we have had little ripples where people have manipulated the system a little to suit themselves but generally it has all been managed in a fair and equitable manner" (General Manager, World Fruit Ltd.). There are tensions between the members as they realise that while they gain benefit over a long period of time from cooperating, in the short-term they may individually identify opportunities in other markets that they can leverage to boost their individual profits, at the expense of the success of NZBrand. If all members did this all of the time the NZBrand venture would not succeed as it would not be functional. If all members worked to benefit NZBrand all of the time this ideal would mean long-term gains for all of them. As each firm attempts to maximise profits there is an opportunity to boost short-term gain at the expense of long-term cooperation with NZBrand, and the individual firms will consider the potential. Each firm seeks to maximise their own gain and while the members see long-term potential to gain by engaging with NZBrand, some still see opportunism, causing ripples, as a way to gain short-term benefits.

4.5.2. Information sharing

Linked to coopetition is the need to share information between NZBrand partners. Broadly speaking, there are two types of information shared within the cluster: numeric data (using spreadsheets) and knowledge about the current state of affairs. One of the managers of a packer claimed they shared much data:

> But a lot of what we do is . . . it is real communication, all that stuff, that we need to understand [. . .] so a good relationship between opposites, for our business, is pretty important. Because you got to understand what is their world, and hence when I talk to [our exporter] about what is going on in an operational sense . . . . I just want him to get a sense of what is we are dealing with.
>
> Manager, Pack Well

The business realities of a packer differ from those of exporters. The packers maintain close ties to growers and have an intimate understanding of stock availability. While there is a dynamic flow plan generated by exporters with packers, vertically in the supply chain, this is supplemented by a qualitative perspective of the present and likely future state of the harvest. When working horizontally in NZBrand, the exporters must understand other perspectives when using partners' supply chains.

4.5.3. Information technology

The literature frequently relates successful supply chain integration to extensive investment in ICT. NZBrand did not evidence such investments to support coordination, their three modes of communication being meetings, telephone calls, and email (both the content and attachments, such as spreadsheets). The size of the exporters' business may warrant implementation of enterprise resource planning (ERP) systems and integrated information systems, yet the value provided by integration with partners is likely to be small. Much of the information presently shared amongst the members is tacit industry knowledge, contextual to the industry and events. Little transactional information needs sharing. The information shared may not be suited to integration with partners with an ICT solution, providing little payback from a significant investment.

Spreadsheets are frequently used in NZBrand. The flexibility and compatibility afforded by spreadsheets is extremely useful and one packing manager exclaimed, "[T]he number of spreadsheets I get a week would go out the doorway!" (Manager, Pack Well). Spreadsheets can aid with many calculations and facilitate rapid changes; changes can be made collaboratively and discussed with other parties. Spreadsheets form an important part of the planning system used in the cluster (including vertically, with suppliers), particularly for the generation and revision of flow plans. The communications required to generate and update flow plans involve "information, facts and figures" (Manager, Pack Well), embedded in spreadsheets.

4.5.4. Different responsibilities in the chain

While NZBrand generates benefits to the entire chain, many individual links in the chain have divergent responsibilities. Exporters want to meet customer requirements for a certain amount of a certain grade of fruit. The request may be passed to the packer who wants to fill these requests but is at the same time constrained by obligation to their suppliers, the growers, to pack as much fruit as possible for these growers. There may be an exception, or mismatch, between what the customer requires and what the supply chain can supply. The Chairman of the Packer Group noted that, "the packer is still obliged to pack the maximum number for a grower as well. So I guess

those [exceptions and mismatches] are worked through on an individual basis." While mismatches may occur in a single supply chain, using multiple sources of supply enables NZBrand to reduce these instances. Working collaboratively produces a win-win situation for the exporting and packing phases of the supply chain.

4.5.5. Process evolution

Initiation of NZBrand and the coopetitive atmosphere forced alterations to the internal processes of exporters and suppliers. The packers bear the bulk of the changes in processes relating to physical stock. One manager of a pack house noted that there may be an:

> initial reluctance to have more stock, other stock that is on hand [. . .] the fact you are having to pack for two markets instead of one and not getting paid anymore for doing that [. . .] but there has been an acceptance that that is just the way it is. So that [initial reluctance] is just a very narrow-minded 'packer-only' view of it.
>
> Chairman, Packer Group

Changes in processes and expansion of required processes may be perceived as detrimental by some in the industry. Over time the expansion of processes becomes more accepted, particularly as benefits are realised. The Chairman commented that, "I guess it is just part of operational procedure now. And some see it more of a hassle and a nuisance, but those that do it on a more regular basis [see that it] becomes just part of the system." Over time the value gained through participation in NZBrand outweighs the costs of additional processes. The change in process involved minimal innovation; the process shifts were related to expansion in the variety of products at the pack house level. The new packaging and despatch process for NZBrand stock was an adaptation of existing processes, allowing easy and rapid introduction. The packers view the increase in work due to NZBrand as being "[. . .] just another box, it is just another colour. So the packing procedure was the same. It is just another stock item that we have got to have. That's what it is" (Chairman, Packer Group).

4.6. Overcoming barriers

The most significant barrier to effective horizontal coordination is coopetition, a barrier driven by issues surrounding the trust between competitors and the information sharing required so that coopetition works effectively.

4.6.1. Coopetition – trust

An important point was made by the General Manager, World Fruit Ltd. who noted that for the NZBrand concept to work "you need to have the right people that are working for the common

goal." The people involved in the organisation and day-to-day running of NZBrand appear to be one of the greatest assets. With a well structured and close industry the key players all know one another, if not personally then at least by reputation, fulfilling the first requirement of having 'the right people' involved.

There are several features that make this possible. Firstly, the industry has been commercially viable for only several decades. The stalwarts of the industry have been involved for the entire period and have a shared experience and understanding. Secondly, 90% of the New Zealand export is controlled by NZBrand, with fewer than six members. This small number of participants assists with consensus; NZBrand aims for rapid consensus on problems, which is easier to obtain with fewer participants.

There needed to be a common goal for the initiative. To keep all the partners on track, regular NZBrand meetings occur. The Manager of Healthy Fruit states that, "[NZBrand] have a pre- and post-season face-to-face meeting with all exporters present to discuss issues. We also have a procedures document covering all aspects," of the business. These regular meetings operate at the tactical and strategic levels to build longer-term benefit and trust between members and ensure alignment through clear and specific longer-term common goals. A strong common goal ensures that members are committed and reduces the likelihood that members may 'do their own thing' to maximise short-term gains for their company. Ultimately, all members are clear about their goal of growing long-term success in the Japanese market. When problems need to be discussed members are open and frank and attempt to gain resolution quickly.

When a member 'creates a ripple' there is little formal 'punishment' other members can apply. The remaining members apply a strong group pressure and require the member to defend and explain their actions in a meeting. The pressure applied will be relative to the size of the ripples. The General Manager of World Fruit Ltd. notes that "part of NZBrand is agreeing to pay bills within periods of times and stringently sticking to it." If payments are not made on time the offending member will not "get a dirty letter" about what has happened, they will be "hammered" (General Manager, World Fruit Ltd.).

4.6.2. Coopetition – information sharing

Much information passes up and down the supply chain on a daily basis, between exporters and growers and is incorporated into the flow plan. These flow plans are created jointly by the partners and become utilised by their suppliers as NZBrand matches demand. This is accomplished with information-sharing horizontally, between exporters, and vertically, with suppliers. The

information is qualitative and rich. The flow plan enables NZBrand to ship to a well arranged programme that benefits their customers. Many members still struggle to share current information about their interactions with customers, creating minor fluctuations in flow plans within NZBrand. Upstream actors, such as packers, found it difficult to come to grips with the concept that they needed to share what had been proprietary information about the crop and how they were operating their business.

4.6.3. Sharing of benefits and costs

One reason that members may behave opportunistically and in their own interests, rather than in those of NZBrand, is to maximise their short-term profit. It appears logical that if the attraction of profit from actions detrimental to NZBrand can be reduced, then NZBrand should work together more effectively. Early on, NZBrand devised methods for sharing revenue equitably while providing benefits to the cluster. The system was explained by a manager at Healthy Fruit who succinctly noted that "one invoice is raised per customer, the proceeds split based on product supply." The revenue from customers in Japan is pooled and an average amount per unit is split between the members on the basis of supply. There is an average price split between NZBrand members; there is no claim to extra benefit by withholding supply or not assisting the other members. The splitting means that "you're not disadvantaged or advantaged [. . .] by doing any of those things. You know you get what you deserve, kind of thing, out of the group" (Export Manager, Best Fruit). The revenue sharing approach reduces the need for gaming and opportunistic behaviour as members see that the potential benefit from gaming actions are reduced under NZBrand.

Costs associated with NZBrand operations relating to the Japanese market are shared amongst members on a pro-rata basis relative to the proportion of supply over the season. NZBrand will "even out freight and market differentials so that no-one is disadvantaged by which order they fill" (Cluster Literature). However, there are aspects of this sharing of costs and benefits that confound the impact that trust has on the success of the cluster. Members "pay all shipping and distribution costs equally and in a timely fashion" so NZBrand is not disadvantaged, yet the approach requires trust between members.

In the US market the costs and revenue per shipment are split on a pro rata basis as there is significant benefit for an exporter if they are able to supply early in the season. However, some orchards do not ripen early enough and these members are unable to participate. The equitable split of revenues and costs, in this case, is on a per-shipment basis. There is one NZBrand customer operating in the USA.

Both customers and suppliers are pleased with the results that NZBrand can achieve. The existence of NZBrand has brought greater stability to the industry on the supply side. The return per tray has become higher, on average, and is more stable than it was before NZBrand. Growers see increased stability in the business environment that enables effective planning due to reduced uncertainties. These benefits cause the vertical members of the supply chain to exert pressure on the NZBrand cluster to continue operation.

Sometimes minor irritations occur in the operations of members that lack efficiency, affecting on the ability of other members to operate effectively as a group. Poor individual management of harvest flows, or packing requirements, can cause NZBrand to come up short in the market. However, NZBrand is quite forgiving of these unintentional problems as they are not opportunistic.

4.6.4. Pooling expertise

Literature notes that collaboration is most effective when there is adequate homogeneity to ensure partners can collaborate while also having adequate heterogeneity for them to gain benefit. The members are in a young industry, presenting participants with shared understanding and experience. Despite the youth of the industry each of the cluster members has evolved separately and developed different skills to bring to the partnership. For example, one exporter has more experience and connections in the shipping industry and is the logical choice to arrange NZBrand shipping. Cost benefits can be derived through negotiating with a larger volume of business with shipping lines, and these benefits are shared with the partners by reducing overall shipping costs. Other partners have more experience with marketing and work more closely with importers in Japan. The costs from marketing exercises are shared proportionally based on the share of supply. For example, if one of the firms supplied 25% of the volume they would pay 25% of the costs of the marketing.

4.7. Key lessons from the cluster

How do the firms measure and determine if the NZBrand exercise has been worthwhile? Members are continuing with their efforts after many seasons and this bears testimony to the fact that they consider that they gain value from NZBrand. It is difficult to measure whether NZBrand offers

benefits using traditional logistics KPIs, as exogenous problems can impact on supply. Poor weather can ruin a crop and reduce a KPI, such as DIFOTIS.[10] One manager explains that:

> What we measure now is how we manage to increase the value in Japan over the last four to five years by [an amount in Yen] per tray which shows an increase in the market perceived value of New Zealand grown [fruit]. And that is outside of any effect of foreign exchange, it is straight market value from [a 30% increase in price] per tray.
>
> General Manager of World Fruit Ltd.

The measure of success is the continuing increase in price that customers in Japan are prepared to pay. The members also note "massive increases in market share in Japan" along with "stable pricing amongst New Zealand fruit" and "high value distribution of market intelligence amongst the members" as indicators of success (Cluster literature).

4.8. NZBrand in the present and moving forward

Recently the problem of opportunism has materialised in NZBrand. After operating with "irritating" small problems with members that caused "embarrassment" in the market, NZBrand faces a threat to the ongoing stability of the cluster. A member acted to maximise their profit by "blatant manipulation," leaving NZBrand exposed in the Japanese market. Meetings will be held where the members will challenge the wayward member over the actions, asking "What the hell are you doing?" and demanding answers.

The issue is serious and threatens to undermine the work that the cluster has invested in creating and supporting the brand in Japan. Currently there is "no rulebook" on how to deal with this issue in the "evolving" structure of NZBrand. The situation is set to change as NZBrand is likely to become more formal over the next season in an attempt to prevent future opportunism, to ensure long-term stability in NZBrand. Careful consideration of the problem showed the perceived opportunism was, in fact, a misunderstanding due to an instance of poor communication both inter- and intra-firm.

4.9. Conclusions

Working with the other exporters has enabled the members of NZBrand to secure supply benefits that are passed on to their customers in Japan. The members cooperate through the NZBrand structure to coordinate their supply activities in the Japanese market, while maintaining separate,

[10] DIFOTIS (Delivery In Full, On Time, In Spec) is a common KPI in logistics and supply chain management. Successful SCM initiatives may be expected to improve the DIFOTIS metric.

competing, operations in other markets, in a coopetitive venture. After years of operation the cluster is stable and successful, having early on overcome several barriers relating to trust and information sharing in coopetition.

Chapter 5. HortCom – Collaboration in Shipping

Settlers from Europe have been growing orchards of fruit[11] of various varieties in New Zealand since soon after their arrival. Over years the patterns of production and consumption of the fruit have changed considerably. Whereas during the early years of European settlement the fruit was grown locally and consumed close to the point of origin, the fruit industry has now become an increasingly important export product for New Zealand, representing 28% of New Zealand's horticultural export earnings, equivalent to over $500 million in value. Approximately 50% of the fruit are exported. However, the broader international market is highly competitive; New Zealand produces less than 1% of the world's total fruit production. Internationally almost all fruit are consumed near to their point of origin and only 6% of the total world production is exported from the country of origin. Of this international trade, New Zealand's output accounts for 14% of the global volume. The most important exporters are South Africa, Chile, Argentina, United States of America, and the European Union. As the fruit is harvested in specific seasons the countries in the opposite hemisphere will be in their off-season, and are willing to import the fruit as there is no domestically produced fruit to sell. As a result New Zealand fruit exporters tend to compete only with the other fruit exporters from the southern hemisphere. The three largest competitors in the southern hemisphere are South Africa, Chile, and Argentina.

Despite strong international competition, New Zealand has remained competitive through the development of new and special varieties of the fruit to provide a high quality product not available from other countries. New varieties developed and grown only in New Zealand now account for approximately 80% of the total New Zealand crop. In contrast, New Zealand's key competitors (South Africa, Chile, and Argentina) rely on traditional varieties. Promotion of these New Zealand developed varieties has generated enhanced competitiveness, reflected by proportionately greater returns from the market. In the major export markets in Europe, Asia, and North America the New Zealand returns are greater than its market share by volume, indicating greater returns per fruit than the traditional varieties have offered.

5.1. Revisiting the New Zealand fruit industry: the impacts of change

Recent decades have seen multiple challenges to the fruit growers. In 1998 there were approximately 1500 growers; by the end of 2000 this number had dropped to approximately 900 as the industry consolidated. Much of the growth in the industry has taken place in the past three

[11] To preserve the anonymity of participants as fully as possible the type of fruit will not be disclosed.

decades, during which time the New Zealand production has increased to around 20 million bulk units a year. This is one third of the total southern hemisphere crop. Presently the majority of orchards are operated by families as a lifestyle and self-employment opportunity. Most of the fruit is produced in two regions in New Zealand. Region1[12] accounts for approximately 30% of the country's total production while Region2 accounts for 55%.

During the 20th century much of the New Zealand success in the industry was attributed to the cooperative marketing strategy formulated by the Exporting Board[13] (EB). This board, which later became a cooperative owned by the growers, held a statutory monopoly on the export of fruit. This single disk operating structure meant that the EB had the sole right to acquire the fruit and sell it in export markets, excluding Australia. In 1995 exports reached their peak with a value of $482 million, but dropped to $400 million in 2000 in response to changing patterns in international demand. In the early 21st century the decision was made to deregulate the New Zealand fruit industry and the EB was disbanded.

One key reason for the dissolution of the EB was its extensive restrictions. These included non-diversification, non-discrimination, and full information disclosure. Many felt the policy restrictions impeded the ability of the EB to compete in the international marketplace. Exporters now have the freedom to operate independently to seek out and take advantage of opportunities. However, the loss of the EB has the significant drawback that the industry has lost an "integrated perspective."

Currently a large proportion of New Zealand's fruit is exported by several exporters. There is concern that this fragmentation among exporters is leading to a weaker selling position. In addition, much of the volume is being shipped at the growers' risk, many exporters acting only as commission marketers and undercutting one another in order to get rid of the fruit, an activity which has only benefited large overseas retailers by enhancing their buying power when dealing with New Zealand exporters.

One of the key challenges that New Zealand faces as a fruit producing nation is its physical distance to key export markets. With a small domestic market growers are heavily reliant on overseas sales as drivers of profitability. The fruit has low value and large volume, providing a ratio that causes freight costs to become a significant concern for New Zealand exporters.

[12] The names of the regions have been changed to preserve anonymity of the participants.

[13] The name of the board has been changed to preserve anonymity of the participants.

The key export markets for New Zealand have remained those in the northern hemisphere markets, predominantly the UK, Asia, Europe, and the United States of America, with New Zealand taking advantage of producing during the northern producers' off-season. One key market has been closed to New Zealand exporters of fruit for a number of years due to government regulations in the exporter market concerning the alleged presence of a disease in the New Zealand crop.

While international fruit production has been increasing at a steady rate the international demand is growing more slowly, resulting in an oversupply situation globally. Furthermore, the advantages of producing during the northern hemisphere's off-season have recently been reduced due to technological improvements and increased competition from other southern hemisphere producers. The most critical improvement in technology has been the ethylene inhibiting technology, called Smart-Fresh, which prolongs the storage of many types of fruits and vegetables. Uptake of this technology has been rapid in Europe and North America and it has enabled the local producers to preserve fruit for a much longer period. The extended storage ability enables growers to continue to service their local markets during what was the traditional off-season for the domestic producers, when southern hemisphere producers have traditionally have taken advantage of the disparities in production.

With the dissolution of the EB, industry members have been required to become much more market-orientated. Specifications of the fruit such as the size, quality and variety, are now driven by the market and dictate what fruit the growers must produce. Some growers have had to consider existing varieties in their orchards as they plan the introduction of new varieties. Precise and specific quality standards have increasingly made manual grading of the fruit infeasible, forcing growers with older packing sheds to make a significant investment in new electronic graders to ensure they can continue packing for export. Several industry-wide programmes have reduced use of pesticides and increased the uptake in the adoption of more environmentally benign processes. Furthermore, growers are required to keep a spray diary, recording the date and amount of each type of spray applied to the crop.

Opportunities abroad have increased with renewed development of the new varieties of the fruit and the possibility that a major export market may once again open its doors to imports from New Zealand. The adoption of modern dwarf rootstock,[14] capable of producing smaller and more efficient trees, is also beneficial. The industry has been through a period of consolidation as many

[14] Like many types of fruit trees, the specific variety is governed by the main 'body' of the tree which is grafted to rootstock appropriate to the conditions the plants will be grown under in specific orchards.

of the small, traditionally family owned, orchards are struggling to survive. The consolidation has resulted in an increase in the average orchard size and also the average size of the pack houses that serve the growers. This indicates that economies of scale, obtainable using large orchards, may be essential to survival in the modern marketplace.

Extant research indicates that a great weakness for these exporters and growers in New Zealand is its geographical isolation, lack of cooperation amongst exporters, the presence of diseases, and the fact that New Zealand is a small competitor in the global industry. They also identify that the most significant threats to New Zealand growers are the potential entry of new competitors, an oversupply of fruit in general, a high New Zealand dollar, high oil prices (impacting on the costs to harvest and transport fruit), and the increasing effectiveness of fruit storage technology that reduces the ability of exporters to supply in the off-season of the northern hemisphere markets.

This lack of cooperation amongst exporters is being examined in the present research, which focuses on the ability of the exporters to export in the face of a sustained period of reduced shipping service in New Zealand. One exporter stated: “New Zealand is simply too far away.” This has forced exporters to form a collaborative venture to ensure that they have timely and guaranteed service out of New Zealand.

There had previously been a group of five exporters cooperating to secure favourable shipping rates. The system worked well and the participants had been satisfied. This had been a case of using bulk buying power to effectively increase the scale of their buying operation with regard to shipping services. In this way the group was able to reduce transportation rates, which had been seen as a major detriment to competitiveness internationally.

Recently the shipping situation changed. The underlying issue is, as one grower put it, “Mother Nature doesn't produce according to a schedule.” The fruit itself cannot be delayed in reaching market; when the fruit is ready it must be dispatched to the target market. Requiring consistent and guaranteed shipping service, exporters and growers cannot change their production to suit available transportation; the transportation must be available to work to their schedule. This is in contrast to a manufacturing firm where stock may simply be held until transportation is available. The fruit industry requires a large amount of capacity at the same time as many other exporters in New Zealand. In order to supply this capacity the shipping lines must arrange for extra vessels to

come to New Zealand. To make this commitment, which means they take on additional risk, the shipping lines require a guarantee of volume and have begun to charge for dead freight.[15]

To guarantee adequate volumes a larger group of exporters was required to negotiate with a shipping line, Shipit,[16] resulting in intensive negotiations. The shipping line had available regular runs from New Zealand. However the capacity available was not going to be adequate at the time of harvest. In order to secure greater capacity another vessel would be required, forming a dedicated service established to support the exporters. As international freight trade increases the scale of the vessels has become larger. This has several complications for countries such as New Zealand. In order to gain more capacity and shipping it is not always possible to add just a fraction of capacity; sometimes an entire vessel would be required for the additional capacity, which may represent a significant capacity that the shipping line must fill to ensure it is cost effective for the vessel to come to New Zealand. In order for the proposed solution to be cost effective the vessel must be filled to, or near to, capacity. This requires a commitment on the part of the group of exporters to provide adequate volume to fill the vessel.

Previously, the EB would have been able to represent the multiple exporters, presenting a unified volume of buying power, which is more difficult to represent in a fractured market without the EB. The EB would also have been better able to effectively 'punish' exporters that would not commit to an arranged schedule. The EB could have cost effectively met market requirements and shipping schedules. With the collaborative effort, on the other hand, it is very difficult to make such arrangements.

The five firms that banded together in order to secure more favourable shipping rates no longer have sufficient volume to negotiate with Shipit. In order to secure commitments for adequate volume they were required to increase the number of parties in their group from five members to ten. This larger group has presented a sizeable enough volume for them to effectively negotiate with the shipping line for the required capacity.

[15] 'Dead freight' is the term used when the exporter, or shipper, has paid for space and does not use it. Alternatively it is the penalty charge leveled when the shipper fails to fulfill the contract to fill the space.

[16] A pseudonym.

5.2. The supply chain

The supply chain is similar to most fruit supply chains. There are multiple phases (as shown in Figure 5.2) with the most significant phases representing the growers, packers, exporters, importers, and supermarkets.

Growers plant and care for orchards and harvest fruits. Trees will not bear fruit in commercial volumes for several seasons, representing a significant lead time; increasing production may take several years. Growers also apply sprays, recording these activities in spray diaries.

Packers sort, pack, and grade fruit and prepare it for export. New technologies mean that other treatments may be applied at this phase in the supply chain, such as Smart Fresh technology, to enhance the product further.

Exporters arrange placement of the fruit in international markets, transportation, and distribution of the fruit, in accordance with their customers.

Importers accept the fruit and arrange final distribution to the retail outlets, often supermarkets.

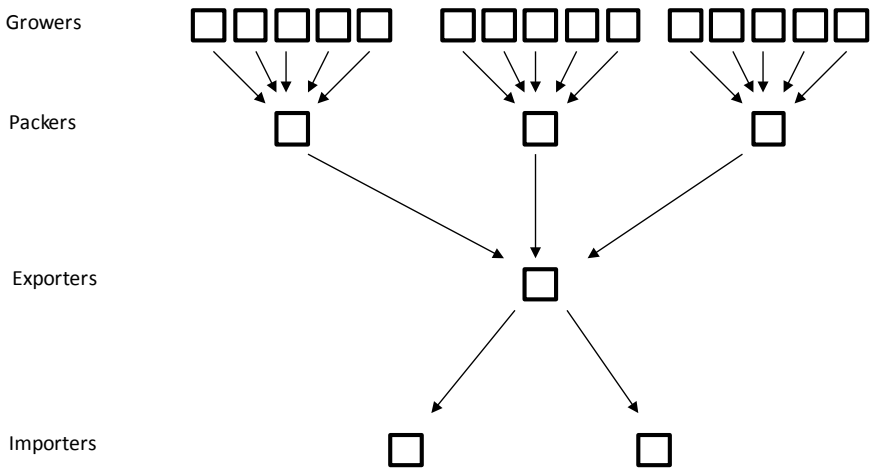

Figure 5.1: The links in the supply chain

Varying numbers of firms operate at each tier. Several growers may supply one packer and several packers may supply one exporter (as illustrated in Figure 5.1). Some firms have greater levels of vertical integration; some growers may have extended their influence down the supply chain by establishing their own pack house facility (Figure 5.2). The packing facility may service only the growers that own it, or it may also operate as a contract facility packing for several smaller growers. The extension of control down a vertical supply chain extends the processes that are controlled and allows greater flexibility and control over the end product and processes applied throughout the chain.

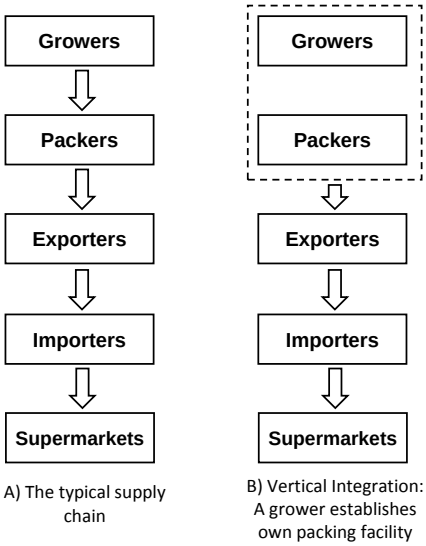

Figure 5.2: Vertical integration within the supply chain

5.3. Challenges

Multiple challenges face this industry, including the weather and uncertainties in supply, the nature of the product, the small volume produced by New Zealand in comparison to the international trade, and the legal and political issues surrounding export.

5.3.1. Weather and uncertainties in supply

Nature plays an important role in the timing of the harvest. The impact of the harvest flows down the supply chain affecting many of its linkages. The industry can be severely impacted by poor weather or climatic forces creating uncertainty in supply through changing the timing of the crop or destroying it.

5.3.1.1. Timing of supply

Swings in the weather of growing regions can cause crops to mature at unanticipated times. The inability to forecast the period when the transportation is required creates difficulties in arranging it in advance. One exporter explained that:

> Mother Nature doesn't grow fruit to [coincide with] the shipping service. We had to try and manage the supply according to the weekly shipping service, rather than when it was best available. We had to meet market requirements with our shipping service rather than necessarily putting it in the market when it best suited the customer.
>
> Donald

The flow on effect from the uncertainty in supply impacts the customer who may have to locate storage for the crop earlier than expected if the fruit arrives early, or face shortages if it is not available.

Another exporter noted that, "this year, for instance, we had probably predicted the timing reasonably accurately but we did have more fruit available in the earlier part of the season than we had anticipated, just due to seasonal factors, so that did create pressures on the shipping" (Manager, Good Fruit Ltd.). In this case there is a mismatch between the requirements for transportation, changed due to an earlier harvest, and the fixed shipping schedule (Figure 5.3).

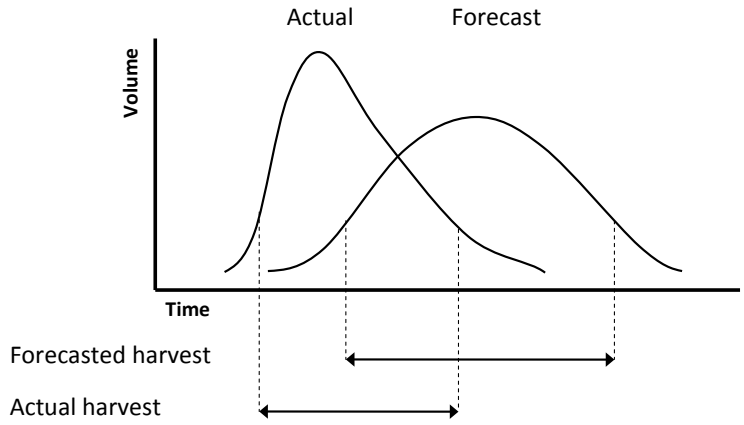

Figure 5.3: Impact of uncertainty associated with the product

The schedule for shipping will be based on a balance between the customer requirements and the availability of the fruit. For the fruit to reach the customer in the best condition it must be transported near to the time of harvest. When transportation is arranged in advance the earlier readiness of the fruit for harvest causes problems as there is subsequently no transportation available for the expected volume of fruit when it is ready, and the previously arranged transportation is no longer required.

The situation can be demonstrated in Figure 5.3 where the actual harvest is earlier than anticipated, meaning that transport is required sooner, in greater volumes, than anticipated.

5.3.1.2. Destruction of the crop

Weather may also impact the harvest when there is a destructive weather pattern that severely damages, or destroys, large portions of the crop. In this case there may be shipping services that have been scheduled and arranged in advance that are no longer required. Under these circumstances the contracts provide a method for dealing with the problem due to the inclusion of the Force Majeure clause. One exporter asserts that:

> Force Majeure does exempt us from that guarantee [of providing volume], because we say "Look, we can't be held responsible if there is a hailstorm throughout New Zealand and destroys the [fruit] crop – there is nothing we can do to stop it." I mean, I would think [Shipit] would want some recompense but from our point of view we wouldn't have any cash because we wouldn't have any fruit to sell.
>
> Export Manager, Delicious Fruit

If the crop were to be destroyed the exporter would also need to work with the importer or buyers to mitigate problems caused by the lack of New Zealand fruit, through contractual clauses. When the exporter deals with long-term customers, a continued loss of supply may be looked upon unfavourably; continued problems may present difficulties in securing favourable long-term arrangements with customers.

5.3.2. Small supply relative to demand

The New Zealand crop, only a small fraction of the total global trade in the fruit market, is further fractured into multiple exporters, each "doing their own thing." Since there are only small volumes of New Zealand fruit on offer there is the potential for importers to be disinterested as they may not be able to secure adequate volumes to service a large chain of supermarkets in a large market. The small volume of supply also restricts the opportunities to secure economies of scale in various stages of the supply chain and reduces the ability of exporters to negotiate with a stronger assurance of a large volume of supply.

5.3.3. Political and legal

As with other types of fruit there exists the possibility for governments to restrict the trade of produce within their borders because of the potential for bugs or viruses to be present in imported fruit. Imported bugs or viruses may adversely impact their domestic production and cause significant damage. Individual organisations within the supply chain have little control over these barriers as they are enacted at a national level.

5.4. An initiative to ensure continued shipping

In order to secure continued shipping services in the volumes required, the members of the supply cluster work together to procure shipping services by guaranteeing a large volume of business. In the present case the members of the cluster work with an independent coordinator, employed to manage the allocation of shipping between the members equitably. The coordinator liaises with the shipping line with regard to the allocation of volume over the season. Exporters still maintain

direct links to the shipping line, communicating destination and loading information and making direct payments for the services. One manager describes the arrangement by explaining that:

> The exporters are representing the growers, and although we still have a direct link to shipping lines, the independent administrator works on a line-basis, for some elements of the business, so payments don't go through him, the administrator [or coordinator], it's all done directly and the shipping line, we will pay them, we will talk with the shipping line and tell them where exactly we want it delivered to. So all that is on a direct relationship with the shipping line and the administrator is there purely to manage the volume allocation.
>
> Export Manager, Delicious Fruit

The operation of this collaboration has three phases: pre-season negotiations, volume allocation during the season, and post-season discussions.

5.4.1. Pre-season negotiations

Before the season begins the exporters open negotiations with the shipping line in order to determine the basic structure of the total volumes that will be made available to the group and also how these volumes will be scheduled (Figure 5.4). Taking the aggregate requirements for the group and factoring in the approximate harvest times for various volumes of fruits and regions allows the creation of a preliminary flow plan which the shipping line and exporters can use to determine shipping requirements and costs.

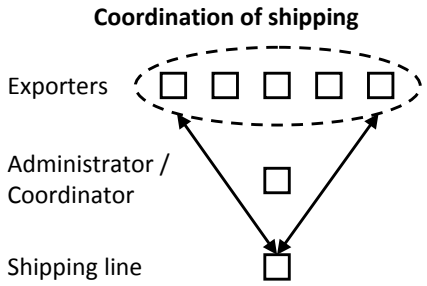

Figure 5.4: Coordination of overall shipping requirements for the group.

5.4.2. Volume allocations during the season

During the season the timing and volumes for the shipping service has been settled and the specifics of the harvest become apparent. At this point, there is on-going communication on a daily basis among the exporters, the coordinator, and the shipping line, to ensure that the volumes that the cluster agreed to supply are filled. The coordinator needs to ensure that the right volumes are being committed by each exporter. When an exporter is in a position to over- or under-supply for that period, the coordinator needs to seek consensus amongst the other members about who is prepared to increase or decrease their share of the volumes in order to meet the obligations for the

entire group. In this manner the coordinator sits between the shipping line and the exporter members of the cluster (Figure 5.5).

The coordinator plays a central role in the volume allocations for each weekly period. Total availability of volume on the Shipit service is communicated to the coordinator who needs to ensure that the exporters are able to meet this allocation; failure to meet the allocated volume will incur penalties. To understand the availability of fruit the coordinator must contact each exporter and piece together a picture of what is available in the cluster. The volume committed each period by the cluster must match that offered by the shipping line.

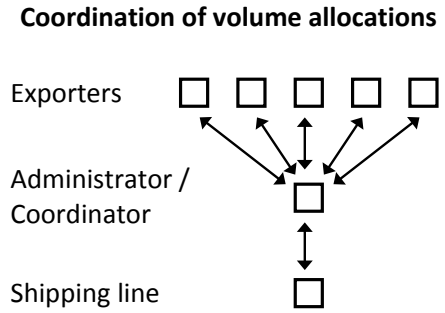

Figure 5.5: The central role of the administrator or coordinator in coordinating the volume allocations

The coordinator is an independent force when coordinating the volume. Members do not have past history with the coordinator nor do they have any rivalry or competitive edge to gain through their interactions with the coordinator. Anonymity of requests by members of the cluster can be preserved through use of the coordinator, allowing past history between specific members to be counteracted as it becomes less relevant. The coordinator works from a neutral position, critical in gaining input from the various members to ensure that the volumes committed by the supply cluster balance with the capacity offered by Shipit. Working under the auspices of this neutral position the coordinator is effective in ensuring that the cluster meets supply requirements. One manager explained that:

> If we are short of three containers [. . .] we would like to think that [another member of the cluster] might have three containers of fruit that they would like to load. So rather than us running around asking everyone, "Hey, would you have three containers [that we can] use?" The administrator [or coordinator] undertakes that role. And the converse, if we have met our volumes and we have loaded our ten containers but we would like to add another four, we ask the administrator "Hey, can you go out and find if anyone is short by four containers, or are there another four containers available with [the shipping line]?" Because if we were to go out, as a group, we would all go out ourselves to our competitors, and we tell our competitors that we are going to be short three containers they would say "Haha," and it is all over. Or if we had more fruit, they would say "Nah, we are not giving you any of my spare containers – you are not having any." So there is a bit of anonymity to it, the administrator goes out and knocks [on doors].
>
> Export Manager, Delicious Fruit

When determining the costs of the shipping the cluster is billed for a fixed amount which is then split, pro rata, between the members of the cluster (Figure 5.6) based on their proportion of supply. (A member that contributes twice as much volume pays twice as much.) This system is designed to distribute the costs fairly amongst the members. Finally, the coordinator receives a fixed salary for the services provided.

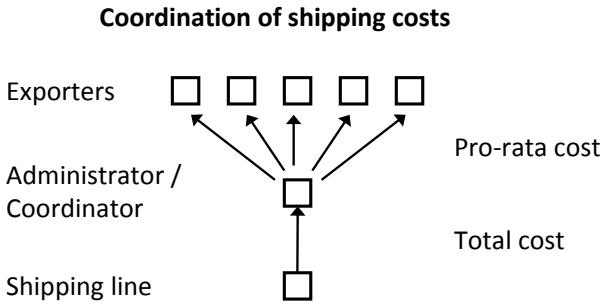

Figure 5.6: Distribution of shipping costs

The system for the splitting of costs appears to be equitable as it is based on the volume supplied; however, it fails to take into account the timing requirements of individual members who may have an urgent need for extra capacity or may not have any volume to contribute, despite the agreement to contribute a volume that period. There is little incentive for individual members to agree to provide extra volume in order to help the cluster meet the agreed volumes. In contrast, an organisation such as Zespri (in the kiwifruit industry) provides bonuses if their suppliers are able to supply extra volume in a tight timeframe in order to top up the volumes for a shipment to better meet customer requirements.

5.4.3. Drivers of the cluster

The ultimate and most important driver of the collaboration was to ensure continued shipping service in New Zealand on a schedule that would benefit the members. One export manager noted that:

> We are trying to ensure that we ensure that we have service in New Zealand, really. Our number one goal is to ensure that the shipping lines actually want to come to New Zealand. If we all go individually and we offer little volumes, it doesn't [. . .] provide [. . .] a confirmed incentive for [a shipping line] to ship reefer containers down to New Zealand.
>
> Export Manager, Delicious Fruit

A smaller group of exporters had previously collaborated in order to secure and negotiate better shipping rates. Recently the group was unable to provide guarantees of adequate volume in response to changes in the shipping industry; this was motivation for them to expand in order guarantee adequate volume to interest the shipping line.

There is a huge volume of low-value products, or commodity products, exported from New Zealand. The fruit industry not only needs to ship the fruit during the peak New Zealand shipping season but the significant volumes of capacity required also represent a significant contribution to the peak in shipping requirements from New Zealand. Meanwhile, too few containers flow into New Zealand filled with products; more containers leave New Zealand full than arrive full.

Due to the imbalance in the volume of trade with New Zealand, empty reefers and ships need to be brought to New Zealand in order to accommodate the outflow of fruit shipments. By bringing vessels and reefers to New Zealand, the shipping line takes a substantial risk that requires careful management and justification to global managers. Justification is made through securing a guaranteed volume from the exporters.

The principal organiser for the cluster described the need to form the cluster by saying that "[the other exporters] couldn't make it work on their own; we couldn't make it work on our own. So I said, 'Look, guys, you got to come to the party; we have got to come to the party,' so throwing your lot in collectively – which is what we did." All members realised that it would require commitment from the others, as well as from themselves. Only by combining the volumes would they be able to secure a large enough commitment of volume to negotiate with the shipping line.

5.4.4. Features of the cluster

The cluster is formed solely to ensure continued shipping service in the volumes required by the exporters, enabling members to meet customer requirements.

5.4.5. Common transport strategy

Each of the exporters operates and acts independently of the others with regard to individual export strategy, since each exporter interacts with their own customers. The origin and destination for each consignment are agreed upon by the exporter and the shipping line. There are two main markets (the EU and the USA) visited by the shipping line. In each shipping period a proportion of the total volume is allocated to each of these markets. Volumes for each major market must be split between the individual members.

5.4.6. Benefits

Multiple growers in several regions, each growing a different mix of varieties of fruit, create greater variation in the supply pool. Situations where one grower may find that their harvest may be ready earlier than anticipated (as illustrated in Figure 5.3) may be balanced out by another

grower, that is either located in a different region or is growing different varieties, or that finds that their harvest is later than anticipated. The variations in harvests may balance out (Figure 5.7).

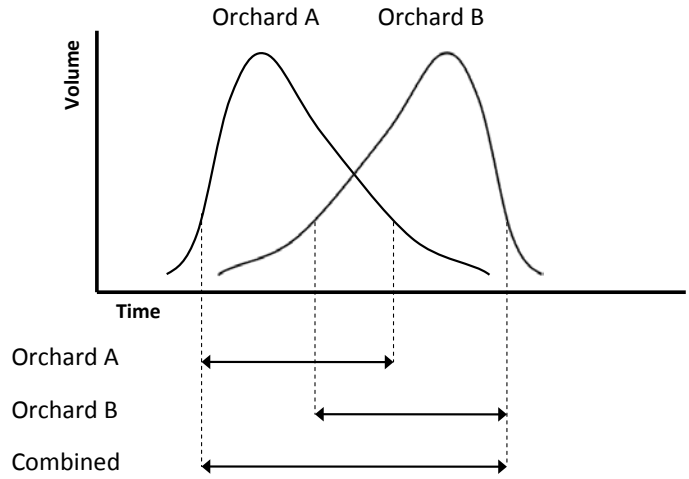

Figure 5.7: Variations balancing when combined in a risk pooling strategy

This is a risk pooling strategy (Simchi-Levi, Kaminsky, & Simchi-Levi, 2003, p. 66) where supply is aggregated over several suppliers, growing different varieties or growing in different locations, and it thus becomes more likely that the supply variations of one orchard will be offset by another. There is greater certainty in the timing for the aggregated national crop than there is for the timing of individual orchards or varieties.

A larger supply cluster will gain more benefit from the risk pooling of the supply as there will be an increasingly average amount of transportation required at any time. Since there will be fewer extreme positions the previously arranged transportation should not fall far from the requirements of at least one exporter.

Aggregation of supply in this manner means that overall transportation will be available to the supply cluster when it is required by exporters, despite the likelihood of Mother Nature supplying to an unexpected schedule. Furthermore, the aggregation should lead to lower levels of waste and lower costs for the supply chain. However, the aggregation of supply works best when the individual supply is independent of each other (Chopra & Meindl, 2007). This assumption of independence may not be valid as there are limited growing regions and closely related varieties. There are few growing regions and within one region the same climatic conditions will impact various orchards simultaneously to reduce independence of the supply of these orchards. Similarly, where there are few closely related varieties grown, there will be less independence in the supply of these few varieties.

5.5. Barriers to effective horizontal relationships

With the industry and the initiative outlined, the challenges and barriers faced when setting up the coordination of shipping requirements are now discussed in detail.

5.5.1. Coopetition and trust

The Manager for Shipit noted that "whilst they were a group they are still very much individuals," each with different requirements and drivers. One member noted that open dialogue, requiring significant trust between members, was a significant barrier, and that this was, "probably just what you expect from a group of competitors doing [. . .] coopetition" (Export Manager, Delicious Fruit). The issue is exacerbated by the number of members in the group and the historic divisions and history that divide them. This is of great concern; if a member did not meet their obligations to the group then the remaining members would be under pressure to find a solution to ensure that they meet volume obligations. One manager noted that they were "always worried that people commit then pull out. There are also worries that people put in an X volume of product that they are going to contribute and then do less, so the group can fall over because one person left it short" (Export Manager, Delicious Fruit). If such a situation were to occur once, it might be possible for the members to brush it off. However, if the situation was recurrent it may endanger the long-term success of the group. It would increase the costs of shipping (due to the presence of penalties for not meeting volume requirements), making other solutions more attractive for members as a result. The Manager for Shipit pointed out that they had, "negotiated a volume for the group, we haven't negotiated a volume per member. So I think [the group of exporters] were … a little bit unsure about how [allocations within the group] would work out." The structure requires negotiation within the cluster of exporters to ensure that the flows of product are well coordinated with the volume offered by Shipit.

The dynamic nature of the industry also caused some headaches for members. One Export Manager (Delicious Fruit) noted that "it may be that you wanted 100 containers for the year, and due to the crop and production you have actually got 120 containers for the year and how am I going to ship that extra 20 containers" within the constrictions of the group's volume allocations from Shipit. The uncertainties meant that some members found it necessary to investigate other shipping services part way through the season to supplement their share of the capacity, negotiated through the cluster with Shipit.

Such actions exacerbated the differences between members on the reliance on the volume that had been negotiated on behalf of the group. Some members had not committed all of their shipping

requirements to the group, retaining the opportunity to secure potentially better rates elsewhere. This led to some members wondering:

> just how was the group going to perform together. We have [X] different companies, all essentially competitors in the marketplace overseas, all working together in New Zealand. With somewhat different objectives. Some people are committing all of their export volume; some people are committing 30% of their export volumes.
>
> Export Manager, Delicious Fruit

This was concerning to the Manager as he further noted that some:

> people actually deliver less than they committed to, or go and start to go and do some of their own shipping negotiations with . . . other shipping lines [the group] haven't been negotiating with, on an independent basis [. . .] Some of the members may go and talk to a much smaller shipping line to get a cheaper rate to bring down their total average. And then you will find that they send more of their fruit that way, and getting less to the main shipping group.
>
> Export Manager, Delicious Fruit

Splitting obligations, and the opportunism of seeking better rates elsewhere, can cause the group difficulties in meeting the overall volume obligations if individual members renege on their commitments to the cluster to secure better rates elsewhere. Other reasons for such a splitting of obligations are to ensure ongoing relations with other shipping lines (where the exporter needs capacity at other times during the year for other crops) and to ensure that the exporter "didn't have all our eggs in one basket." For the larger exporters, splitting requirements this way provided a "floating volume" outside the cluster, so that the exporter would be more likely to be able to meet their individual requirements and not incur any dead freight fees.

In order to ensure the rates received by the group were adequate, one manager noted that "as a group [we] have gone back to [Shipit] to have some rates revisited, which they have done" (Manager, Good Fruit Ltd.). Working in this way the group can ensure that the activities engaged in by the group become more attractive to the members, giving more reason for the group to work together effectively.

There is a long-term focus amongst the members and they "want this thing to work for the long-term, not just a one-off [. . .] that is probably the main concern" (Export Manager, Delicious Fruit). The presence of some members that may have commitments to ship elsewhere, for better rates can pressure individual members to act in a manner detrimental to the group as a whole. The manager went on to say that "we are in it for the long term and this is year one – and half way through if you realise that some people are not committing or playing the game, then [. . .] we will

work it out then" (Export Manager, Delicious Fruit). The implication is that group pressure will be brought to bear on members that are not upholding their end of the bargain.

Setting up the group also proved challenging as there was no past history to draw upon to show that the approach had been successful. Potential members investigated and realised potential pitfalls to the approach. One Manager noted that:

> It was certainly an individual liability that came to a collective and if we couldn't put it together collectively it didn't start individually. So it was a bit of a chicken-and-the-egg and which one came first – not sure – but everyone in the end had a financial reason to get on and do it.
>
> Donald

The 'chicken and egg' situation was also clear to another member who commented early in the first season that they still had to "go through the season and see if other folk are having issues with finding shipping space. At this stage it is a bit of a leap of faith" (Manager, Good Fruit Ltd.).

5.5.2. Personalities

There is history among some of the exporters, who may have split from, or been associated with, other members in the past. While there is an awareness that members would need to work beyond these issues in order to make the group successful, there appeared to be some difficulty in letting go of personal differences. One manager noted that he:

> didn't want to work with [some of the other members]. But at the end of the day we didn't have enough critical mass to start the service. So we had to get the tonnage in there to make it work. Two or three of them I don't particularly want to help them out. But at the end of the day [. . .] I didn't have a shipping service for my own business, let alone the others, if we didn't bring in enough to make it work
>
> Donald

The requirement for each member to ensure that they are able to secure shipping services creates pressure for them to put aside personal differences. Some of this history, contributing to personal differences, is a result of the closeness of members and the size of the industry in New Zealand. As one manager put it, "New Zealand is a small place, and only dealing with half a dozen shipping lines out of New Zealand so you generally know when people are out there, trying to conduct their own deals. I mean . . . time will tell" (Export Manager, Delicious Fruit).

5.5.3. Information sharing

The difficulty in sharing information amongst the members of the group presents a significant barrier to effective operation. Distrust between some members, leading to some preferring not to

help out others in the industry through collaboration, makes it difficult to ensure the achievement of open dialogue. Dislike for other members led to problems surrounding "ensuring open dialogue. I am not saying that anyone is **not** open but it is one of the challenges" (Export Manager, Delicious Fruit) identified by members. With the number involved in the group some noted the inherent difficulty of ensuring that as many as possible attend meetings relating to the group activities.

As the season progressed more information came to light to help the managers make decisions. One manager noted:

> A lot of what was promised at the start by [Shipit] hasn't really eventuated. For instance, we were told we would have [X] number of container spaces on the boat and when it has come down to the crunch that number has been greatly reduced. So it is those sorts of things . . . you know, so we have got to find a better way.
>
> Manager, Delicious Fruit

Such information has the potential to impact significantly on members of the cluster and their behaviours.

5.5.4. Power inequalities

With the cluster comprised of firms of different sizes and a core group that has worked together previously in a similar manner, there is the potential for power asymmetry to exist in the group. The presence, let alone any potential abuse, of power asymmetry and the dislike between some members, means that there is greater pressure for the group to separate. One manager believed that "there was just dirty backhand dealings between the members of the group and [Shipit]" which had adversely impacted on his ability to secure the capacity of shipping that was required.

5.5.5. Planning

In order to ensure the group worked effectively together, and with Shipit, there needed to be a higher degree of planning by the individual members. In some cases they had not previously planned and organised their information to this extent. Shipit introduced the requirement for extensive pre-season planning.

From the perspective of the group if there was a failure to meet volume obligations there would be repercussions in terms of penalties, pushing up the overall costs for the group. These penalties are "built around in terms of [. . .] both sides of the fence, and penalties for non-performance" (Manager, Shipit). Even the shipping line could potentially be penalised, which they were acutely aware of. The Manager at Shipit noted that "the penalties on ***us*** not delivering also caused us to be

quite vigilant." Careful consideration helped to generate a course of action to reduce the possibilities of penalties. The Manager explains:

> We [at Shipit] took a two-prong approach to it by saying [. . .] we cannot be caught with a penalty for non-performance. So we need to stay on top of our own game. To do that we need to stay on top with [the members of the cluster]. Because you don't want to get to a stage where if something went wrong we didn't have a trail saying, "We told you that this was an issue and you haven't done anything," or, "We told you it was an issue and you have mitigated it to this level." We could say to the industry that even with the penalty in there, if they came up short and gave us plenty of notice the week before that then we can get the space with another commodity.
>
> Manager, Shipit

The planning and communication required to achieve this objective also forces careful consideration and frequent ongoing communication both within the cluster and between the cluster and the shipping line.

5.5.6. Different drivers

A significant issue that increased the forces of dissolution of the cluster was the presence of different drivers and pressures motivating the behaviours of individual members. At times these drivers would pressure the members to act in ways that damaged the unity of the cluster. The Manager from Shipit commented that, "at the end of the day [. . .] you are dealing with a bunch of individuals who have individual drivers. Getting them cohesively into a group can sometimes be a bit challenging."

These different drivers and motivations caused some members to act in their own interests at times. One member noted that "there were a couple [of the members] that were off doing their own little thing as well, but you always have that. A smaller group is more manageable than a large group. It's a bit like herding cats" (Export Manager, Delicious Fruit).

Within the group there was a distinct variation in individual requirements, caused by the location of members in different regions and the different varieties that were grown. The Manager at Shipit commented that:

> It would probably be fair to say that something like [Variety1] which comes on early and has specific carriage requirements, and have a fixed market, as opposed to the [Variety2] which come on at the same time. With any product like this it is a race to the market; first one to the market gets the best prices. So if you are shipping [Variety1] which are only going to run for a short time, vs [Variety2] which run for longer, but if you are not doing [Variety1] you want your [Variety2] to go anyway, because you can get the best price.
>
> Manager, Shipit

Despite the fact that there were different drivers for all members, they needed one another and relied on each other for the guarantee of volume. The Manager from Shipit noted:

> It is very true that [the shipping line] have come down here to make a couple of dollars. But we need [the exporters]; we need the industry to get the containers moving in the same way that they need us to get their fruit to market. Because without us [. . .] it has got no way of getting out of the country. So it is very much a symbiotic relationship.
>
> Manager, Shipit

This symbiosis represents a pressure on each party to ensure that the working relationship is one that encourages outcomes mutually beneficial to all members and stakeholders.

5.6. Bridging the barriers

In order to bridge the barriers to working together there were several key components of the structure that was implemented. One manager noted that:

> In one way this has been forced upon us because the shipping lines have asked everyone to [. . .] formally guarantee a volume, which has forced every company in the group to formally guarantee a volume [. . . .] The second part is that we have put in an administrator, an independent administrator, who is on a paid basis [. . .]who will be administering the group, getting the volumes, sorting it out, allocating containers to people, and in that respect that covers a couple of concerns. And [. . .] regular formal meetings to make sure everyone in the group knows it is working so everyone is understanding where the current business is at.
>
> Export Manager, Delicious Fruit

The group structure that was adopted, with an independent coordinator, overcame some of the existing barriers.

5.6.1. Coopetition – trust

One of the biggest barriers to coopetition is the trust, or lack of trust, that existed between members. A major method of overcoming this issue was the use of the coordinator for the group. Of the coordinator one manager said that:

> We still have to negotiate with the shipping lines to get containers and all that. The administrator solely ensuring that as a group we are meeting our commitment to Shipit], so if we have committed, as a group, 100 containers for the week, and every party has its own little commitment to make up that 100 containers, then the administrator is ensuring that everyone is fulfilling that delivery.
>
> Export Manager, Delicious Fruit

This specific and well defined role as a neutral coordinator was important as:

> if everyone is short, is there anyone else who can pick up that volume so the group delivers its one hundred containers to [Shipit]. So really, it helps so if we are short of three containers [. . .] we

> would like to think that someone else might have three containers of fruit that they would like to load. So rather than us running around asking everyone, "Hey, would you like to have three containers to use?" The administrator undertakes that role. And the converse, if we have met our volumes and we have loaded our ten containers but we would like to add another four, we ask the administrator "Hey, can you go out and find if anyone is short by four containers, or are there another four containers available with [Shipit]?"
>
> Export Manager, Delicious Fruit

While the individual members are able to perform these tasks themselves there are only a certain number of hours in the day; in the peak of the season the members of the cluster become extremely busy. Furthermore, there are potential issues surrounding the contacting of other members of the group. One manager explained that there is a fear of exposure to the group and that admitting a shortcoming would earn scorn; anonymity, through the use of the coordinator, removed this problem and many members found it reassuring. The presence of the coordinator means that the issue of distrust between individual members can be mediated by the positive influence of a neutral outsider.

While some firms worked easily with others at an operational level, there were others that struggled. There were a handful of members "who worked together very grudgingly," with strong feelings between some individuals.

5.6.2. Coopetition – planning

The planning that has gone into the structure of the group, relating to how the individuals fit together in the division of the volume collectively acquired, and how the costs are split, have been a strength of the group. An example is the way in which:

> every member of the exporters group is [. . .] committing to pay a flat fee per container shipped. Which covers pro-rata, so if you are only doing 50 containers you do not pay as much as someone doing 500, which is fair enough. So we all pay [X] dollars per container to the administrator.
>
> Export Manager, Delicious Fruit

Simple strategies that are accepted as fair by all members remove issues that may be disputed, allowing situations to be resolved fairly and simply. The use of the coordinator role was also perceived to be advantageous for the group as the "coordinator [. . .] was there to literally coordinate whatever deal had been negotiated" (Manager, Good Fruit Ltd.).

On an individual basis there is a great deal of planning involved to ensure that the volume requirements allocated by the group match the requirements of the individual member. One member, who also allocates some of their volume to other shipping lines, describes that they manage their volume allocations:

> by looking at our customer. And some customers have the ability to receive a quantity of fruit in one hit, where they will put that fruit into cold storage and move it as required. So, for those people we would use the slower boat but we would put more fruit on that boat, so that they receive fruit in lots of say, five or ten containers at a time. And then some of our other customers, and this is where we would use the shipping group, [Shipit], scenario. Because we know that they are a reliable service, where we would say, "Well, let's ship to a program," so it is two containers shipped in week ten, for arrival in week fifteen. Three containers shipped in week eleven for arrival in week sixteen. So it is very measured and very programmed. So it comes down to the customer and their ability to either receive fruit either as a big lump sum or whether to receive it as a programmed quantity
>
> Manager, Good Fruit Ltd.

This shows a strong emphasis on the requirements of specific customers. Different customer requirements may result in a firm enhancing their flexibility by allocating volume to other shipping lines that have offered a different set of speeds or volumes that better enable them to meet their customer requirements.

The implementation of strict planning protocols for the group and Shipit appears to have been successful. The Manager for Shipit said that "this is the first year that we have taken [the planning] to this level of formality and I think that we are looking to keep that."

While there is general acceptance that the planning has been successful, the Manager at Shipit also noted that "there are certain things that we have learned and that we will discuss with the group upfront, insofar as sometimes individual needs do not match the group needs which do not match our times [for the shipping schedule]." The ability to continue to evaluate the success of the planning approach indicates a willingness to work to overcome the barriers. The issues surrounding the allocation of space within the group was also raised as a potential issue and the Manager commented that they had to:

> get some discussion around who gets the space when the space is available and that is around different varieties [that] come on at different times. So if you are big in one variety and not big on the other variety, so if you're big in an early variety, should you get more space early on? But sometimes it is not.
>
> Manager, Shipit

The complexities due to the nature of the product, the varieties grown within the group, and the differences in climate between growing regions, have all impacted on the difficulties in forecasting exact volumes and schedules required by the group. This was touched upon by the Manager at Shipit, who commented that:

> there were sometimes those sorts of discussions [surrounding members needing to ship different varieties] which reverberated around a little bit. But at the end of the day we had set up a programme

> which said "This is what we said we would commit. This is how you guys said you wanted to fill up." And that is on the table for 2010.
>
> Manager, Shipit

5.6.3. Early success

The members of the group have completed an initial year working together and coordinating their total volumes for shipping. There is general acceptance that the effort has been successful, although several pointed out areas that they believe needed more work in order to ensure a smoother and fairer operation. This early success has provided enough comfort and confidence for the group to move forward and improve on the success. Had they not operated successfully in the first year it is unlikely that there would be interest in continuing the operation, which would have caused dissolution of the group. A successful first year means that the cluster has got "a few runs on the board" (Manager, Shipit), which will help them to believe in what they are doing and provide confidence going forward. The success increases the pressure to cooperate, which counterbalances the pressures to compete and dissolve the cluster. This early success is a key driver of the potential long-term success of the group. The Manager for Shipit also pointed out that "the fact that the industry **did** go through this process, and get to where it was, that deserves a bit of respect as well" (Manager, Shipit).

5.7. Key lessons from the cluster

The outcome and benefit for each member will be individualised by the context in which they are operating. The Manager at Shipit noted that "by and large the outcome is determined by how much volume they have got and what is their shipping period" as this will impact heavily upon the value that they can extract from their membership in the cluster that helps arrange the shipping.

Despite the general satisfaction amongst the members it was pointed out that the "experience has been that other shipping lines actually see opportunities. For instance, we have one line that is looking at expanding its services in the knowledge that [Shipit] is falling over a little bit" (Manager, Good Fruit Ltd). The presence of alternative providers of shipping service may increase the alternatives for individual exporters. More favourable alternatives (to working in the cluster to arrange shipping services) will increase competitive pressure to dissolve the cluster, making it more difficult for some members of the group to continue working together closely.

5.8. HortCom operations in the future

At the time of writing HortCom is in its second year of operation. The structure has changed to reflect the concerns of members, who wanted to reduce freight costs by US $1000 per container. The desire to reduce this waste led to the coordinator role being adopted by Shipit (who already had very frequent communication with members of the cluster during the peak of the season), and the role of a broker to help reduce rates, being introduced. These changes have gone a long way towards reducing the costs by the desired amounts, creating greater benefits that can be passed through the supply chain to the growers.

Two of the exporters have partially split from the group as they have an extensive variety of fruit and vegetables requiring shipping services and thus greater flexibility. These two exporters maintain links with the rest of the HortCom and have guaranteed space with Shipit, but need to leverage their volumes of other horticultural products. By maintaining relationships with other shipping lines the two exporters find it easier to secure shipping services for their other exports at other times during the year.

5.9. Conclusions

After a single season operating as a cluster the members appear to have been successful in their coordination of the group shipping volumes, although there are still several on-going issues that are in the process of being sorted out as they progress into future seasons. The structure, employing an independent coordinator, allows the cluster to ensure that their obligations to provide capacity have been met. The use of the coordinator has assisted in overcoming many of the barriers faced by the cluster while engaging in effective horizontal coordination.

Chapter 6. WineCom – Cooperation in the Wine Industry

In this cluster over a dozen participants within a defined geographic region are involved in the viticulture industry; the participants are vineyard owners and wine makers.

6.1. Introduction

New Zealand earned NZ $945m in export income from the export of wines in the year ending 31st March 2009, with the USA, UK, and Australia accounting for 85% of the country's wine export volumes (MAF, 2009, p. 55). The focus of this case study is a single wine producing region in New Zealand, operating within a well defined geographic region. Such a regional focus in the wine industry is not uncommon. Quality wines are generally defined by a combination of botanical factors such as the grape varieties used; wine craft, the styles and skills of the viticulturalists; and the geographic origin of the grapes, allowing for climatic factors and geographic influences (Hayward & Lewis, 2008). The geographic origin is a peculiarity that is usually unique to specific wines and frequently becomes a significant asset to the region (Patchell, 2008).

In the wine literature, where it is extensively discussed, this factor is known as 'terroir', to which there are two accepted aspects: the regionality that allows co-learning, shared knowledge, place-based conventions, informal networks to inform production, and many interdependencies (Guthey, 2008; Lewis, Moran, Perrier-Cornet, & Barker, 2002); and the biological and physical processes such as the marketing and production practices and concomitant identity building (Vaudour, 2002). Within the one region or territory the "winegrowers not only compete with winegrowers in other regions, but must differentiate between themselves" (Patchell, 2008, p. 2364), in a form of coopetition. While they cooperate with the other winegrowers in the region to promote their region, they must also compete with them, create a distinct brand, and carve out a niche to improve their competitive position.

The present case will focus on the supply of grapes within a specific geographic region[17] used to create wine that is distributed throughout New Zealand and the world. The wider supply chain, consisting of suppliers to the growers of grapes, such as those providing professional services, fertiliser, or plant stock from nurseries, will not be investigated in detail.

[17] The name of the region is not revealed in order to preserve anonymity of participants. Names of companies or participants have been altered to further preserve anonymity.

6.2. The supply chain

Each wine crafting region has areas of land identified as ideal for viticulture and where the vines are planted. Vines are carefully crafted from rootstock, which may have different tolerances or capabilities depending on the land to be planted, and the main body of the vine itself, giving different varieties of grapes that will be used in the creation of wines. Many of the larger suppliers of vines work closely with their customers to ensure that the best type of rootstock is selected for a specific region.

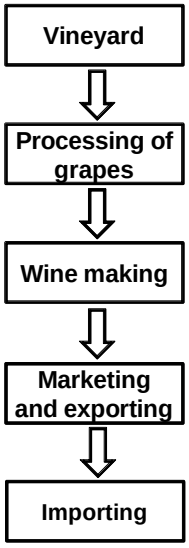

Figure 6.1: The supply chain in the viticulture industry

The major stages of the supply chain that are focused on in this case are the growing and harvesting of grapes, the processing of grapes, the winemaking process, the marketing and export, and the importing of the wine (Figure 6.1).

6.2.1. The growing of grapes

Each vineyard owner understands approximately when the grapes will be matured and ready for commercial harvest. The picking of the grapes must occur at a time that is ideal; the characteristics of the desired wine will largely determine when the grapes should be harvested. The weather can be a source of uncertainty at this point in the process, as the Manager of AB Wines noted that in one year the “weather didn’t actually come in like what they thought,” resulting in early harvest. The Manager further notes that the buyer of the grapes has “got to make the call and it comes down to what the weather says” and it is important to note whether “the weather is going to pack in [because] we don’t want grapes which are all split and rotted and things like that, so it is better to get them off a week earlier” rather than risk damage to the grapes.

These uncertainties mean that the winemaker, or the buyer of the grapes, must have close contact with the vineyard owners. Regular testing must be undertaken to ensure that the grapes are harvested at the optimum time so that they can be made into wine with desired characteristics. As one vineyard owner commented, "it is very difficult to make a silk purse out of a sow's ear. So [. . .] if the grapes are pretty good then there is no reason why the wine at the other end shouldn't be good" (Golden Grape Wines). Parcels of grapes are available for sale so "it is quite easy to get grapes; it's hard to get a long-term relationship" (Manager, AB Wines) which is the type of relationship that many in the industry seek to develop.

6.2.2. Harvesting of grapes

Harvesting of the grapes is an intensive task that requires careful consideration. The two primary methods for harvesting are manual (traditional) methods and modern methods that involve greater levels of mechanisation. In each case there is an amount of harvesting resource required, whether labour or machine, which must be controlled at the ideal time for harvest. Problems can occur, as generally many of the vineyards within one region will require the services of the same resources at the same, or almost the same, time. In terms of labour-based harvesting practices this may not be a major consideration, as extra labour can be brought in and brought up to speed rapidly. In terms of mechanical harvesting practices this can sometimes prove problematic as the equipment required has a high capital cost. Many smaller vineyards are not able to utilise this equipment effectively because of their relatively small size and the volumes they need to process; the cost of owning and controlling the machinery does not make financial sense. Meanwhile the opportunity to hire or rent such equipment is reduced as other vineyards require the same equipment at roughly the same time as their own grapes need to be harvested.

Purists claim that it is better for the grapes and easier on the vine when labour is used to carefully pick them, and any damaged grapes can more easily be removed in the ensuing stages. On the other hand, many pragmatists point out that it is certainly quicker to use mechanical aid to harvest to grapes, ensuring that they can be picked at their optimum. Machines, after all, work constantly and tirelessly (Hawkesby, 2006).

Hand pickers take small bins which they fill with grapes before emptying them into larger containers for transport to the winery. The larger containers will be labelled to record both the winery and the variety of grape, allowing traceability throughout the processes. The grapes from different vineyards and varieties must be kept separate in the process.

If the grapes need to be stored or moved as individual pieces of fruit this is known as 'skin contact'.[18] Since white wines are extremely sensitive to skin contact time, when the grapes are harvested there is incredible pressure to have them juiced as soon as possible. If the juicing facility to be used is situated a long way from the vineyard the grapes may have to endure many hours being transported, hours which increase the skin contact.

6.2.3. Processing and bottling

The key steps in the processing involve taking the grapes, cleaning them, juicing them, and then fermenting this juice into a wine, before bottling the wine.

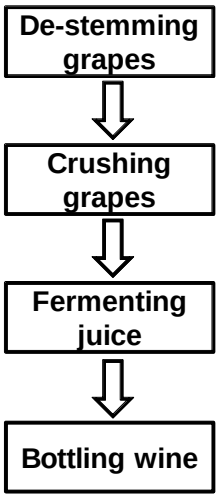

Figure 6.2: The processes involved in making the wine from grapes

The fermentation process, where the juice from the grapes has yeasts added to create the wine, requires the purest juice possible in order to enhance the fermentation. This means that any insects, twigs, leaves, or any other foreign objects must be removed before the juicing commences. This process is known as 'de-stemming' and it culminates in what is, hopefully, a bunch of perfect grapes. The by-product of the de-stemming process is a large volume of small pieces of vine, leaves, and other organic material that is usually mulched and returned to the vineyards as mulch. This process helps to return moisture and nutrients to the soils in a sustainable cycle.

When the winemaker has secured a complete load of de-stemmed grapes they must be crushed to extract the juice. In modern processes the same machine that de-stems grapes frequently crushes the grapes as well. This crushing process releases the pulp, known as the 'must', which is usually

[18] Skin contact is a term used to describe the period of time during which the grapes are in contact with their skins. With some varieties of wines this is deemed to have a negative impact on the quality of the wines.

stored in stainless steel fermentation tanks. Traditionally, this crushing process was completed by 'foot stomping'; many purists still prefer a manual process to help extract the juice, particularly when it is required to separate the juice from the skins. This is an area where purists feel the hand plunging techniques still have advantages. Smaller winemakers may also be compelled to employ manual techniques as the smaller volumes they process make it infeasible to employ greater levels of mechanisation. The opportunity to rent or hire equipment for de-stemming or juicing is complicated by, again, the fact that many competitors in the region also need the equipment at the same time.

In some cases there is a 'cold-soak' phase where the grapes are first chilled for up to five days before they are crushed, or the must is chilled after crushing. This is done to enhance the colours and fruit flavours of the grapes.

White wine grapes must be pressed as soon after harvest as is practicable. They should ideally have no, or limited, skin contact to maximise the opportunity to create a good wine. However, when making red wines the skins are incorporated into the wine itself, reducing the need to separate the juice from the skins. When the must is stored in a fermentation tank these skins will rise and must be kept moist. At this point a yeast culture may be added, after removal of leftover skins, or the juice may be transported to a winemaker elsewhere.

When the juice needs to be transported there should be very little air present. Chemical reactions mean that the wine will become oxidised by the oxygen present in air and turn into vinegar. To prevent the oxidation a minimum amount of ullage[19] is required. If the ullage increases the wine may need to be topped up to reduce potential exposure to air. Natural evaporation from barrels, which increases ullage, is a concern and must be counteracted. During the crushing, transport, and storage processes, the wine may be transferred from tanks to barrels and back again several times.

Fermentation will usually occur in large stainless steel vats. Traditionally fermentation may have occurred in wooden barrels, which have much less capacity than modern stainless steel vats. The traditional methods have the advantage that the wine takes on some of the flavour of the barrel in which that it is stored. This helps to impart subtle flavours from the oak barrels used. In modern winemaking the bulk of the wine may be held in large vats but nearer the end of fermentation a portion of the wine may be 'racked off', or transferred, to oak barrels in order to capture some of the flavours and aromas associated with traditionally prepared wines. The content of these barrels may then be reblended with other wine batches at a later stage. The time that wine spends in a

[19] Ullage is the amount of airspace above the wine when it is being stored.

barrel is known as ‘barrel aging’ and is necessary to help impart flavour from the wood. Most red wines, and some white wines, are matured in oak barrels.

The barrels themselves may be kept for three or four vintages before they are removed from use. After each vintage the barrel must be carefully cleaned. When it is decided that the barrel is no longer fit for use, or that the probability that it may not be fit for use is too high, it tends to be discarded. Some barrels are turned into planters for home-owners, while others may be sold to enterprising owners of small vineyards, who are prepared to take the barrels at a low cost while realising that they may jeopardise their wines prepared in the barrel.

After being stored in a stainless steel tank or a barrel (or both) for months the wine will be ready to be bottled and packaged for sale.

6.2.4. Distribution and retail

There are various retail channels for wine. Much of the retail and distribution channel strategy for an individual winemaker will be determined by whether the brand aims for an international or domestic market. Organisations that desire a niche in the domestic market will seek to use a wholesaler, for whom the winemaker will promote their brand at various venues around the country while having the wholesaler fulfil orders. Larger vineyards and winemakers will frequently be associated with a multi-national organisation that will coordinate the supply from New Zealand and place it appropriately in the international markets. If the winemaker wishes to export they will need to seek an importer in a key international market who will be able to store the wine and despatch it as and when required.

6.2.5. Vertical integration

Many larger companies have been gradually shifting towards greater levels of vertical integration upstream. The reliance on contract growers is reducing as the larger companies have been slowly increasing the hectares of vineyards that they plant.

It is possible for larger winemakers to rely on contract growing by vineyards for the grapes, an approach that has traditionally been taken in many parts of New Zealand until recently. Contract growing refers to an arrangement where the vineyards sign a contract specifying requirements relating to different variables, such as quantity, quality, varieties, prices, and the time of delivery. Frequently the buying company will also provide the contract grower with other assistance, such as advice on new technologies or knowledge (Gwynne, 2006).

Smaller vineyards tend to be either contract growers or they tend to virtualisation. This is not always the case, however, as there are examples of small vineyard owners who are able to maintain strict controls on costs while creating their own wines that have been acknowledged in competitions as being of high quality.

6.2.6. Virtualisation of the industry

What has been presented is a traditional conception of the viticulture supply chain. Modern advances in technology and changing business practices have also led to a trend towards 'virtualisation' of a brand. Previously, the different processes had frequently been performed by a single, vertically integrated, firm in the supply chain. With a virtualised brand some of these processes are performed by a contract facility. An example is provided by several vineyard owners and operators in the region that own vineyards of moderate size. The output from the vineyard is harvested and delivered to a processing facility that performs the tasks of juicing and winemaking for the vineyard owner. The vineyard owner retains ownership of the products produced and is using the contract operator to gain 'virtual' control of the processes in the juicing and winemaking phases of production. Many of these vineyard owners focus on delivering a low-cost product as they have larger volumes that they need to move. There is a growing acceptance of this process with more contract juicing and winemaking facilities being established around New Zealand.

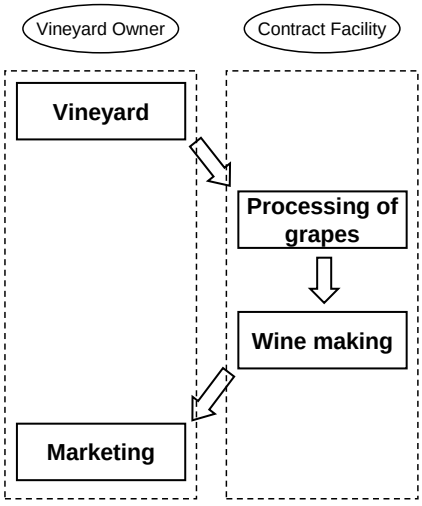

Figure 6.3: Virtualisation in winemaking

Thus the vineyard owner has effectively 'outsourced' the processing and winemaking steps of the process (see Figure 6.3). These are the phases of production that are the most capital intensive. Many of these vineyard owners will take a very active interest and work closely with the designated winemaker to ensure that the final product meets their expectations. There is a trend for

owners of these virtual labels to have a full-time job in another industry, allowing them to more effectively split their time between occupations.

Virtualisation of the supply chain can allow vineyard owners greater control over aspects of the business which are perceived to generate higher 'rents' or returns. Working in this manner the vineyard owner attempts to extract more value from the brand. Virtualisation demonstrates reduced vertical integration in the chain compared to the level of integration that many larger, traditional, viticulture companies exhibit (Gwynne, 2006).

6.3. Challenges

In terms of supply chain management there are several important challenges facing firms in the viticulture region under consideration. These involve the nature of the product, political and legal issues associated with export, the capital requirements and cost structures associated with the industry, and branding and marketing challenges.

6.3.1. Nature of the product and industry

As with all fruit products, it takes time to bring production from a vineyard up to a desired level because of the number of years it takes for a newly planted vine to produce fruit in a commercially viable volume. The Manager of Juicing Co. explained that:

> grapes have got a long lead-in period in that the vines planted in the spring of one year may have a light crop 18 months later with a full crop not until 30 months later. Therefore by keeping a tab on new plantings we have a pretty good idea on future tonnage well in advance.
>
> Manager, Juicing Co.

The ultimate harvest will be determined by other factors, such as the weather; however, a rough estimate can be generated through consideration of the areas planted with vines. Thus, while it is possible to determine a rough estimate of the size of the harvest well in advance, the actual volumes will only be known with greater certainty closer to the time of harvest.

With the emphasis on quality of the finished wine, the quality of the raw materials is also of concern. The grapes within a region, let alone a vineyard, are not homogenous in terms of quality. One small vineyard owner pointed this out when he said that:

> We are producing well over [X] tonnes [. . .] over [Y] tonnes of grapes between the two of us. And we just skim off the excess tonnage. It gives us the ultimate choice – I mean we know where the better fruit is. In a given year [. . .] if the grapes are not up to spec you do not have to worry about them you throw them on a truck to the other winery and let them deal with it.
>
> Vineyard owner, Golden Grape Wines

In this manner a small vineyard owner is able to select the very finest grapes in order to create a premium quality wine, as part of a recognised boutique brand, while the rest of the grapes are grown on contract for other winemakers; this procedure provides the flexibility to ensure that quality is maintained at the highest possible level for the boutique brand.

The very *terroir* of the region can act against aspirations for innovation. One participant noted that:

> it's hard work to try and break through, a new wine label from [this region], because it's [. . .] not yet regarded as the premium region. But it's working on it, it's working on it. There are a few labels that are regarded, like [X's], but [. . .] there's a change afoot. It is starting to produce more medal-winning wines that are well regarded.
>
> owner of Heritage Wines

In this instance the reputation of the region means that the wines coming from it are judged to be of a certain quality in a particular variety. Wines from a specific region may be held in high esteem if they are of a specific variety; varieties that are not traditionally associated with the region may not be held in such high esteem. Persuading downstream actors in the supply chain, let alone the consumers, to accept the differences in wines coming from a new region, new brands, or different varieties from a well-established region, can be challenging. The very challenge of understanding the perceptions surrounding quality can be important to the vineyard owners and winemakers. This is because "people, they may not particularly like that particular brew, because it's personal taste that goes into everything" (Heritage Wines) when an individual is deciding whether they like a specific wine. The challenge of being associated with a region shows that if a winemaker is in a region that is not well regarded, they may experience difficulties 'breaking the mould' and crafting a wine that is well accepted. The corollary would be that a rising tide would lift all boats; if the quality of wines generally associated with the region increases, the acknowledgement of the region as a good region will increase, making recognition of individual winemakers simpler and easier.

6.3.2. Political and legal

There are few legal or political barriers associated with the international movement of wines. In contrast, the movement of unprocessed fruit can attract attention as governments move to protect their own industries from pathogens or insects that may be present in the fruit.

0Of the smaller winemakers in the region some export and some do not. With the volumes available many find it easier simply to sell their entire produce on the domestic New Zealand market. Others that export have been approached by groups overseas, who take care of the

marketing and supply. The result is that there is not as much export of wine from smaller winemakers as there tends to be from the larger winemakers that are part of a much larger multinational organisation.

6.3.3. Capital requirements and cost minimisation

The costs of capital required to complete the processes in creating wine using modern techniques can prove to be prohibitive for smaller winemakers. These high fixed capital costs can be a significant barrier for smaller operators as they seek to grow their brand. One owner of a small vineyard said that:

> Basically the cost of bricks and mortar is huge [. . .] so even though our per bottle cost [with small scale production] may be a little bit higher than a big winery, sort of generally it doesn't really stack up building something until you are around 300 tonnes. Then you get the economies of scale.
>
> Manager, Golden Grape Wines

As a result, the smaller vineyard owners frequently chase spare capacity available at other contract facilities. The Manager of Golden Grape Wines noted that "when [our current partners] reach full capacity of course we will have to find somewhere else. But of course that is no problem; it is just a case of moving the barrels to the next venue." With the smaller scale production and outsourcing, or using traditional processes, the costs per bottle may be higher than those at a larger winery, forcing the wineries to seek higher returns per bottle using higher unit prices than larger wineries may be prepared to accept.

Another small vineyard owner and winemaker asserted that:

> Just to compete in this current market you've either got to be niche, and produce something that people are prepared to pay a premium for. Otherwise [. . .] if you're competing in the bulk markets, at supermarket level, you need the scale [. . .] to make a few cents on each bottle, and those few cents add up when you're talking millions of litres. But on my scale, I'm just trying to add some value to my grapes.
>
> owner, Heritage Wines

There is a consistent feeling amongst the small members of the cluster that to avoid being a niche player a huge volume was needed to secure economies of scale in order to compete on price. The emphasis that the small vineyards and winemakers placed on seeking a niche was very strong. Small firms in niche markets are capable of significant achievements. The owner of Heritage Wines noted that he had received many medals for his wines over the last few years, indicating that it is possible to create a very high quality product on a small scale when you "don't compete with the big boys."

It is possible to maintain costs at a competitive level, while producing small volumes, through careful management of all processes and stages in the wine making. The owner of Heritage Wines claims that because he is careful to "keep my costs down [. . .] I do a lot of stuff myself [. . .] my winery is now my storage area." Careful selection of processes and the use of space or capital equipment can render significant gains in terms of cost reduction. This owner discusses the way in which he operates to minimise costs:

> I use old barrels for my reds. I buy them from other wineries who they've used them for 3 or 4 years, and they're culling them. I take some risk in doing that, because there might be bacterial problems. But I check them, smell them and check them before I put any wine in. And so I'll use them, I might pick them up anywhere from $50 to $100. I'll then use them for a couple of years, and then I'll sell them for $50 to $100, or as planters, or whatever. So basically the oak costs me nothing. With reds that's pretty good. And I know that I can make bronze medal winning red wines in old barrels. And when you get a new barrel, yes, you can do a bit better. But the price goes up for the wine, so, because it's a better wine. So yeah in general it's [. . .] for some people oak is the most expensive item in the winery, for me it's not, 'cause I'm using old barrels.
>
> owner, Heritage Wines.

6.3.4. Branding and marketing challenges

The literature indicates that much of the value that can be extracted throughout the supply chain is related to the perception, and to the control of the brand (Gwynne, 2006). While the industry members may not be fond of the marketing portion of their job, it remains an important consideration. The smaller winemakers in the region focus heavily on the quality of their product. Seeking a niche, developing a reputation, and backing that reputation up with awards is a strategy that they frequently follow.

The emphasis on quality is important in the region and small vineyards have the opportunity to make a positive contribution in terms of the grapes that they can grow. One small winemaker notes that:

> There's all sorts of parcels [of grapes] that are too small for a big winery, but I might be able to do something with them. And some other growers are wanting to see what their grapes can do. Because they might supply a big company all the time, and it just goes into big blends. So they don't actually know what their grapes can do. So if you can actually spit off a row and make a wine out of it, then they've got more of an idea of what's possible.
>
> owner, Heritage Wines

The fact that award winning wines can be created from grapes in this manner can provide small vineyard owners with greater negotiating power when they sell their grapes to a buyer. A winemaker explains how it works by saying:

> One of the guys who I do get some of my other grapes from, he's used the fact that we've had award winning wines from his block to sell the rest of the grapes to other wine companies. And he can say

> "Well this is from my block, this is a wine that produced last year from my vineyard. This is what can be done."
>
> owner, Heritage Wines

In terms of international branding and marketing there are specific varieties which are well received in the major export markets. These are not the varieties which are grown in this specific region; the main varieties of grapes grown in the region are well supplied by European winemakers. While international supply is important, key export markets, such as the UK, can be challenging to break into. The owner of Heritage Wines noted that:

> At the moment for [this region] it is a tricky one for exports, because a lot of the things we do well are well supplied by European countries. And we don't have [variety x], and we don't have [variety Y] at the high price points. So we're more the workhorse. But we're value for money wines. But don't necessarily translate into the export market at the moment. Because there's a lot of, worldwide everybody does a good [specific variety] around the world.
>
> owner, Heritage Wines

Marketing within New Zealand for the small firms in the cluster can be achieved through working closely with owners of stores and heavily promoting the product. This may involve many road trips, the presence of the owners at wine tasting events, and a large amount of face-time with potential outlets for the wine. Intensive work on the ground, while possible for the domestic market, is not possible for international markets due to the costs of travel. The efforts and time required do cut into the time of the vineyard owners, although there may be periods when they are in the off-season, when they have greater latitude with how they invest their time.

Many of the individuals involved in the viticulture industry entered because they love wine. They do not necessarily enjoy selling it, and generally prefer to leave this to others with greater expertise in this area. There is also little support for international marketing from industry-wide associations; the large New Zealand Winegrowers Association has a budget of only $5m for international marketing (Slade, 2009b).

6.3.5. Changing structures of the industry

With a much stronger presence of multinational or extremely large organisations in the region and cluster, there is a weakening of the older, more personal, relationships between many of the key players in the region. The Manager of Juicing Co. noted that when they set up their facility he "would say that when we did it was a little bit easier because there have been so many takeovers in the last few years, that I don't think [that now] you have quite got those personal relationships are the same as they were then." This changing nature of the industry means the use of personal

relationships, which had been important in the region previously, may lose significance going forwards. The likely replacement for personal relationships would be the use of negotiation and contract in arranging relationships, and reputations for deciding which potential partners should be approached or entered into agreements with.

6.4. Initiatives to improve supply chain management

This section identifies several initiatives in the region that draw on horizontal relationships and coordination in order to improve their supply chain management.

6.4.1. Juicing facilities

When the different processes in the supply chain can be performed at geographically separated locations there may be transport of material between regions or for a long distance within a single region. In the case of grapes transport in bulk is undesirable as it increases skin contact, which may give a lower quality wine. In the interests of preserving the reputation of wines made from grapes sourced in the region, a group of individuals decided that it would be more sensible to locate juicing facilities in the region where the grapes originated. Once juiced and stabilised the processed product is more suited for transportation as skin contact of grapes has been minimised. An additional benefit is that there is no transportation of unneeded by-products, such as stalks or skins, which may otherwise be a significant portion of the total mass when transporting freshly harvested grapes. The establishment of a local contract juicing facility was ultimately an "industry-wide [initiative] to raise the profile of wine, or [this region] and its name" (Manager, Juicing Co.), through providing the facilities to preserve the quality of the materials that are turned into wine. The Manager went on to explain that:

> a lot of grapes were sourced from [this region] by wineries that had their facilities out of the district so they would come in and buy grapes and they would cart the grapes away [. . .] in bulk on trucks, so we saw it as a way of enhancing the quality of the product that was coming out of [this region] by having a juicing facility. So that the companies could still come in, and purchase the grapes, then we would process them to clear juice, and then they would go away in tankers once they were stabilised. They would still use their own facilities to make the product into wine, but they were getting a superior product by taking it out as clarified juice rather than as bulk grapes.
>
> Manager, Juicing Co.

One small vineyard owner commented that they now hand-pick the grapes before having them processed within the region to produce the juice which is then transported to the winemaker, in a different region. Previously, this vineyard owner had hand-picked the grapes and sent them to a distant region, as grapes, for juicing and winemaking. This resulted in a great deal of skin contact, an undesirable attribute for the vineyard, as it specialises in white wines.

At the time of establishment there were three large wineries with juicing facilities in the region that had recently been acquired by the same corporate group. Thus, any regional vineyard that supplied grapes to these wineries was supplying the same organisation. The establishment of a separate, independent, contract juicing facility was desired as it would be "giving growers slightly more choice of where they were selling their grapes because [. . .] when they were supplying those three companies they ended up supplying the same company" (Manager, Juicing Co.).

The facility was also designed to assist the entrepreneurs who established it. Individually, the entrepreneurs did not have commercial juicing facilities themselves due to the smaller sizes of their operations. However, even with commitment by the original entrepreneurs there was not adequate volume to warrant the investment in a large juicing facility. While it "was primarily just an open contract facility" it was still of use to the founders and "the four original people did use the facility to one degree or another for their own use as well" (Manager, Juicing Co.).

In order to secure adequate commitment of volumes the founders canvassed the local business people. The Manager of Juicing Co. recalls that they:

> had great commitment right from the beginning from some wineries such as [X], and [Y], and a couple of other minor ones, [but] we did not have sufficient tons to make it a viable operation and it was only when we secured the assurance from another major winery that gave us sufficient tons to proceed.
>
> Manager, Juicing Co.

This commitment was in the form of discussions between individuals. It is important to note that the four founders "in one way or another have been growing grapes for quite a long time." This tenure in the industry meant that the entrepreneurs "certainly had a lot of very strong contacts within the industry with companies," and the strength of these relationships with other managers in the region meant that "their verbal commitment was enough for me. But in the end, of course, we had signed contracts" (Manager, Juicing Co.) when setting up the facility. This reliance, or trust between the local business men was important, as the Manager notes that "we understood on an informal basis, that if we went to them, and they said they would support us, we knew they would. There was a lot of personal relationships involved at that stage." The personal relationships that were important in setting up the venture were less important when the venture was operating. However, the commitment during the initial stages was critical. The Manager explained that:

> you know to get that commitment a year out, or two years out as it eventuated, to give the economies to go ahead, there certainly had to be good relationships that we had right from the beginning. For

> instance, [Mr U.], I've known him for years [. . .] but he just said 'oh yeah, got a truck turning up March 23rd, kind of thing, and he just made that statement and I never doubted him once.
>
> Manager, Juicing Co.

The industry associations play a large part in the success and nourishment of these informal relationships, as does tenure in the industry. In explaining the presence of these relationships the Manager notes that the other managers are "just in the same industry, I was on New Zealand wine growers, which is [. . .] the composite body representing wine makers and growers in New Zealand, I've been in that for a number of years, I've just known people for a long time."

The ultimate objective of establishing the juicing facility was to generate a higher quality product coming out of the region. The Manager notes that "the total thing is on quality. And that is why we have all the very latest equipment," to ensure that the very finest wine is associated with the region. By providing a facility to improve the processes involved in making the wine it is hoped that the wine produced in the region will improve, in turn improving the outcome for all members of the cluster.

There are difficulties in the scheduling of the facilities near harvest time. Having the grapes de-stemmed and juiced rapidly is of great importance to the owners of the grapes. However, the customers do not have the ability to force the issue and the facility must be careful as they are not the owners of the product that they are processing. As a result the scheduling for the processing of the fruit involves careful negotiation and consideration by all parties. The Manager explains that:

> it's different, say, [from] a company like [a food processing company] who are processing sweet corn; they are not dealing with a whole lot of owners, they are dealing with growers, they just tell the grower you will come in there and there and there. But they own the product; we don't own the products
>
> Manager, Juicing Co.

The lack of ownership over the food that is being processed makes it more complex for the juicing facility, which, having no ownership over the fruit, experiences a lack of flexibility and control over the options available to them while scheduling. The Manager further explains that:

> the logistics of scheduling is absolutely crucial to the efficient running of our facility. We have a full scheduling meeting every night [during the peak season], of which we have our bigger clients represented. There will be a few staff, viticulturalists, etc. plus our general manager, plus some harvesters and operators [. . .] if we can get bigger lines of one line of fruit through together, then it is far more efficient than chopping and changing. So every [. . .] batch of fruit [. . .] is [. . .] treated separately, but is scheduled in when it is going to come in.
>
> Manager, Juicing Co.

Thus the juicing facility tries to operate as efficiently as they can. Many smaller batches cause headaches:

> Whereas if you have one big line of the same fruit it is just going from container to container filling it up, it's just a nice smooth process. But [. . .] when we are dealing with about 24 clients, about a dozen main variety of fruit, which will be only three to four big [. . .] varieties of grapes, well then there are different grades amongst them, too, so it is a whole sort of jumbled system so you are trying to get everything to fit in as smoothly as possible.
>
> Manager, Juicing Co.

The cooperation required between these different groups of stakeholders, with different requirements, can be challenging. During the period of harvest the operation runs day and night with as smooth a schedule as can be devised, taking into account the requirements of the different stakeholders. When scheduling the incoming grapes:

> It is just a matter of [. . .] with your different parcels of fruit, your different companies, your different harvesters, maybe [. . .] where each vineyard is situated, because it makes sense to try and draw from one area [. . .] it's just a matter of smoothing all these things and so making it as smooth an operation as possible.
>
> Manager, Juicing Co.

Customers may not receive service on a daily basis as often as they would like. The facility operates on a pro-rata basis but this is not strictly applied on a per day basis. During harvest:

> it is a pretty full-on period and the companies work in pretty well together, so if it is logical that company A, who has the rights for twice the amount of company B, it may be better for company B to have one day, then company A to have 2 days, than strictly pro-rata throughout a day.
>
> Manager, Juicing Co.

When scheduling this way "the idea is [. . .] to treat everyone equally [. . .] they know they are not going to get their absolute requirements, it's just impossible. I mean, this is [well understood] through the whole wine industry" (Manager, Juicing Co.).

The infrastructure involved in the juicing facility can be further capitalised on to provide a greater return on the investment. The juice is held in large tanks while on site; when the juice has left the facilities these tanks are idle. There was the potential to become further involved in the winemaking process and also store wine in these tanks between seasons. Using the facilities to become more involved in the creation of wine:

> was part of the vision [. . .] we didn't specifically setup to do it right at the beginning but we always did with the understanding that to utilise the capital of what we were investing then winemaking

> would certainly have to be an option as well further down the track. We are now at the stage now where we use our full capacity for wine making.
>
> Manager, Juicing Co.

The setup of this contract juicing facility has added capacity in juicing and winemaking to the region, and opened up avenues that provide smaller firms options other than working with large corporations that have facilities in the region.

6.4.2. Bottling

The process of bottling the finished wine is another phase of wine production that smaller winemakers, who create their own wine on site, frequently struggle with. The owner of Heritage Wines explains that he utilises a mobile bottling unit from another region. To make his smaller operation cost effective he must cooperate with other local winemakers. The owner explains that:

> [We] will organise, say [X] have got a small bottling run, [Y] have a small bottling run, or a big bottling run. And then myself, or another winery, and we'll work together in terms of sharing the costs of getting the unit up here. And then, so there is sort of an efficiency there. But he'll come here, set up; we'll do the bottling run sort of for 5 or 6 hours. It's done, the bottles [. . .] have arrived the day before, and then they're filled. Then they're sort of put into bins, straight back into the winery. So that sort of thing, it's very efficient, and then that's then in storage [. . .] So it's a very, very efficient way of doing it. And you're just paying a contract rate, so you don't have to have the infrastructure for a bottling unit.
>
> owner, Heritage Wines

Through cooperation with other competitors in the area the smaller winemakers are able to keep their costs down, rather than supplying or securing the cost of utilising the mobile bottling unit themselves. This is especially true as the bottling equipment comes from another region. By working with other small winemakers they are able to share the costs of the bottling equipment being relocated to their cluster, while they each then pay a fixed cost per day to use the equipment once there. If a larger number of winemakers used the bottling facilities the fixed costs of relocation of the equipment could be further reduced for each winemaker. The negotiations determining which winemaker retains the services of the mobile bottling unit are arranged through discussions and negotiations between the winemakers concerned. Past history, reputation, the perceived ease of dealing with the other parties, all make a difference to the winemakers when they enter into this type of arrangement.

6.5. Barriers to effective horizontal coordination

The biggest barrier to increased coordination between members of the cluster is the traditional vertical integration in the industry, the presence of larger firms new to the cluster, and the perception that they need to seek out and conquer a niche in order to be successful.

Vertical integration means that there is little need for a single firm to outsource or coordinate with other members of the cluster. All facilities and equipment for all the production processes are controlled by the firm. Most coordination occurs within the firm since there is little need for coordination with other, external, members of the cluster.

With an increasing number of larger firms entering the cluster the traditionally strong relationships shared by many of the members had with one another are being threatened. In the larger firms there may be key managers with whom relationships can be formed; however, these managers are not likely to remain in the same position for very long as they do not have a personal vested interest in the region, as do the local small enterprises. The lack of personal relationships, and the inability to form them, makes it more challenging for the smaller industry players to form effective connections with the larger firms.

The perception held by the small firms in the cluster is that they must discover and command a niche product in order to be successful. A niche product can secure higher prices per unit, offsetting their higher costs of production. Working with other firms and coordinating activities with them does not seem to fit the mindset of securing a niche product.

6.6. Overcoming barriers

The previous section highlights some areas of cooperation in the region. Several methods that have been utilised to overcome some of the barriers to closer coordination require further attention.

6.6.1. Trust and the industry structure

Winemakers and vineyard owners have a high level of trust between themselves. Through the industry-wide association and the regional association there is much information that flows vertically through the supply chain, particularly market information and knowledge, which can then be spread horizontally between industry members. The regional associations help form valuable regional networks. The owner of Heritage Wines notes that the local association “do work fairly well together. I mean, I'm on the committee of the [regional association], so we know what’s going on” in the industry and the markets. In addition, the industry associations provide a

forum for industry participants, particularly smaller ones, to come together and discuss common problems, particularly those surrounding the quality of their products, markets, and marketing efforts.

An example of the benefits associated with the presence of dense local networks is provided by the owner of Heritage Wines who noted:

> There's [the regional winegrower association]. I know a lot of the winegrowers, we meet up at the pub, on a Wednesday night and so yeah there's the informal part. I mean, I've done trials with other varieties that I haven't got at my vineyard. And I've been contacted and [the other vineyard owner] said "Well we've got some grapes; do you want to do something with them?" And it might be Sauvignon Blanc, it might be Viogner, it might be whatever!
>
> owner, Heritage Wines.

When a small volume of wine is produced with these types of wines they can reveal the potentially high quality wines that grapes from that particular vineyard are capable of producing. This quality wine can be used as evidence by the vineyard to secure greater leverage in negotiation with larger buyers in the future. It also means that there is a method for sharing around excess capacity of grapes that may not have been contracted out.

This collaboration can extend over many aspects of the supply chain and under the auspices of the associations, "the smaller wineries are working together." Many in the region are working increasingly collaboratively now and the region "in general is re-inventing itself on the wine side." This reinvention, and the cooperation between smaller players, is important as the owner of Heritage Wines notes that "those small wineries tend to be the source of the innovation, and the new things coming through."

A strong regional association could also help the region to achieve more success in terms of marketing. The winemakers point out, however, that the associations were not formed for marketing. Many members would like to see greater marketing involvement by the associations, yet many others resist these moves. The associations themselves have inertia, being slow to change and adopt radically different charters. There remains the possibility for the local regional association to transform itself and take a more active role in marketing and sharing the joint costs of marketing campaigns.

6.6.2. Cooperation impacting on a niche

Many of the winemakers in the region spoke of their wine occupying a niche in the market. There was a strong feeling that there are two models of making money in the industry: either by selling a large volume and gaining small margins per unit, or identifying and securing a profitable niche

where larger margins can be secured. The smaller winemakers are more likely to turn to the domestic market when seeking a niche to occupy. While only a few of the smaller winemakers seem to enjoy the sales process (rather, they entered the industry because of a love of wine), many spend time and effort providing marketing support. A coordinated marketing campaign could be orchestrated amongst the smaller winemakers, bringing their product together and marketing it more aggressively with the costs split on a pro rata basis. However, there is a feeling that aligning closely with others will 'dilute' the value of the brand that they have created. Capturing the ability to establish and leverage a brand is seen as one of the best ways of creating value in the industry.

In contrast to other fruit, which is mostly homogenous, different parcels of grapes from different vineyards have various attributes. This makes the creation of a homogenous brand, representing a series of smaller vineyards and winemakers, challenging. The Family of Twelve, comprised of quality wine producers from around New Zealand, was established in 2005 (Slade, 2009a, 2009b). These family-owned wine companies have "embraced one another with the aim of flexing their combined muscle" (Rose, 2010, p. 40). These efforts represent coordination in the marketing only. A more intense level of coordination would be to create a brand which draws upon the supply of grapes or wines from several vineyards or winemakers. The challenge with such an approach is the process of blending the wines to ensure consistency over batches and the maintenance of a high level of quality to ensure that the quality remains associated with the brand. The coordination required to achieve this objective would reduce the ability for individual winemakers or vineyards to extract value through sole control and ownership of a successful brand.

6.7. Conclusion

Within the viticulture industry in the specific region there are isolated pockets of cooperation, notably the contract juicing facility and the formation of a small group of winemakers to secure the services of a mobile bottling facility. There are dense networks in the industry, particularly with strong industry and regional associations providing support. Many of the smaller winemakers appear content to operate entirely independently rather than collaborate and coordinate more closely with other winemakers. Many others will rely on large multi-national organisations to provide a strong chain capable of marketing their product (Gwynne, 2006). The limited intensity of the horizontal coordination for supply chain management will be investigated in the following chapters.

Chapter 7. Analysis

"It is good to have an end to journey toward; but it is the journey that matters, in the end."

Ursula Le Guin, American Novelist.

The previous chapters presented the cases considered in the present research on the barriers to forming effective horizontal relationships and how these barriers may be bridged. The underlying similarities and differences in these cases will be analysed in this chapter in order to answer the research questions.

The main barriers unveiled by this research are the willingness to share information with others; the level of trust; their ability to work together; and a single focus only on cost savings in the supply chain. These results will be briefly discussed here before a more detailed analysis, including measures taken to bridge these barriers, is presented later in the chapter.

7.1. Analysis of NZBrand

Table 7.1: Analysis of NZBrand

Barrier	Explanation	Evidence	Bridging the barrier
Coopetition	Little opportunism evidenced. Procedures deal with small problems, usually operational mistakes. Referred to as 'ripples'.	Challenges of errant behaviour during meetings (§4.6.1, §4.8).	Regular meetings and strong communication.
	No structure to work through a case of malicious opportunism	Recent events provoked a fear of the inability of the cluster to deal with malicious opportunism (§4.8).	Consideration of an expanded 'rule book' with procedures that explicitly address this issue
	Sharing of benefits and costs	Formal processes to share costs incurred and to split benefits. Fair splitting of revenue increases likelihood of coordination (§4.6.3).	The ability to split costs on a volume-basis and working on an 'average revenue' basis for income splitting.
	Sharing of expertise	Different members have complementary capabilities with members 'specialising' in providing support to the cluster (§4.6.4).	Sharing capabilities reduces costs to the cluster and binds members to the cluster as they do not otherwise have access to these capabilities.
Lack of trust	Challenges trusting members as they are direct competitors in many markets	While cooperating as NZBrand, members compete in other markets (§4.4.6, §4.5.1).	Working towards a common goal, a close-knit industry, having the 'right people', and small cluster size has enabled trust to be gained.
Lack of willingness to share information	Difficulties were related to willingness rather than capability in sharing information.	Initial reluctance to share what had previously been 'proprietary' information (§4.5.2, §4.6.2).	Shared flow plan and requirements to complete this encourage members to share information horizontally and vertically.
Information technology insufficient	Information technology is not considered to be a significant barrier to NZBrand horizontal coordination	Members are satisfied with the technology used (§4.5.3).	Telephone conferences, emails, and spreadsheets are used to transmit information between members
Different objectives and goals	Suppliers to the cluster members may have different priorities	Different members in the chain have different priorities but there is a general move to return value to the growers (§4.5.4).	Creating benefits in the supply chain that returns are stabilised and increased. This encourages members to put aside differences and support the effort.
Process evolution is challenging	Bringing the NZBrand into existence required expansion of product lines.	Members and suppliers deal with another brand, meaning increases in processes (§4.5.5).	Most members see that the advantages of packing NZBrand produce outweigh the small incremental costs.

7.2. Analysis of HortCom

Table 7.2: Analysis of HortCom

Barrier	Explanation	Evidence	Bridging the barrier
Coopetition and a lack of trust	Long-term view may fail due to short-term actions of members	Fears that members will experience difficulty seeking long-term benefit from the cluster and will be cautious about cooperating (§5.5.1, §5.5.6).	Some initial faith is required by members. Shortly after, getting some early successes can demonstrate to members the value, increasing their support for long-term operations.
	Dynamic nature of industry causes operation difficulties	Commitments may have been 100 containers in a week but actual numbers may be 120 (§5.5.1).	Coordinator can smooth over the fluctuations and work with members to ensure that overall volume from the cluster is matched to capacity from Shipit.
	Differences in commitment of volume	Some members used alternate shipping lines (§4.6.1).	Coordination of group volumes should enable negotiation of best deals for members. So far members splitting volumes has not impacted on group coherence.
	Chicken and the egg	Hesitation of some members to join (§4.6.1).	No past history to draw on so a 'leap of faith' is needed
Personality clashes	Personal differences between members cause tensions	Extensive history in industry and size of cluster meant that some members did not like the idea of helping other members (§5.5.2).	Awareness that they had to work together to ensure volumes and working through a coordinator helped ease concerns.
Lack of willingness to share information	Related to trust, there is unwillingness to share information	Members find the role of coordinator, and the sense of anonymity offered, acceptable (§5.4.2, §5.6.1).	A centralised coordinator is able to act on behalf of members, providing anonymity
Power inequality	There are perceived imbalances in power in the cluster	Some members have previously worked together and this creates imbalances in the present cluster (§5.5.2).	The use of a central coordinator and involving all members in the negotiations with Shipit was supposed to bridge the barrier but there were critical departures from the expected procedure.
Difficulties in planning	Members engage in joint planning	Requirement for members to create flow plans and create a joint flow plan for the cluster (§5.4.1, §5.4.2).	An external force, Shipit, required the members to coordinate their flow plans effectively, forcing a higher level of planning than some members had previously experienced.
Different drivers	Different motivations may force members to behave in a manner that threatens the cluster	Sometimes the members would be "off doing their own thing" (§5.5.6).	Forced planning and constant communication through the season through the coordinator and Shipit helps to keep members focused and on track.

7.3. Analysis of WineCom

Table 7.3: Analysis of WineCom

Barrier	Explanation	Evidence	Bridging the barrier
Traditional vertical integration	Traditionally vertical integration is important in the industry	Vertical integration by large firms leads to less reliance on other members for volume (§6.2.5, §6.3.5)	Barrier is difficult to bridge unless there are a large number of SMEs that need to cooperate.
Decreasing personal relationships	Many relationships in the industry are long-term and personal	Large firms moving into the region have displaced some small firms and as managers in large firms rotate it becomes difficult to maintain long-term relationships (§6.3.5, §6.4.1, §6.3.3)	The nature of the industry means that that it is increasingly difficult to form long-term relationships with larger members of the cluster. This can reduce the trust and make it more difficult to start an initiative.
Need for a niche	Most firms compete by finding a niche	Many small wine makers aim to create a quality product that will win awards (§6.3.3, §6.3.4, §6.5)	A niche product is desired to secure higher revenues per unit. Cooperating and securing sales in an international market is another method that could be used to achieve this objective.

7.4. Barriers to forming strong horizontal relationships

This section outlines the major barriers to strong horizontal relationships identified in the case studies.

Lack of information sharing

The more successful clusters share information freely in the cluster, with customers, and suppliers, using telephones and email. There is initial reluctance to share information freely with competitors. Significant investments in ICT would provide little benefit. The supply clusters avoid "the cost and complexity of implementing advanced systems" (Fawcett et al., 2007, p. 365) and potential for system incompatibility.

Distrust and unwillingness to work together

The most significant difference between clusters is revealed in their ability and willingness to work together and the trust exhibited. The successful JEMCO and NZBrand clusters have fewer participants than HortCom WineCom. A smaller cluster ensures a meeting of minds and easier resolution of problems.

Power and capability imbalances

Members within a cluster frequently have dissimilarities that are a source of heterogeneity within the cluster. These differences may be in regards to the power a member exerts (related to the volume contributions) or the capabilities possessed.

Competitive pressures

Each cluster has competing companies, with the risk that members will individually fall to competitive pressures and damage the outcome of the cluster. Using its own internal pressure enabled NZBrand to counterbalance that of the competitive pressure. In contrast, HortCom employed a coordinator to overcome trust issues and achieve effective coordination.

Lack of risk and reward sharing

The sharing of costs and risk is on the basis of volume contributions that incur the costs. Sharing of revenue is conducted only by NZBrand, on the basis of volume contributions.

Inconsistent goals

Members of clusters are torn between opportunities to obtain benefit in the short-term in opportunistic manners or to coordinate with other members to achieve long-term success through the cluster. This is exacerbated when members do not contribute all their volume through the cluster arrangement.

Limited competitive focus

HortCom works to secure a cost advantage in shipping and to ensure continued service. In contrast, NZBrand and JEMCO work to improve market mediation (Fisher, 1997) of their products and to create greater value for their customers. WineCom members focus on quality and controlling costs.

Table 7.4: A comparison of attributes of the case studies

Issues	Cases			
	NZBrand	**HortCom**	**WineCom**	**JEMCO**
Members	4	10	10+	4
Industry	Horticulture	Horticulture	Viticulture	Aquaculture
Focus	Sourcing, order fulfilment	Shipping services	Sharing information with limited cooperation	Sourcing, quality, order fulfilment
Level of trust	High	Low	Moderate	High
Level of willingness to work with others	High	Low	Low	High
Use of technology	Low	Low	Moderate	Low
Previously regulated industry	No	Yes	No	No
Relatively new industry	Yes	No	No	Yes
Use of group pressure	High	Low	low	Unknown

7.5. Interpretation of barriers

Here the barriers identified in the previous section are interpreted and discussed in more detail. For each barrier the different cases are engaged in order to identify how these barriers have been identified and characterised, based on the case. The natural conclusion for each barrier is to discuss how each case has (or has not) managed to bridge the barriers they face.

7.5.1. Lack of information sharing

In NZBrand and HortCom it is necessary to share information pertaining to flow plans both horizontally, with members, and vertically with suppliers and customers. Information must be drawn from the market and distributed in the cluster to improve managerial decisions. Information concerning the sourcing of materials must be analysed and distributed along the chain to enable effective outcomes for all.

One manager in the NZBrand cluster said:

> We sit there and say [. . .] what are [Partner-1] going to do? What are [Partner-2] going to do? [. . .] Now we are discussing at a level as an industry with us, now [the cluster] covers probably 90% of the industry in terms of what will happen with Japan and America. I think it is an interesting concept for most people, we are actually better, from a commercial aspect it is better to sit down with your competitor and say, "This is what I am going to do," and he says, "Well, this is what I am going to do." So you can actually understand. And there [are] 'no surprises' as well.
>
> Manager, NZBrand

Initially, sharing information with competitors is difficult to contemplate. As the Manager noted, "that was one of the bigger hurdles to get over, is that 'oh, **** we don't want them to know too much about our business,' " but the benefit was that there is increased understanding of activities elsewhere in the supply chain. A key benefit is that there are 'no surprises'; the communication ensures that all parties understand where the other parties stand. Now that the relationship has developed more completely the willingness to exchange information has become an asset. This is because:

> the more you let [the others in the cluster] know the better it is. Because you have nothing to hide, the only reason you have got to hide it is because if there is something wrong with it. If you are trying to hide something it means that you can't take it out in the open then you shouldn't be doing it, and that is the way I look at it. So from our point of view, we don't hide anything; when people ask us what we do, we tell them. And I reckon that is a good way to be.
>
> Manager, Pack Well

The sharing of information forces the participants to closely examine their own practices, especially how and why they are planning or taking actions.

The Manager of Shipit agreed that the sharing of information closely and carefully with participants is important, the Managers in HortCom were careful to ensure that everyone was looking at the same set of figures. The Manager of Shipit noted that they "go through a process where we, from the start of discussions, map out volumes, and every time we have met we have made sure those volumes are the same." This was found to be extremely valuable. The Manager further noted:

> It is a question of keeping up to date with the individual players and their needs [. . .] in 2009 we saw a lot more energy and attention put into that area [. . .] largely driven by the fact that there were penalty clauses on both sides which there hadn't been in the past. So everyone tried a little bit harder and [. . .] there was a huge amount of improvement in that [. . .] if there was a penalty at first there is a lot more involved in their forecasting.
>
> Manager, Shipit

In NZBrand and HortCom, the sharing of information has been successful and of benefit to the clusters.

In order for the participants came to become more open with each other they had to overcome this barrier of unwillingness. NZBrand used mutual trust among a small close-knit group; HortCom used penalties to overcome initial unwillingness and the use of an impartial coordinator.

In WineCom, where a willingness to share information is absent, information is shared between competitors through industry and regional associations, but tends to be strategic and relates to market demand and conditions. Detailed information such as stock levels, required for more intensive supply chain coordination, is not shared. Some information may be inferred, such as long-term forecasts of harvests based on observed planting patterns.

In JEMCO, it is not possible to infer willingness to share information, based on secondary data.

7.5.1.1. The NZBrand use of mutual trust

Despite shared history between members of NZBrand there was still hesitation about sharing information between the natural competitors. Now, however, there is some awareness that the members are able to make better business decisions while working together, a realisation that in itself helps the members to bridge this barrier.

Operating as a cluster has required that effective information sharing take place between the members. This must be more specific than general market information and involves information that would otherwise be closely guarded from other industry members. When proposing the clustering initiative, many different types of information were considered and buy-in was sought from upstream members of the supply chain. Discussions between members focused on the implications of the new coordination and how this would impact on business processes and the information flows required between members. These discussions were initiated from:

> just from a lot of talk basically, telling people what the plan was, and how it was going to work, and what we believed the benefits would be. And what that would mean in terms of managing co-loading of vessels, and allocation of fruit to a particular market. And all of those types of things that need to drop out of that. But just communication really, and communication to our grower base [. . .] telling

> them [. . .] what we were doing, and why it's a good idea, and all those sorts of things. So just communication really.
>
> Export Manager, Best Fruit

The seasonal nature of horticulture ensures that members have ample time between seasons to engage in strategic-level conversations about direction and achievements. These conversations help them to re-align processes and objectives, and ensure that there is joint understanding regarding information sharing requirements. The Export Manager (Best Fruit) noted that, "we have off-season, and so there's plenty of time to talk about the next season, and what that means for [NZBrand]. And what that might mean to our customer base, etc, etc. Do we need to change our customer base? Do we need to develop a new brand?" Working this way allows extensive evaluation of the most recent season. With constant communication the members enhance trust and become closer.

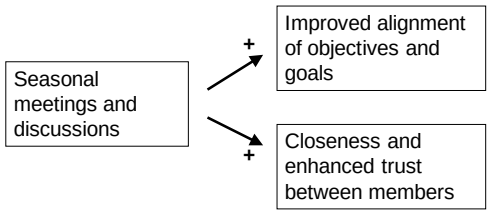

Figure 7.1: Benefits of seasonal meetings

NZBrand operates without extensive integration of information systems between firms; the information shared requires tacit understanding between two parties. There are many telephone calls and meetings between members, providing a rich flow of information between the members, as:

> We have lots of [NZBrand] meetings, and we have lots of conference calls. And we travel together with each other to the marketplace. So we're always in contact, and there's e-mail of course, and collecting orders, and distributing orders, and shipments, plans, and all those sorts of things. So there's daily contact in that respect. And that feeds back to our operation base. So what happens in the field and what happens in the pack house, and packing particular brand. And [. . .] all the things that need to happen to get an export consignment completely, packed, and in a container, and shipped. So all of those sorts of things are [. . .] it's kind of part of any one of our four export companies kind of daily behaviour. It's just normal business.
>
> Export Manager, Best Fruit

Over time the close coordination results in joint work. The Export Manager indicated that much of the information shared vertically is also shared horizontally, among members. Furthermore, vertical information flows are important for NZBrand to be able to meet their objectives. To make NZBrand work requires:

> just a whole lot of talk and representing to people. Whether they're your operations people, or your importers off-shore, or your grower base, or whoever it is within the industry that [. . .] needs to understand what it is that NZBrand means. And what it means for us as an individual company to make it all kind of work.
>
> Export Manager, Best Fruit

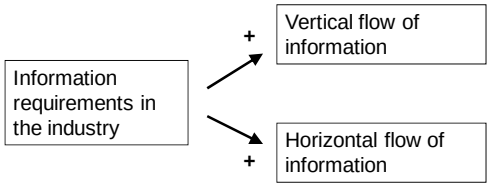

Figure 7.2: Requirements for vertical and horizontal flows of information

The role that this cooperation and sharing of information has played in enabling members to trust one another is critical. Over time, the cooperation enabled better returns for suppliers.

7.5.1.2. The HortCom use of structure and penalty

HortCom managed their horizontal coordination through the introduction of penalties for failing to meet performance objectives. The penalties apply to both members and Shipit. The barrier to information sharing has two interrelated aspects: the size of the cluster (ten members) and the history and reduced trust between the members.

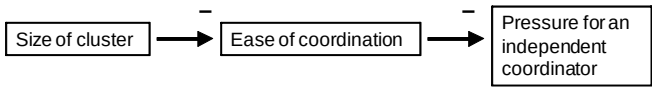

Figure 7.3: Impact of the cluster size

Introducing penalties for failing to meet obligations has forced HortCom to be systematic in the development of a cluster flow plan. Failing to meet obligations is a cost that could not be justified by members. With the threat of extra costs the members were motivated to bring information to the coordinator to ensure a positive outcome for HortCom. However, there are significant differences in the levels of professionalism and care taken by members in preparing and sharing this information.

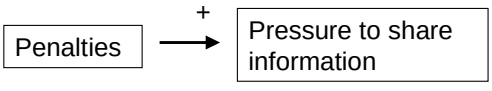

Figure 7.4: Penalties impacting on structure

The number of members makes manual information sharing a cumbersome process; there is no integrated information system. The number of firms involved, with different processes, would require considerable investment of effort to align internal processes of members to facilitate the

implementation of an integrated information system. For the foreseeable future the information systems will likely remain non-integrated and will require another party, such as the coordinator, to consolidate information.

The use of a group guaranteed volume, to secure shipping services, means there is planned delivery of capacity to the group over the season. The cluster must internally coordinate their requirements and needs for this capacity. Individual firms must understand their own crops, along with the uncertainties surrounding the harvest volumes and times, while balancing this with the flow from other members. During the peak of the harvest, however, members are extremely busy with day-to-day running of the business. Donald explained the advantages of utilising a coordinator and noted that:

> We are all too busy trying to organise our own shipping without worrying about nine other guys. And secondly we needed a person to be able to contact all ten people independently, get their weekly flows, and massage that into a whole [. . . . The Coordinator] didn't have to worry about anything else. Given he was independent there was no favouritism to be seen if he had to drop somebody one week and add to the other.
>
> Donald

The ability of the members to share information is dependent on their willingness to do so. 'Massaging' individual weekly flows into a flow for the entire cluster requires significant administrative time. The workload involved in sharing and working with this information forms a barrier that no single member can bridge. However, the independence of the coordinator and the requirement to treat all firms equally meant that "the role of the coordinator probably added an unnecessary layer of complexity to the process" (Manager, Good Fruit Ltd.). Not all members were capable of responding to opportunities and the necessity for the coordinator to follow equitable procedures prevented those that were able to respond from acting swiftly.

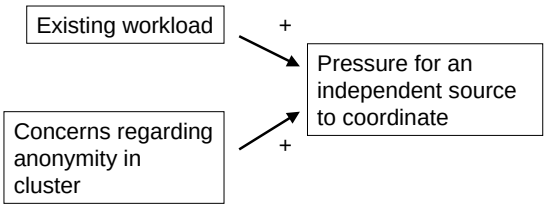

Figure 7.5: Workload as a function to use an independent coordinator

Working with a coordinator and requiring a cluster flow plan was prompted by an external stakeholder: Shipit. To effectively understand its shipping requirements, the cluster needed to understand what their total output would be, and when that output would need shipping. Understanding the position, as a group, required careful communication and information sharing between members, both pre- and post-season and during the season, as circumstances changed.

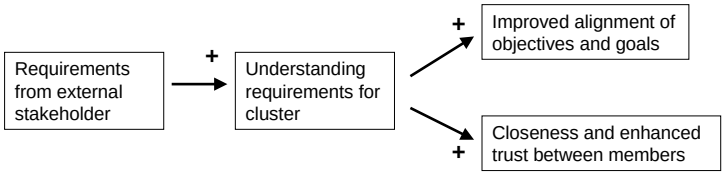

Figure 7.6: Requirements from external sources that result in improved information sharing

An independent coordinator enabled this role to be performed centrally, forming an integral component of the cluster structure. The contribution of the coordinator role comes through being independent and anonymous, bridging a lack of trust, being able to handle the workload associated with the number of members, and the need to manage the information centrally to meet objectives.

7.5.1.3. The WineCom use of technology

WineCom members have low levels of effective use of horizontal coordination, yet the integration of information systems in the industry is more pronounced. Larger enterprises utilise a comprehensive system designed to meet the specific requirements of the viticulture industry. Smaller members of the industry, such as the majority of firms in WineCom, cannot afford to use this software, yet there are other options available that achieve similar results.

Juicing Co. uses a package tailored to the needs of smaller viticulture firms to manage their internal operations. They previously attempted to use a generic package but found that "the people and equipment didn't understand the industry completely" (Manager, Juicing Co.). One requirement driving the adoption is the need for a full paper trail and documentation concerning all stock movement. The detail required by customers, particularly larger retail chains in the UK, varies. It is expedient for Juicing Co. to store detailed information so they can meet the requirements of all customers. This information can be transmitted vertically through the chain.

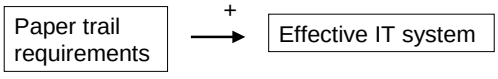

Figure 7.7: Paper trail requirements

The existence of standardised information formats and similar requirements by customers in the industry indicates that there exists the ability to share such information horizontally, between members of a cluster, if the need arises. This has not yet occurred in WineCom.

The presence of strong industry and regional associations facilitates the flow of information vertically and horizontally. With dense relationships and flows of information the opportunity to develop new relationships with other members abounds.

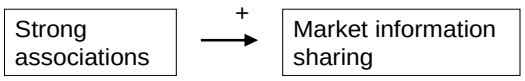

Figure 7.8: Impact of strong associations

7.5.1.4. Bridging information sharing barriers

The following table presents a summarisation of the information sharing characteristics of the clusters. The JEMCO cluster has been excluded due to paucity of data.

Table 7.5: Attributes relating to information sharing in the clusters

Attribute relating to information sharing	Evidence from clusters		
	NZBrand	**HortCom**	**WineCom**
Number of members	4	10	10+
Information shared	Inventory, conditions, flows	Inventory, conditions, flows	Market information
Use of information	Marketing, produce availability, able to find alternate supply in cluster	Meeting obligations to fill specified number of containers	Planning for individual members
Willingness to share	Open with information (horizontal & vertical)	Difficulty sharing horizontally; reason for independent coordinator	Willing to share information on markets and trends.
Source of motivation to share information	Internal, in order to coordinate activities more successfully	External, provoked by Shipit to ensure members understand their requirements as a group. Internal, limited resources of each company to coordinate.	Internal, so that members can understand macro trends more effectively.
Characterisation of the bridge	Mutual trust, strong relationships & industry structure allowed rapid development of trust	Structure of coordination and penalty due to financial repercussions for failure to meet obligations	Mutual trust, built around personal relationships with others in industry, strengthened by associations
Level of trust	High	Low	Reducing with fewer individuals
Common vision	High	Moderate-high	Low
Governance aid	Mutual trust, cooperation, strong industry associations	Structuring, forecasting, penalties	Industry associations and cooperation
IT aid	Spreadsheets, email, telephones	Spreadsheets, email, telephones	Spreadsheets, email, telephones, specific industry IT solution

7.5.2. Distrust and unwillingness to work together

Differences exist between clusters regarding the willingness to work together and the openness to trust the other members. These differences are most pronounced when comparing NZBrand and HortCom; the clusters have taken alternate approaches to bridge the barrier.

7.5.2.1. Differences in trust

In NZBrand a long shared history exists between key industry members; in HortCom the trust levels are much lower; within WineCom there is a high level of trust due to strong personal relationships between industry members.

Table 7.6: Differences in trust between clusters

Attribute relating to trust	Cases		
	NZBrand	HortCom	WineCom
Level of trust between members	High	Low	High
Characterisation of trust	Close personal relationships	Reputations and long history	Close personal relationships, giving away to larger corporate involvement
Impact of industry structure	Small and well-structured	Large, fractured	Large, fractured, strong industry associations
Personal dislikes between members	Low levels of personal feeling between members	Strong personal feelings between members – some work together grudgingly	Low levels of personal feelings between members.

There are a relatively small number of firms in NZBrand, operating in a relatively new industry. The key individuals who set up NZBrand know one another well, and have worked closely together in their industry. The industry is 'well structured' and the individuals have a shared history and a common vision.

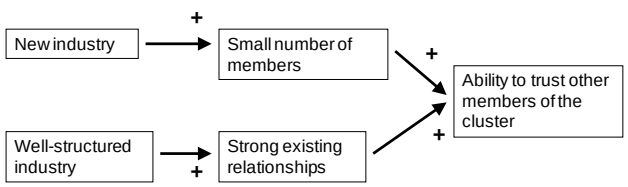

Figure 7.9: A small cluster and previous relationships enable NZBrand to work effectively

HortCom has a long and fragmented history. Since the dissolution of the EB there have been a number of competing exporters. Many of the exporters and individuals have been involved with

one another previously. There is a history between people; the reputation of individuals is considered when there is the opportunity to collaborate. The size of New Zealand means that reputation is significant and it is difficult for industry members to keep secrets from one another. Participants in HortCom say "in the smaller group it was a somewhat tighter group," and this meant greater harmony in work, although "there were a couple in there that were off doing their own little thing as well, but you always have that," and one manager noted that this can be risky for a member as:

> New Zealand is a small place so you hear when people have not been honest. It's personal behaviour analysis, really. You look at people and work out whether they have been honest or not, and at the same time you do hear around if they are not – [. . .] if they start going around and offering their volume to other shipping lines – you hear about it.
>
> Manager, Delicious Fruit

Some individuals have a long history with engagements through past transactions. The outcome of some of these transactions was not favourable for some parties, leading some individuals to feel that they were badly treated by others. Some members were not particularly happy about HortCom making business easier for others. They have conflicting motivations; on one hand they need the cluster to work to ensure continued shipping service; on the other hand, they prefer that their competitors do not benefit from the cluster. This reduces their willingness to collaborate.

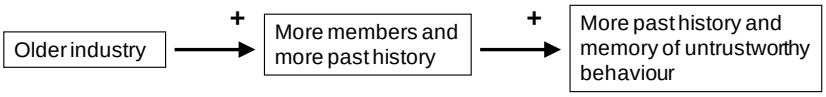

Figure 7.10: Difficulties with a more mature industry with more past behaviour

Despite the large number of members in WineCom there is willingness to share information of a general nature, concerning markets and consumer tastes. Members are willing to join associations; however, there is an unwillingness to move towards greater coordination.

7.5.2.2. Building on previous success

The Export Manager of Best Fruit noted that continued information sharing is "important to us as a company and it's important to the growers, you know? So we've always sort of [. . .] it gains momentum every year really." The more the NZBrand members coordinate, the more they gain and benefit from the coordination and the more momentum there is to continue.

As the Manager of Shipit noted, it is necessary "to get a few runs on the board before you actually believe in what you are doing."[20] These earlier successes provide confidence for the participants, encouraging them to collaborate. As the cluster gains more success there is greater belief that there will be future benefit from working together. In this way early successes generate stronger pressure for the cluster to cooperate.

Building on previous successes is a key method that the clusters have used to motivate members and ensure continued success. The dynamic indicates that clusters find greater success splitting the phases of coordination into a simple early phase that is easy to implement, before moving to a more substantial phase of coordination.

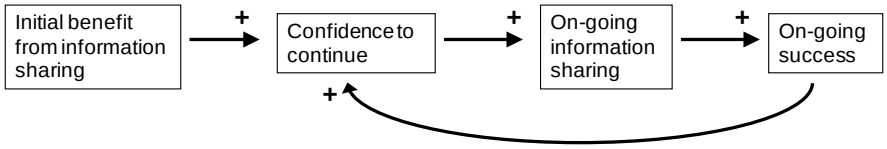

Figure 7.11: Success in information sharing as a driver for further efforts

7.5.3. Power and capability imbalances

Not all members contribute equally towards outcomes, or possess equal capabilities. This heterogeneity, where some firms provide greater volumes and / or have a higher level of internal capabilities that can be leveraged for the cluster, provides imbalances in the power distribution amongst members. While there must be some similarities, to enable members to coordinate and collaborate, differences that are too great create problems.

[20] This is a New Zealand expression that refers to the game of cricket where the objective is to gain 'runs' along the cricket pitch to obtain points.

Table 7.7: Power imbalances within the clusters

Attributes	Cases		
	NZBrand	**HortCom**	**WineCom**
Volume contributions	Some members much larger than others	Most members have similar volume contributions	No volume contributions but significant differences in size of the companies
Volume that is placed outside of cluster	Cluster works together in Japan/USA; members are able to place product in other markets	Some members have volumes allocated for other shipping lines	N/A
Capabilities	Different capabilities contributed by various members that the cluster can utilise	No contribution of capabilities by members. Currently no use of capabilities by the cluster	Some limited sharing of capabilities through the regional association.
Rules	Rules and procedures concerning operational faults. No rules regarding opportunism.	Rules and procedures concerning the failure to meet agreed flow plans from the cluster.	N/A
Flexibility	Members have comparable levels of operational flexibility.	Differences in level of internal control of members means there may be little advantage for many members to capitalise on opportunities offered by cluster	N/A

7.5.3.1. Differences in volume contribution to NZBrand

One manager explained that as the largest member they "were a threat to the smaller exporters in the group, purely by our critical mass. You need to put all of that to one side, and make them part of [the cluster], or feel part of [the cluster]" (General Manager, World Fruit Ltd.) in order to get the best results. The implication is almost as though while the smallest members are not vital, the dominant members still make them feel "part of it". Encouraging an atmosphere where all are welcome to contribute, despite inequality of input, helps NZBrand achieve positive outcomes.

The ability of different members to work well together depends in part on the power balances within the cluster. In a smaller cluster, like NZBrand, a dominant member may contribute a disproportionate volume. The General Manager of World Fruit Ltd. noted that "[W]e do 45% or something of the total programme, where some of the small exporters only do 15%."

Helping smaller members feel comfortable contributing can mitigate the impact of heterogeneous volume contributions. While the contribution of greater volume could potentially be leveraged during negotiation with other members, the larger members of NZBrand feel that their success is partly due to their attitude to the power imbalances. The General Manager, World Fruit Ltd. comments that:

> I think with [NZBrand] you have to eat your humble pie. If you think you are being wronged, it has to be a very important wrong before you would take it any further so you have to be flexible and you have to be tolerant. And you have to get rid of your ego [. . . .] "You got to leave your ego at the door," it will not work with attitude. That doesn't stop us from challenging one another but you got to leave attitude and ego out of it.

General Manager, World Fruit Ltd.

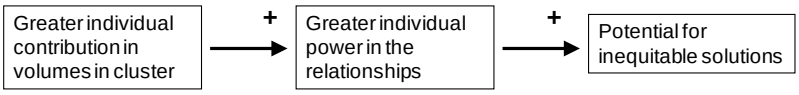

Figure 7.12: Differences in volumes

This attitude demonstrates a willingness to allow some decisions to 'not go their way' even if the member may be powerful enough to force the issue. Members feel that many heads and perspectives are better than one; collaborative decisions should reflect a broader consensus and prevent individuals from making mistakes.

7.5.3.2. NZBrand capability imbalances

Differences in member capabilities are evident in NZBrand. The heterogeneity of member capabilities provides a barrier to horizontal coordination, as there is a "difference in professionalism [among] the [members of NZBrand]. Some are far more professional at what they do than others, so those that are more proficient tend to carry those that aren't. Operationally, volume-wise, and [in] marketing" (General Manager, World Fruit Ltd.). Each member possesses capabilities that can be contributed to further the objectives of the cluster. If one does not contribute they still gain advantage from others and are 'carried'. Contribution of volume can be measured due to the homogenous commodity nature of volume; contribution of capabilities defies simple measurement as the capabilities are not homogenous. If a member is not contributing capabilities they are not required to contribute payments as compensation and it would be difficult to determine the value of capability contributions.

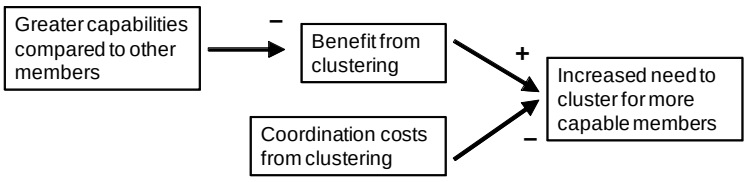

Figure 7.13: Differences between members that have more capabilities

If a member contributes volume but not capabilities they may, overall, be contributing a small amount towards the value propositions NZBrand offers. Leveraging of member capabilities by NZBrand provides significant benefits. When a member cannot share capabilities, as they are not possessed, they are not providing a benefit to the cluster, while they gain value by being a member, a situation perceived to be unfair by the others.

7.5.3.3. History of the HortCom cluster

In HortCom the power imbalances originate in the history of the cluster. Originally, there were five firms that collaborated to secure favourable shipping rates. When the shipping industry introduced significant changes the cluster required more members to ensure adequate volume guarantees. In the present incarnation of the cluster there are two 'classes' of members. These are not official classes of membership but have led to some members feeling 'left out' of decision making and feeling incapable of securing required capacity.

One participant said that he "made the rules and they had to accept them and if they didn't they could go somewhere else. At the end of the day that's what they signed up for and they did." The feeling among some members was that there was inadequate adherence to the rules. One recalls that they "were at the meeting and we were asked to leave the room while at least that negotiation took place." While absent, negotiations impacted the ability of these members to access capacity to a specific destination. Rights to this capacity were hotly contested due to significant shortages.

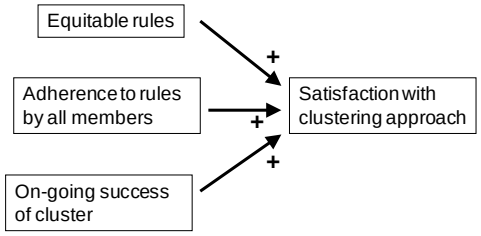

Figure 7.14: Rules in the cluster

While there is general satisfaction with the cluster operations, members believe that in the years following coordination there is opportunity to make improvements. As the cluster continues these distinctions between the original, and the newer, members should become less important.

7.5.3.4. Volume and capability contribution heterogeneity in HortCom

Each HortCom member contributes volume on the basis of a prearranged flow plan, based on forecasts of volume and harvest timing. Unlike within NZBrand there is no contribution of capabilities in HortCom. In this respect, the ability of the different members of the HortCom cluster to contribute volume is spread evenly amongst members. Differences in volume contributions between members should be reduced as there are a larger number of them, providing reduced opportunity for power imbalances due to volume contributions to arise, particularly as the coordinator organises allocations.

The ability to gain advantage from HortCom appears to depend on the control and flexibility a member can exert on internal operations. The different supply chains that constitute the HortCom

cluster have different attributes. Many of the exporters use third party cool stores in which case the exporter in HortCom becomes one of many customers of the cool store. This means that the HortCom member has effectively lost control of the cool store operations and the ability to complete tasks in a timely manner. A lack of control means that when the coordinator needs to find a member capable of contributing extra volume in a given period it becomes difficult for those using a third-party cool store to commit their fruit in a short time frame. The Manager at Good Fruit Ltd. explained that his company, which operated their own cool store, "had the advantage of being able to load very, very quickly. Whereas a lot of the other groups didn't have that same flexibility. Often it would just delay us by 24 hours for a situation that we already knew [. . .] offering it out to the group wasn't going to make a lot of difference," as the other groups were unable to take advantage of the situation.

The Manager of Good Fruit noted that:

> We have our fruit packed and cool stored all on the one site and we load our own containers. So it means that in the click of the fingers we can get a container loaded pretty much. Whereas other operations, or many their operations, use third party cool stores. So lets say they have an opportunity to load a container straight away they need to contact the third party cool store and they might find they are actually number 28 in a long list of other jobs [. . .] that exist. So it is not a simple task of just saying [to the coordinator] "Yeah, we can load that container right now," or in our case we might have had loading boats for a Tuesday cut-off, a Thursday cut-off, and a Saturday cut-off. And it might be that we have a container all ready to go for the Saturday and then saying "Actually, we have an opportunity now for the Tuesday," so we can say "Right, let us delay the loading of the Saturday container and do the Tuesday one first"; we had that instant flexibility.
>
> Manager, Good Fruit

The flexibility to adapt to the changing opportunities, presented by the cluster, is a significant advantage. Agility in the operations of all members may make the cluster operate more successfully. Greater agility allows a member to take advantage of additional shipping capacity as it becomes available through the cluster, and the cluster should be more able to meet the volume allocations and avoid penalties.

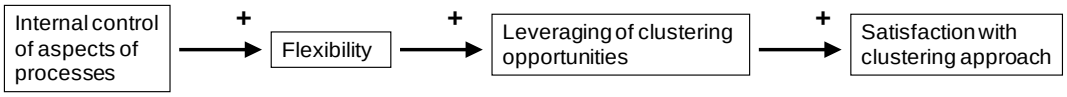

Figure 7.15: Advantages of operational flexibility

Not all firms contribute equal proportions of their volume to the cluster allocations, creating another source of heterogeneity. This means that some may be placing portions of their volume with other shipping lines. Reasons for splitting volume can relate to the mix of goods shipped, cost of the service, or the ability of an alternate shipping line to service a customer, using different

delivery characteristics. This may include the preference of the customer to receive one larger shipment of fruit, rather than multiple smaller shipments of fruit, to suit their flow plan and programme. Delivery speed differences between shipping lines enable some exporters to be flexible with shipping as they have more options available to them. There may also be the temptation to take volume otherwise allocated to Shipit, and allocate it to alternate shipping lines.

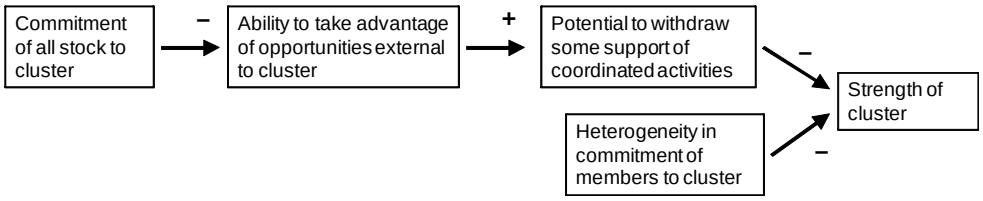

Figure 7.16: Ability to take advantage of opportunities outside of the cluster

7.5.3.5. Heterogeneity in WineCom

There is a wide range of firm sizes in the region where WineCom is located. Some large multinationals have local operations and there are many smaller owner operator vineyards or winemakers. Since there is little coordination of materials handling in the region there cannot be discussion of the level of heterogeneity in volumes. The size of firms, as well as the day-to-day management activities, varies greatly: some firms are run by professionals in the industry while others are run by individuals who have full time employment in other professions. Firms with owners or managers that devote their full attention to the industry are likely to have enhanced capabilities to contribute to the cluster.

7.5.4. Competitive pressures

Within each cluster there is a state of coopetition where members are locked in a perpetual state of competition, and securing higher returns from short-term efforts may compel some to act in a way that threatens the long-term success of the cluster. When opportunities arise to profit outside of the cluster, members may take that opportunity to compete. The danger arises as these members may neglect to take actions that are in the long-term interests of the cluster, or they may take short-term actions that directly hurt the ability of the cluster to succeed in the long term.

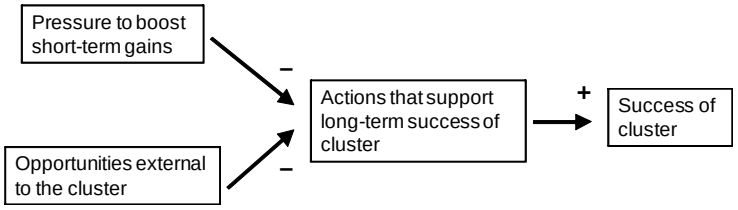

Figure 7.17: The impact of competitive pressure

7.5.5. Lack of risk and reward sharing

The sharing of risks and rewards between members in a collaborative venture can be very challenging and is ranked as one of the most significant barriers by Fawcett et al. (2008) and Ballou (2007). The barrier is the structure and determination surrounding not only how the rewards of cooperating together are to be shared, but how the sharing of costs or risks of cooperating must be split.

Benefits from successful coordination can be equitably split between internal divisions. The division of the successes that come with effective operation as a cluster working cooperatively is more strained. Each member of the cluster expects to benefit from their contribution to the cluster. In this section the methods used will be compared and contrasted.

7.5.5.1. Identifying the rewards

The key benefits observed by the members in a cluster are related to the intentions and objectives of the cluster as a whole. In NZBrand the objective is to grow market share by developing new markets. HortCom members aim to secure guaranteed shipping services to enable them to meet demand while maintaining competitive shipping rates. Members of WineCom seek to share market information. JEMCO members aim to develop long-term markets.

In both NZBrand and HortCom the objectives (of developing market share and success with the shipping service, respectively) can be measured objectively. The members of NZBrand seek to grow market share through ensuring consistency in the supply of quality fruit, bringing increased returns. The members of HortCom seek to ensure guaranteed shipping to meet customer requirements, with success measured by the securing of shipping at the right price.

7.5.5.2. NZBrand rewards and cost sharing

The benefits from NZBrand are realised through the generation of greater revenue streams while developing a new market. The revenue from a customer is split on a pro rata basis, based on volume contributions. Greater success in target markets equates to greater revenue for NZBrand which in turn equates to greater returns per member.

This structure ensures simplicity in administration since there are few complexities in the arrangement. A primary benefit is that a member will be willing to allow others to draw upon their own supply chains, as the contribution attracts an ‘average’ amount of revenue. Using an average value of revenue per unit means that there is no cost in not supporting another member. This is because the member knows that they are not able to seek a higher return elsewhere by reserving

the fruit to serve their own customer; the average return will be the same if sold to their own, or the other's, customer. The structure ensures amicable sharing of supply, improving the outcome for all.

Growing and developing market share can accrue many costs, particularly in Japan, which is recognised as being a high-cost market to service. Each member of NZBrand has different capabilities despite the relative newness of the industry. One has stronger ties with different shipping lines and has more capability to effectively organise the shipping processes. This capability indicates that this member has existing processes that have been refined to achieve effective outcomes. On the other hand, another member is extremely proactive and professional with marketing and has strong international connections. Again, the existence of this capability implies effective processes within the member's operation.

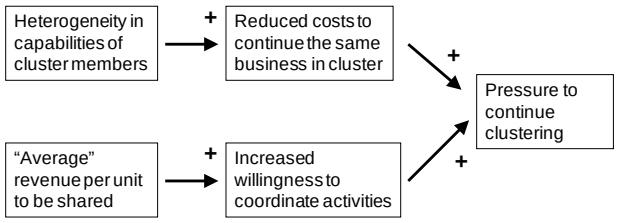

Figure 7.18 Capabilities and revenue sharing promote clustering

Coordination in NZBrand enables a member to complement the capabilities they possess by drawing upon those of other members. The one with the strongest capabilities in a certain activity can perform the activity in the most cost-effective manner. Increasing the volume of work the specific member will accomplish using this strength usually generates economies of scale. The cluster benefits by allocating tasks to those best able to accomplish these tasks, and the costs associated can be reduced. The cluster can achieve the same result at a lower total cost than could be achieved independently.

The costs incurred by each member can be split among the others on the basis of supply. The member with the highest proportion of supply pays the highest proportion of costs, a method that reduces ambiguity about the level of costs and responsibility for paying them. Payment of bills is extremely important despite the level of collaboration and costs and payments are watched carefully. As one manager exclaimed "if people don't pay bills they get hammered. You wouldn't get a dirty letter – you would get hammered."

The revenue for NZBrand is paid to a single member of the cluster, responsible for disbursement to the other members of the appropriate share. Utilising the capabilities of the member with the

highest expertise in international finance ensures that the best foreign exchange management techniques can be applied to the revenue.

7.5.5.3. HortCom rewards and cost sharing

Working together in HortCom the members negotiate with Shipit to ensure an adequate volume of shipping capacity during the peak of the season so they may meet customer expectations regarding fruit movements. The allocation of the capacity for the cluster is performed using an independent coordinator, ensuring that there is no abuse.

Not all capacity was created equal; the two major markets for HortCom members are North America and Europe. An imbalance in the capacity provided to each market resulted in capacity to one of the markets being in shorter supply than members desired. The shortage resulted in jostling for position among the members, with some expressing displeasure at the final allocation.

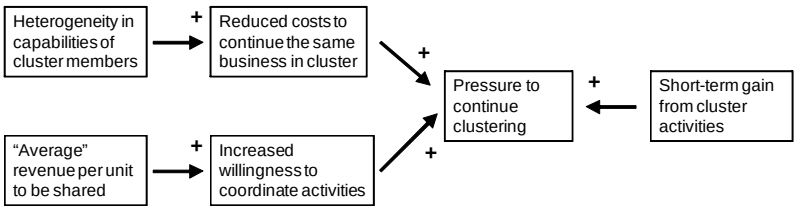

Figure 7.19: The role of the coordinator and the impact of allocation

The complexity of matching the requirements of an individual member with the capacity offered by Shipit was absorbed by the coordinator. The capacity could be known in advance but uncertainties surrounding the harvesting of the fruit, impacting on shipping requirements of members, caused allocation issues. These issues were inflamed by many members vying for limited capacity destined for specific markets.

The sharing of the costs associated with the coordinator role is split between members, proportional to the volume of supply they contribute.

7.5.5.4. WineCom reward sharing

WineCom members aim to secure and disseminate market and industry information. This objective is accomplished effectively using the existing structure. In the few instances of horizontal coordination in the cluster the relationships are managed on a contractual basis. The allocation of the supply, or the capacity, is on the basis of common sense, in the context of the intensity of work during the peak period in the industry. Costs are split on the basis of the proportion of supply for each member. Membership in the industry associations bears a small cost.

7.5.5.5. Risk and reward sharing summary

In both HortCom and NZBrand the sharing of costs is proportionate to the supply contributed by each member. HortCom has the additional complexity of having multiple markets that are served by the cluster members. Splitting costs is based on the proportion of total volume contributed by a member, providing an unambiguous split of costs. No specific procedures are in place to reward members for the contribution of capabilities that the cluster uses. NZBrand pools revenue so members receive an equal share per unit, no matter which member's supply chain was used to satisfy demand; a greater share of the volume attracts a greater share of the revenue.

7.5.6. Inconsistent goals

Different goals exist for different groups of people in each cluster. The inconsistency of goals amongst members can cause problems, particularly when the objectives of one may cause them to act detrimentally to the pursuit of the cluster goals.

7.5.6.1. NZBrand goals

Within NZBrand the objective is to develop emerging markets for their products, and service these markets effectively. Each member has several objectives; an immediate and important focus is to return value to the shareholders while a longer term goal is to further the cluster objectives to ensure long-term revenue growth.

To secure short-term profits members may be encouraged to take actions that cause 'ripples'. These include not fully supporting the activities of the cluster, whether this involves committing less volume than agreed, or neglecting other duties that may be required by the cluster, particularly surrounding the development and sharing of flow plans and customer information. More opportunistically, volumes may be allocated to alternate markets if a member believes that it may be more profitable than fulfilling obligations to the cluster.

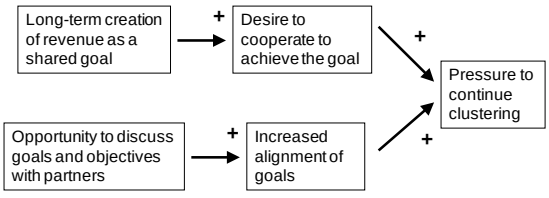

Figure 7.20: Shared goals aid clustering

During the off-season members discuss the season they have just completed. Discussions highlight differences in members' goals, ensuring alignment of objectives. Gaining short-term benefit from

clustering also increases the pressure to cluster by removing the desire for short-term benefits from methods that may damage the cluster.

7.5.6.2. HortCom goals

Some HortCom members need the guaranteed volume more than others, yet not all will commit their total volume to the cluster. Smaller members may switch some volume to alternate shipping lines if other capacity becomes available, to ensure a more favourable rate or to meet obligations to deliver to a customer to a prearranged programme. Larger members participate in several horticultural chains and require capacity at other times for other fruits or vegetables, requiring that relationships with alterative shipping lines be preserved.

Each member has obligations to secure the best returns for the growers they represent, and actions may be taken for short-term profit rather than the long-term sustainability of HortCom. Misalignments are particularly acute where a small member may have volume allocated to other shipping lines. Where lower prices can be secured with the alternate shipping line the member may reallocate capacity to the cheaper shipping line.

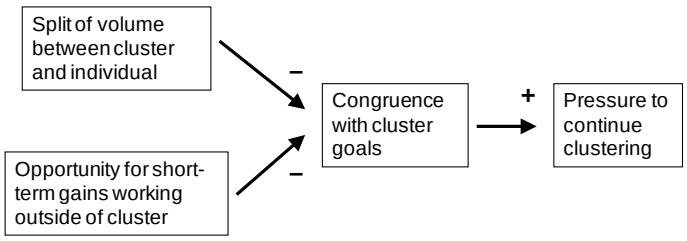

Figure 7.21: Split of volumes and short-term gains can threaten clustering

Leveraging these shipping costs discrepancies incurs cost: if this is a frequent occurrence or is on a large enough scale other members will become aware of it. The Manager of Delicious Fruit notes that “if they start going around and offering their volume to other shipping lines – you hear about it.” The reputation of the member may be damaged, making it more challenging to engage in HortCom.

Intensive pre- and post-season meetings, where the procedures and operations for the cluster activities are discussed, ensure greater commonality in goals.

7.5.6.3. Differences in goals

NZBrand members face conflict over short-term opportunistic behaviours to generate profit rather than support the long-term objectives of the cluster. These differences can be resolved using post-

season meetings. In HortCom, the ability to split volumes may reduce the commitment to the cluster as a member seeks short-term gain outside the cluster.

7.5.7. Limited competitive focus

Differences in the competitive foci can be identified with some clusters pursuing cost benefits only, while others seek to generate greater value over the supply chain. JEMCO and NZBrand seek to both reduce costs and add value to their customers, for example, by ensuring quality output and increased consistency of supply. On the other hand, HortCom coordination focuses on cost-effective supply of capacity. In WineCom members gain value advantages through securing a niche.

7.5.7.1. The cost and value focus of NZBrand

NZBrand reduces costs through the use of complementary capabilities of members of the cluster. Each member's capabilities can be used by the cluster to service the target market at a lower cost per unit. NZBrand gains cost advantages that help to secure a favourable position relative to their southern hemisphere competitors. Lowering costs while servicing the high-cost Japanese market was a primary stated goal for the cluster.

Over time, further benefits have been realised that extend beyond a cost focus. The cluster has developed further competitive priorities by focusing on the value and delivery of their fruit. The most important value propositions for NZBrand are the emphasis on continuity of supply and delivering high quality fruit for customers.

Using multiple supply sources scattered over several regions enables NZBrand to ensure greater continuity of supply. If fruit cannot be harvested from one region it may be sourced from another member of NZBrand from another region. From the customer's perspective there is a more consistent supply of fruit with a longer period of availability. Also important for the customer is the fact that the fruit still comes from New Zealand even if the actual supply chain is not the expected one.

Working with other industry associations NZBrand are able to investigate and implement accepted techniques and standards to ensure that fruit are of high quality. Such cooperation amongst industry associations also enhances NZBrand's efforts to ensure a continuous supply of fruit matching the specific requirements of the customer.

NZBrand's initial focus on costs has been supplemented by increasing value for the customers, an important factor when considering the VPC profile of NZBrand.

7.5.7.2. The cost focus of HortCom

In contrast to NZBrand, HortCom's focus is the maintenance of value provided to customers by ensuring shipping services are guaranteed while ensuring costs are competitive.

Through the bulk guarantee of business by HortCom, members expect suitable prices to be offered. Individual members, particularly the smaller members with less volume, also look at splitting their volume between the capacity guaranteed by the cluster and other sources of capacity. Through this split of volume the total cost for shipping services may be reduced.

The focus on costs, while maintaining the same value, may be symptomatic of a cluster in the early stages of development.

7.5.7.3. The focus of WineCom

WineCom has several initiatives that aim to raise the quality and reputation of wine from the region. Having a juicing facility located within the region (that smaller members are also able to utilise) provides cost benefits by reducing the requirement of transportation over long distances. However, the primary stated goal of Juicing Co. is to increase the quality of the wine, creating more value for the customers, while maintaining price competitiveness. While there is a focus on value within the cluster the members have not been working closely to coordinate supply chain management activities. The opposite has happened: smaller winemakers or vineyards have developed niche markets for themselves. Overall, there is a focus on the quality of the product within this cluster.

7.5.7.4. The focus of JEMCO

It is difficult to determine the cost and value advantages offered by JEMCO. It can be assumed that because the cluster services high-cost markets, such as Japan, clustering allows economies of scale and utilisation of capabilities offered by members.

Larger processing plants could be constructed to service harvesting operations from several regions nearby, delivering economies of scale. However, there is a strong emphasis on the quality of JEMCO oysters, an emphasis that makes it unlikely that the oysters would travel long distances between harvesting and processing. Processing facilities for JEMCO oysters tend to be located close to the farms.

The existence of a single marketing function for the cluster enables members to share the costs of supporting the function. Specialised marketing services, centrally provided, generate significant

cost benefits to members. It is uncertain whether this marketing capability was developed collaboratively, or whether it is a capability contributed by a member.

To ensure a high quality product JEMCO must have a strong focus on competitive priorities relating to value. Huge effort goes into educating customers. It is possible to demonstrate that the JEMCO frozen half-shell oyster can, to an industry professional, appear to be as appetising as a fresh oyster from another region. Frozen oysters also create confidence for the customers as the JEMCO frozen oyster can be guaranteed to be free of any harmful pathogens or viruses. JEMCO oysters may be served to diners with the assurance that they are safe to eat, while providing a product with the quality of a fresh oyster. Being able to serve a quality product, while ensuring the safety of the diners, is a huge advantage to the buyers of JEMCO oysters. These developments and educational efforts represent value created for customers, indicating that JEMCO has competitive priorities other than cost.

7.5.7.5. Focusing on a niche market

Where members focus on a niche market there is less opportunity to coordinate activities. This is illustrated in Table 7.8, showing the number of 'hits' for each cluster in each category relating to niche marketing, incorporating a visual aide similar to 'snake diagrams' used in quality management. For each code the maximum number of hits is recorded to the right of the columns for cases. At the right of the table is a visual comparison for the cases, based on 'snake diagrams' or 'snake plots' commonly found in the 'house of quality' (Evans & Lindsay, 2005). The number of hits in each case can be determined to be low, medium, or high. For each case a series of plots is generated where the hits for each case are plotted and then joined with a line (a snake) moving down the page. Each case has a different coloured line allowing for an easy comparison between cases. When the line for the case is on the far left of the case this indicates that the code is less important in that case; when in the middle this indicates that the code is relatively important in the case; when on the far right, the indication is that this code is important in the case. If the line for a case is predominantly on the left, these codes, as a whole, are relatively less important in the case; if the line is on the right, the codes are relatively more important in the case. In Table 7.8 the lines overlapped on the left so they were shifted apart for clarity. In this table the comparison indicates that a niche market is more important for WineCom as indicated by the line on the right of the column. This make intuitive sense in the context of the study and findings: if a firm seeks a niche and uses a differentiation strategy it is difficult to coordinate activities with other members.

Each member works individually to develop and supply a niche. Only if the cluster, as a whole, can develop a shared niche can greater levels of coordination take place. This is aligned with the

strategy followed by NZBrand as they became the only suppliers of New Zealand fruit, creating a niche.

Table 7.8: Focus of individual members on a niche market

Code	Cases			Max	Low-Med-High
	HortCom	NZBrand	WineCom		
Diversity	0	0	5	5	
Leading Market	0	0	1	1	
Market Selection	0	0	2	2	
Premium-Boutique	0	0	4	4	
Pricing	0	2	4	4	
Quality	0	0	3	3	
Reputation	0	0	3	3	
Specialisation	0	0	5	5	

7.6. Methods used to bridge barriers

In this section the methods used to bridge the identified barriers, are discussed.

7.6.1. Lack of information sharing

The lack of information sharing barrier was bridged differently by each cluster.

In NZBrand the barrier was bridged by acceptance that working together would bring benefits. Previous experience and amicable history between the individuals enhanced their ability to share information.

In HortCom the barrier was bridged through the use of the coordinator and the presence of a strong external party who pushed for better capabilities in information sharing and planning.

In WineCom only general information, relating to markets and industry trends, is shared and is not considered proprietary to any one firm in the region.

7.6.2. Distrust and unwillingness to work together

The barrier of distrust and unwillingness is strongly related to the barrier of a lack of information sharing.

In NZBrand this barrier was bridged through the existence of a short and shared history between the individuals who initiated the cluster. The history enabled them to jointly see greater benefits that could be gained when they worked together.

In HortCom the barrier was bridged through the use of an independent coordinator for the cluster. The coordinator ensured volume information about each firm was not revealed to the other members of the cluster. In this respect, the level of trust and willingness is less mature than in NZBrand.

In WineCom there is adequate trust and willingness to work together in terms of sharing general market information. There is less willingness to share more specific information, or capabilities. The ability and willingness to collaborate with others in the region is built on long-standing friendships between respected business people. The emergence of large multinational-controlled operations in the region has subdued the formation of personal relationships.

7.6.3. Power and capability imbalances

Power imbalances have been dealt with very differently by the clusters. In NZBrand there is recognition that power imbalances exist between the members. However, the members with a greater volume, and thus greater perceived power in the cluster, are acutely aware of this imbalance and seek self-effacement in their interactions. They attempt to make all of members of the cluster contribute and take part, and do not attempt to take advantage of their perceived advantage. There is a range of different capabilities that members contribute to the cluster.

In HortCom power imbalances exist, aggravated by the perceived existence of two classes of members. There is a sense that the newer members of the cluster should be pleased and grateful that they are able to participate. Some members feel that others do not have to participate in the cluster and should cope with events if they do. This attitude is in contrast to the self-effacement evident in NZBrand without which it is difficult to determine how the barrier might be bridged. As HortCom coordination involves volume aggregation only, there is little opportunity for members to contribute capabilities that the cluster is then able to leverage.

7.6.4. Competitive pressures

Within the clusters varying usage of different forms of group pressure were utilised to secure greater coordination and reduce the likelihood of competitive pressure becoming too strong. The pressure could be applied vertically or horizontally in the supply chain. The use of pressure to help control the activities of the cluster members was most evident in NZBrand. In HortCom horizontal pressure is evident to a limited degree. In WineCom there is difficulty in applying pressure due to the low levels of cooperation. No primary data was available to understand the use of pressure in JEMCO.

7.6.4.1. Horizontal pressure in NZBrand

Within NZBrand there are two forms of pressure: horizontal pressure between members and vertical pressure from suppliers and customers.

When there is a ripple, or an issue, that concerns a member, horizontal pressure is brought to bear on the member that caused the issue. Such pressure can be applied because of the closeness of the founding members and the tight-knit nature of the industry. 'Hard words' may be used and these will have an impact not just on the immediate issue of concern, but also with the offending member during future interactions in the industry. Members are required to explain and defend actions in a meeting with their peers.

Initially, only horizontal pressure could be applied within the cluster. The members must be self-policing and bring one another into line. The key figures in creating the cluster had worked closely together in the past and "are co-directors on industry councils and committees and directors of exporter boards, exporter product groups." There is plenty of shared history and understanding between key individuals. It means that "the human beings are very familiar with one another, which is a major asset in putting something like [NZBrand] together." Familiarity allows members to express displeasure at disunity if it is shown. In some ways the cluster has almost formed a 'clan', exerting control over the members.

In addition, the members "all had a common goal. So by getting together to collaborate [. . .] the common goal, it was common sense" (General Manager, World Fruit Ltd.). Commonality in the goals and vision make it very difficult for a member to argue that the actions they took, which caused an issue, were sensible and logical.

Horizontal pressure may be applied when members understand that it may take time for coordination to create benefits. The horizontal pressure can act as a 'glue' to pull the members together at the start of the cluster, helping them to act in concert. In this manner it is a counter-balancing force to the competitive pressures.

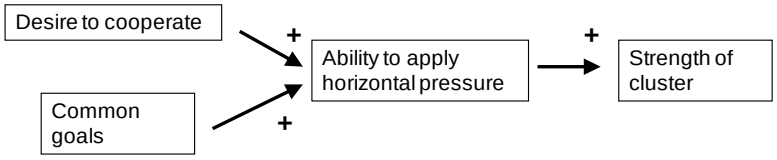

Figure 7.22: The application of horizontal pressure

7.6.4.2. Vertical pressure in NZBrand

NZBrand also experiences vertical pressure along the supply chain. These pressures are exerted on the members to improve or sustain performance and may come from both upstream and downstream actors, from both suppliers and customers.

The growers, suppliers of NZBrand, are interested in the success of NZBrand as the venture improved their most important KPI: the returns they receive. NZBrand, enabling higher returns to be delivered to growers and reducing the variation in these returns, has brought direct economic benefit to the suppliers. Furthermore, there is greater stability in growers working with packers. If there are differences between packers due to swings in returns that are passed up different supply chains, pack houses can attract growers by advertising that they are with a specific exporter who generated superior returns during the previous year. With the NZBrand venture, the returns become stabilised and more uniform over the industry, reducing differences between pack houses. As the returns offered by packers homogenise there is a reduced rate of growers switching allegiance between packers.

NZBrand has ensured greater consistency in the quality of fruit exported. Their customers are able to source fruit that meets their requirements, providing greater certainty of supply, and assurance of consistency of quality. These benefits ensure that the customers are also keen that NZBrand continues, creating further vertical pressure.

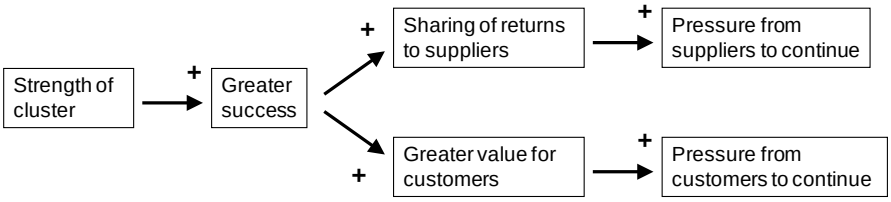

Figure 7.23: Development of vertical pressure

These examples of vertical pressure, from the customers and the suppliers of the cluster, take time to build. The stability and increase in average returns to growers becomes apparent after several seasons on the accumulation of adequate data. Improved consistency and ability to supply the customers also become apparent after several seasons. In both cases there are delays of several seasons in the formation of the vertical pressure. The pressure originates from stakeholders and is external to the cluster, but acts to counter-balance the natural competitive pressures within the cluster.

7.6.4.3. Pressure in HortCom

In NZBrand it took time for the vertical pressure to develop; newer clusters are unlikely to develop vertical pressure early. In the relatively new HortCom cluster there was an absence of vertical pressure, and the horizontal pressures observed were of a different nature.

The main pressure that holds the members of HortCom together is the requirement to secure shipping capacity. As one manager put it, "You got to ship to your customers every week; you got to have to be able to guarantee your supply." There is pressure on the members to guarantee the supply of their output to customers and this guarantee is contingent upon the availability of shipping capacity. This pressure compels the members to collaborate.

The nature of this pressure is a 'negative' form; it is the 'fear of not having shipping' rather than a positive 'let us work together for our benefit'. As one member put it, they "appreciated that we needed people that would stick together. We needed volume to have critical mass to register on the [Shipit] radar. And we certainly had more options in terms of getting a better deal or arrangement by being part of a larger collective group than trying to go it alone" (General Manager, Good Fruit). This pressure to secure guaranteed shipping has driven the group.

The primary external source of pressure is Shipit. From previous experience with similar shipping groups, Shipit managers were aware that effective planning was paramount to securing an effective outcome for all parties. Shipit required HortCom members to thoroughly plan stock availability so that Shipit could ensure that the correct capacity would be available. This was a source of pressure external to the cluster.

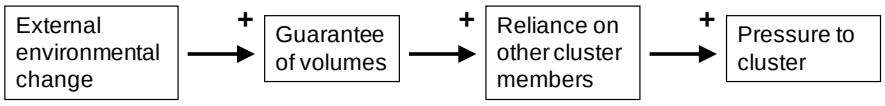

Figure 7.24: External environmental changes force clustering

If some HortCom members are better at meeting shipping schedules and customer requirements this should translate into growth in returns to their growers. The potential to become more attractive to their clients may lead more capable exporters to develop further capabilities in securing shipping options to meet customer requirements, motivating members of the cluster to act with increasing cooperation and encouraging more flexibility and agility in their internal operations.

If HortCom members could utilise the supply of other members, as NZBrand exporters can do, they would be more able to meet customer requirements and generate greater customer satisfaction.

7.6.4.4. Pressure in WineCom

WineCom engages in limited active coordination of supply chain management so there is little pressure. There is recognition that market and industry information must be shared. The members' perspectives indicate that membership of industry associations and the local community ensure events in the industry are well known. The information can create reputation effects that may influence member behaviour.

7.6.4.5. Differences in the vertical interactions and linkages

There are distinct differences in the vertical interactions in the supply chains of the clusters studied. This has some bearing on the amount of vertical, as opposed to horizontal, pressure that can be generated in the clusters. With greater interaction vertically there is greater opportunity for suppliers or customers to exert pressure to continue coordination efforts in the cluster. Generally, in HortCom there was less vertical interaction. In WineCom and are greater more specialist requirements that impact on customer and supplier relationships. There is also industry reliance on long-term commitment in vertical relationships in the supply chain. The use of clusters in both WineCom and NZBrand is well aligned with higher levels of communication vertically with suppliers and customers. In NZBrand the information was frequently specific to customer requirements and inventory; in WineCom the information was general market information and inventory requirements. In contrast, the vertical flow of communication and inventory information was less important in HortCom (Table 7.9)

Table 7.9: Differences in vertical interactions in the supply chains

Code	Cases			Max	Low-Med-High
	HortCom	NZBrand	WineCom		
Certainty of supply	1	12	3	12	
Commitment	5	2	10	10	
Communication	0	17	14	17	
Cultural difference of market	0	1	0	1	
Domino effect	2	5	8	8	
Focus differential	0	1	0	1	
Interface	4	5	0	5	
Inventory movements	2	11	13	13	
Pressure	1	2	0	2	
Pricing-Billing-Invoicing	2	3	0	3	
Sharing problems	0	5	0	5	
Shop-around	0	1	10	10	
Specialist	1	4	8	8	
Suppliers-RM	2	10	5	10	
Variety increase	0	0	5	5	

7.6.5. Lack of risk and reward sharing

The lack of risk-and-reward sharing practices in the clusters are similar. In both NZBrand and HortCom, costs are shared amongst members on a pro rata basis, split proportionally based simply on volume contributions.

NZBrand also generates revenue which is shared among members. One method of securing greater buy-in from the members is to ensure that none will be better or worse off by contributing to the cluster than they would be if they acted independently. This is achieved by creating an ‘average’ value for revenue per unit, no matter which member contributes it.

In WineCom there is no sharing of risk or rewards as there is no coordination in supply chain management within the cluster. In the isolated pockets of collaborative ventures, such as the juicing facility, costs are allocated on a pro-rata basis.

7.6.6. Inconsistent goals

There is no clear method to bridge the barrier of inconsistent goals between members. In both HortCom and NZBrand the members are constantly engaged in a large amount of communication both pre- and post-season. During these discussions dissimilarities that are forming can be

identified by members and new procedures created to rectify the issues, or new consensus may be found.

In NZBrand there are fewer members and they aim to resolve an issue in one day. Reaching swift unanimous consensus shows that the group accepts that they need to bring their individual goals into alignment.

7.6.7. Limited competitive focus

The competitive foci are dissimilar with some clusters pursuing a more limited focus. At the most basic level all the clusters seek cost benefits from clustering, acting as if they were a larger organisation, seeking economies of scale.

The use of a cost focus, and cost saving measures, appears to provide "a few runs on the board" before the cluster moves to other priorities. Securing these quick and easy benefits helps members to see immediate value and payback from the cluster. Quick rewards help draw members closer and secure greater commitment to the cluster, enabling measures to be implemented to develop other competitive priorities.

NZBrand generates other sources of value for customers, including ensuring greater consistency of quality of fruit and greater consistency of supply. Such priorities require better planning, more information sharing, and greater trust among the members.

7.7. Case summaries

NZBrand and HortCom are affected by many factors. Previous figures have been summarised and collated to show key factors that impact on the coordination in each of the clusters. The comparisons in this chapter have broken the cases apart and these figures, summarising each case, return a sense of completeness to each of the NZBrand and HortCom cases.

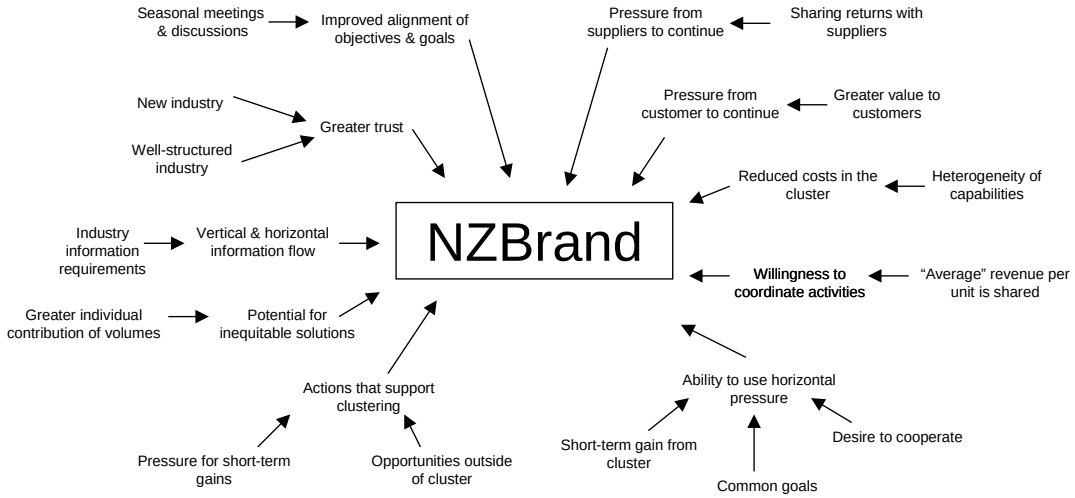

Figure 7.25: Factors affecting horizontal coordination in NZBrand

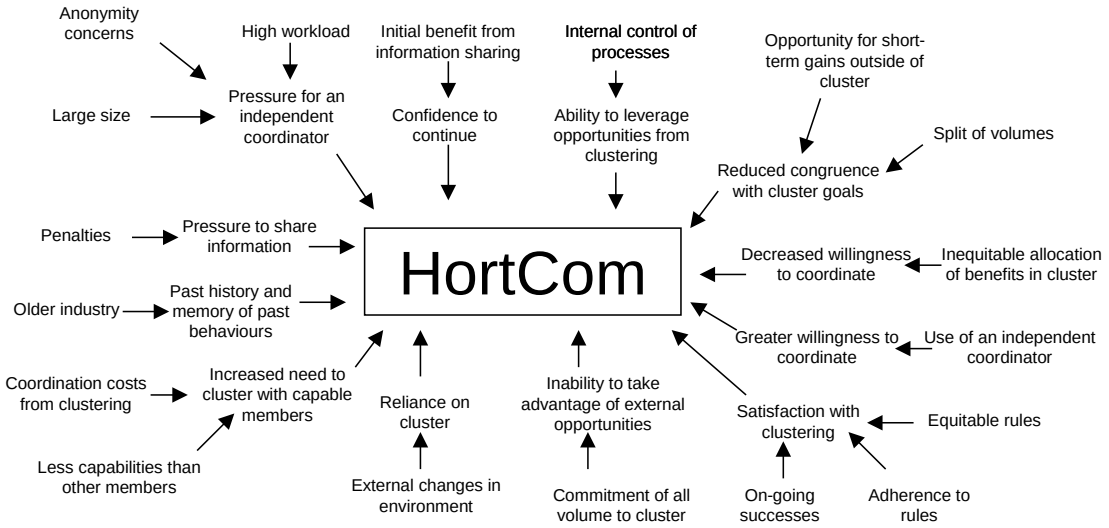

Figure 7.26: Factors affecting horizontal coordination in HortCom

7.8. Conclusions

Throughout this chapter the cases have been compared and contrasted and the barriers that they face have been more clearly identified. Methods that have been used to bridge these barriers have been identified and discussed in brief; a more complete treatment will follow in the next chapter, with greater reference to extant literature and salient theory. The key barriers identified have been a lack of willingness to share information, a lack of trust and willingness to work with others, power imbalances in the cluster, the structure for risk and reward sharing, inconsistent goals, and the competitive focus of the firms.

7.9. Cross case comparison of barriers

Table 7.10: Cross-case analysis between clusters

Barrier	Case	Solutions	Comments/nature
Lack of information sharing	NZBrand	Information sharing to reduce surprises	
		Mutual trust	Requires personal relationships and positive history.
		Post season discussions	
		Rich flow of information	Must occur vertically and horizontally for effectiveness.
	HortCom	Forced joint flow plans	
		Penalties in place	Penalties focus attention on successful information sharing so penalties are not incurred.
		Central coordinator	Overcomes difficulties of coordinating a large cluster.
		Anonymity through coordinator	
	WineCom	Regional association shares some information	Information is general/strategic level only.
		Specialised computer software	Eases paper trail to comply with regulations.
Distrust and unwillingness to work together	NZBrand	Small clusters	Easier to form close relationships.
		New and well structured industry	
		Past success	Positive cycle.
	HortCom	Central coordinator	Provides anonymity making members more willing to share information.
Heterogeneity	NZBrand	Sharing of complementary capabilities and volumes	
		Comparable operational flexibility	
		Leaving the ego at the door	This reduces the impact of differences in volume contributions which could be used to exert power.
		Encouraging smaller member participation	Makes the members feel more involved and committed to the cluster.

Barrier	Case	Solutions	Comments/nature
Heterogeneity	HortCom	Coordination to overcome split of volumes	
		Strong coordination and planning	This overcomes differences in planning capabilities of members. The planning does not overcome the operational flexibility that allows some members to take advantage of opportunities while other members are unable.
		Equitable rules	Adherence to the rules generates more confidence in the cluster operation.
Lack of risk and reward sharing	NZBrand & HortCom	Splitting of costs pro rata based on volume contribution	Operationally simple and equitable.
	NZBrand	Splitting of revenue on an averaged basis	Operationally simple and encourages cooperation.
Inconsistent goals	NZBrand & HortCom	Buy-in required	Agreement by members on what is required.
	NZBrand & HortCom	Post-season evaluation and review	Ensures alignment between cluster objectives and individual objectives.
Limited competitive focus	NZBrand	Cost and value focus	Generates vertical pressures.
	HortCom	Cost focus only	Simple to initiate and attains ‘quick wins’.
	WineCom	Focus on value only	Through offering a quality product members can secure a niche.
	JEMCO	Focus on cost and value	

Chapter 8. Discussion

"The duty and the task of a writer are those of an interpreter."

Marcel Proust, French novelist and author.

The previous chapters have discussed and analysed the cases under study, leading to results that need to be discussed and compared to extant literature in the present chapter. The contribution of this chapter is derived by drawing on the analysis of the cases and contrasting the findings with the literature in order to derive both managerial and academic implications. In order to do this the salient findings from the research are extracted and placed in the context of the wider body of knowledge. The focus of the discussion is maintained on the barriers to horizontal coordination in clusters and how they may be bridged.

The emphasis throughout the chapter is on the operationalisation of the findings. The first aspect addressed is the governance structure of the cluster, looking at alternate structures and some barriers that each structure may present. Following this the results from the research are outlined and compared to theory: the TCE and network governance perspectives are first examined, then the RBV and resource dependency. The interactions between many variables are examined in the following section on coopetition, where a systems dynamics approach is used to understand the pressures to compete or cooperate. The results of the research are then compared with the literature in the supply chain management domain. The barriers to horizontal coordination are discussed, along with the role of horizontal relationships, the role of clusters in sourcing, and the impact of capabilities in clusters and the role that clusters have in competitive positioning. Finally, the implications of the research are outlined, directed at both managers and academics.

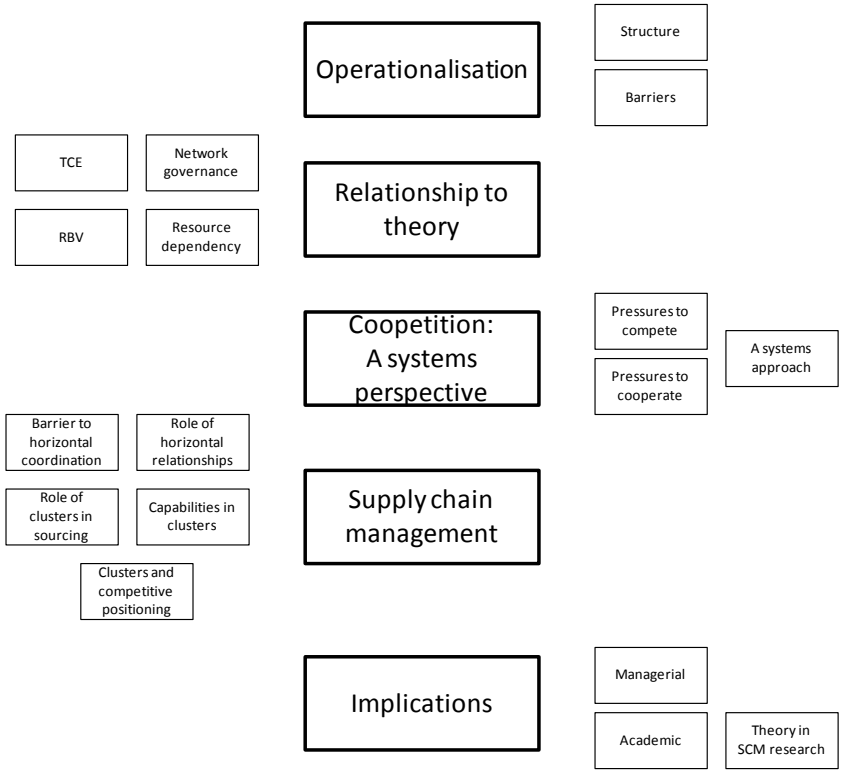

Figure 8.1: Concepts and structure of this chapter

8.1. Answering the research questions

Throughout the earlier chapters the answers to the research questions have been elucidated. Now succinct answers are provided to the original research questions.

Research question one:

> *What are the barriers to improved horizontal coordination, between the members of a cluster, to improve supply chain management?*

During the course of this research several barriers to forming effective horizontal relationships have emerged:

- lack of information sharing;
- distrust and unwillingness to work together;
- power and capability imbalances;
- competitive pressures;
- lack of risks and reward sharing;
- inconsistent goals; and,
- limited competitive focus.

When the first research question has been answered we can proceed to answer the second question.

Research question two:

How can these barriers be bridged to allow successful coordination?

The barrier of a lack information sharing may be overcome through forming a small cluster with like-minded firms where strong personal relationships abound. If a larger cluster needs to be formed the presence of an independent coordinator, responsible for gathering and assimilating information, may help to overcome initial reluctance to share information. If the members work together to generate a joint flow plan, or to understand the output of the cluster, this exercise can help them to begin to release information they would otherwise be unwilling to discuss.

The barrier of distrust and unwillingness to work together can be bridged by forming a small cluster with members who have strong personal relationships among themselves. The presence of associations in the industry, spanning both vertical and horizontal dimensions, allows individuals to develop strong relationships. Where a larger cluster is required, with members who lack these strong relationships, an independent coordinator may be required to circumnavigate any distrust between members. Such a coordinator can be perceived as impartial, with members more willing to trust someone whom they pay. Over time, the ideal case would be for members to move beyond the use of a coordinator, to reduce costs.

The barrier of power and capability imbalances can be bridged by the larger or more prominent members of the cluster being aware of and downplaying their status. Where possible all members in the cluster should be equally involved and engaged in activities. When a sense of superiority is vaunted the activities of the cluster can be strained and it is unclear how this situation may be resolved effectively.

Power imbalances may also be related to the capacity of individual members to contribute capabilities to the cluster. The barrier of homogeneity in the capabilities of firm members can largely be overcome by involving a smaller number of members. If there are a large number there will likely be more homogeneity in capabilities as there will be greater redundancy in the capabilities available for the cluster to employ. When this occurs the members that contribute more capabilities must be aware of the situation and tolerate it. Though not unveiled by the research, it may be the case that a member that was not contributing much could be encouraged to develop new capabilities to benefit the cluster. When there is a focus only on cost as a competitive priority there may be less opportunity for members to contribute capabilities to the cluster.

The barrier of competitive pressures relates to the coopetitive nature of the clusters. A key method used to control competitive pressures is to increase the pressure to cooperate. This is accomplished through generating group pressure which may exist horizontally or vertically.

The barrier of a lack of risk and reward sharing is not easily bridged and will be more or less significant depending on the level of coordination the cluster achieves. The sharing of costs can be achieved simply through the allocation of cost proportionate to the volume contribution of each member. Some members also contribute their capabilities to the cluster and the only method identified for sharing this cost is to take the total cost of the activities for the cluster and, again, split this on a pro rata basis. However, this does not necessarily reward the member for having developed and contributed that capability.

The barrier of inconsistent goals is relatively insignificant when compared to other barriers, and it may be bridged by generating buy-in from the members to support the cluster objectives. When members all actively understand and support the long-term cluster objectives, their own individual objectives can be more easily aligned. If members see benefits from the cluster activities in the short term they are more likely to align their goals and objectives; the attainment of some ‘quick wins’ can help achieve alignment effectively over the long term.

The barrier of a limited competitive focus, on cost, can be bridged by understanding how the members of the cluster can work together to create move value for their customers. Demonstrations from the NZBrand cluster indicate that sharing volume with other members can increase the offering of produce over a longer period, ensure continuity of supply, and increase consistency of the quality of product. Moving from pooling resources to achieve cost savings in a single aspect of activity can be extended to other activities utilising similar principles of cost-sharing outlined earlier. Many of these other activities may also begin to generate greater value for customers as an unintended side effect.

The previous chapter outlined the key barriers to effective horizontal coordination in clusters, and how these barriers may be overcome. The outcomes may be re-integrated into the wider body of knowledge that helped to inform the parameters of the study.

8.2. Governance of clusters

The governance mode and structure of the clusters differed and offered different benefits.

8.2.1. Transaction Cost Economics

Transaction costs are designed to reduce the level of opportunism by the parties involved in the transaction. In the case of the clusters where there is a high level of coopetition the potential for opportunism should be high. As each firm is mutually competitive, these pressures provide incentives to take advantage of the situation – and behave in an opportunistic manner. This section explores the implementation of safeguards against opportunism, their evolution over time, and the role of transaction costs in the clusters.

8.2.1.1. NZBrand transaction costs

In NZBrand the organisations were familiar with one another and had a shared history. The small number of participants ensures that greater attention can be paid to engagement of other members with the cluster. After many years of operation, opportunism does still exist, causing ripples. A ripple can be a minor perturbation in the calm of their collaboration that has little direct malicious intent.

Official guidelines exist examining procedures surrounding the coordination. After many years these guidelines sit on a shelf; one manager said that he did not know where they were presently and would have to hunt for them if he wanted to find them. This indicates that the guidelines, originally designed to guide procedures for dealing with aberrations in coordination, are rarely referenced, in turn indicating that during the initiation of the cluster greater emphasis was placed on opportunism, creating a cost to the members as the procedures were devised. At the present, after nearly a decade of successful operation, the emphasis on protecting members against opportunism has been reduced. The original emphasis did not result in strict rules or give authority to resolve conflict relating to opportunism. The lack of such effective and formal mechanisms has been recognised by members as having the potential to hold them back in the future if there are serious issues surrounding opportunism.

Each of the members is aware of their obligations to the cluster. The size and closeness of the industry make it very difficult for a member to take an opportunistic action without the others discovering it. Smaller issues can be addressed rapidly and amicably. There is always the potential of the stronger members of the cluster to carry the weaker members, due to their disparity in volume and capabilities contributions.

Presently there is greater focus on creating value in their supply chain than on reducing opportunism. Recent events have provoked greater attention to the issue of opportunism. Members have realised that there are no rules and structures in place to formally resolve a case of malicious opportunism if it arises; the creation and implementation of such rules is under consideration.

There may be a lifecycle approach, where the cluster gradually drifts towards greater structure to prevent opportunism, a shift that may occur once members have seen a demonstration that opportunism can occur.

8.2.1.2. HortCom transaction costs

Within HortCom there is greater evidence of transaction costs. Procedures to reduce opportunism still occupy much managerial time and feature strongly in the structure of the cluster.

With a central coordinator to allocate volume amongst the members of the cluster, the structure of the cluster is an attempt to reduce the opportunism. This was indicated by the comments of some members that indicated a belief that others in the cluster would take advantage of their supply situation if full details were revealed. As a result, the existence of the coordinator represents a clear cost designed to reduce opportunism. The coordinator also accomplishes the coordination task for the cluster without extra burden on members, who note that it is time-consuming to arrange coordination during the peak of their season when they are already busy.

Penalties, directed against the entire cluster, also form a guard against opportunism. The structure encourages sharing of information and collaboration. To work closely together and then begin to identify and avail oneself of opportunities to take advantage of the relationships should become difficult. If there is a chance for opportunism the member will potentially bear a proportion of the penalty, charged against the cluster itself, along with reduced trust from other members.

8.2.1.3. WineCom transaction costs

As WineCom has limited horizontal coordination in the supply chain there are few transactions between the members that need to be protected against opportunism. If the cluster evolves, and more transactions occur, structure will be required.

8.2.1.4. Conclusions about transaction costs and opportunism in the clusters

In NZBrand there is an implicit acceptance that there may be some opportunism in the working relationship between the members. This is accepted as a small price to pay in order to secure the benefits of working with the other members. However, all are liable to pay for costs incurred, presenting a standard that members are aware they will be held to. In NZBrand there is limited use of structure to prevent opportunism as the members implicitly recognise the greater value that they are able to gain, by working together, as being worth more to them than they stand to lose with small cases of opportunism. There is awareness that there is growing need for structures to prevent and resolve opportunism, to allow the cluster to continue effective operation.

Within HortCom, however, there is greater use of structure to reduce opportunism, through the use of an independent coordinator. Presently there is little awareness or perception on the part of the members that they may be able to gain greater value, as a group, by moving beyond a focus on opportunism.

Structure and rules govern the operation and relationships of the members. HortCom has focused greater attention on these rules than has NZBrand. However, NZBrand has realised that greater structure and more stringent rules may be required going forward, in order to enable them to tackle the problem of opportunism if it arises. Initially, such structure was considered unnecessary, although procedures were developed to resolve minor ripples.

8.2.2. Network governance

The TCE approach examines transactions and a dichotomous framework of hierarchy and market; the network governance perspective examines a form that straddles the firm and market, with the network itself exerting self-corrective influence. From the network governance perspective the clusters may be expected to exhibit social governance mechanisms that self-regulate behaviour.

8.2.2.1. Network governance in NZBrand

Within NZBrand there was clear use of social mechanisms to control the coordination. With a limited number of partners in the small cluster of exporters each firm is able to monitor closely what the partners are accomplishing and what their activities are. A strong macroculture exists, due to the strength of existing industry associations, spanning both vertical and horizontal dimensions of the supply chain, and to the relative newness of the industry. This macroculture enables members to align activities and perspectives more easily and rapidly so that they understand that there is a set of accepted activities that they may engage in. There is a "convergence of expectations" that is strengthened through the use of off-season discussions and constant evaluation of opportunities and rapid resolution of problems.

While there is tolerance of small infractions, usually relating to operational competency, against the group norms, major infractions would not be tolerated. There is a strong use of collective sanctions and 'hard words' amongst the members that help the cluster self-regulate behaviours; if there is an issue it is confronted it directly in meetings, and explanations are demanded. However, there is also an implicit acceptance that there must be flexibility present and some leeway is allowable. Finally, a member could potentially be expelled from the NZBrand cluster, losing the advantages of membership, such as access to other members' supply chains and capabilities. Since all the major exporters are members of NZBrand there are no others with enough volume with

which to engage in a partnership, in competition with NZBrand. Even if other opportunities arose the reputation of the excluded member would be severely damaged in this close-knit industry.

Group pressure is thus exerted horizontally, among the cluster members. However, as the cluster realised and shared benefits from the horizontal coordination throughout the supply chain, vertical group pressure became apparent. When the customers acknowledged long-term benefit from the cluster, such as improved availability of fruit, they became proponents of the concept. When the suppliers received on-going benefit from the cluster, such as stable and higher average returns, they too became proponents of the concept.

8.2.2.2. Network governance in the HortCom case

Within HortCom exists an air of distrust and hesitation about working together. The ability to employ collective sanctions regarding breaches of behaviour in terms of the coordination between the partners is limited due to the weak social cohesion and the presence of penalties that have been incorporated into the cluster structure. Reputations have affected the ability of the members to work together. Despite a long history in the industry, with many individuals being involved in it for a length of time, there is little evidence that a strong macroculture exists, as many firms appear to be keen to act in their own best interests.

There appears to be little power for network governance to impact on the HortCom case at the present time, early in the evolution of the cluster. With no ability to use group sanctions, or other social mechanisms, there is no development of horizontal group pressure among members.

8.2.2.3. Conclusions about network governance in the clusters

The use of social mechanisms as a governance mode appears to be much stronger in the NZBrand cluster than in the HortCom cluster. This is most likely due to the fact that the relationships are more trusting and there is greater relational embeddedness in the NZBrand cluster. As the HortCom cluster develops, deeper levels of trust and relational embeddedness may increase the opportunity to employ social mechanisms as a governance mode.

8.2.2.4. Conclusions about the choice of governance mode

Structures and rules are more prevalent in the HortCom case, driven by distrust and centralised coordination, than in the NZBrand case.

Network governance plays a significant role in the NZBrand case but not in that of HortCom. Within NZBrand, group pressure, both horizontal and vertical, provides stability and focuses the members on cooperating together. Procedures to resolve ripples involve collective sanctions and

hard words in meetings. Yet these procedures do not enable NZBrand to manage the challenge of facing a true case of malicious opportunism.

Both the concept of rules and structures to prevent opportunism, and network governance, play a role in the clusters. The choice is not mutually exclusive: both forms of governance may be employed simultaneously. Over time, the mix of the two governance forms may shift and adjust.

8.2.3. Operationalising governance decisions

With the governance modes employed by the clusters identified, this section seeks to operationalise key decisions. The operationalisation may be accomplished through explicating attributes of the governance structures and the nature of the cluster.

The governance of the cluster is a critical decision as it relates to several of the barriers to effective horizontal coordination. The two governance forms typified within the present research are the NZBrand structure of mutual agreement and network governance mode, and the HortCom form of centralised coordination with explicit structure. The decision on the governance will rest on one key factor: the level of trust between members. The history of the cluster, and the number of members, impact on trust between members. If the cluster has a long history it is more likely that there will be greater distrust. With a greater number of members it is more likely that there will be higher levels of distrust.

With greater trust between members the cluster will tend towards a structure of mutual agreement with the use of network governance modes. At this point the level of trust will be high (t=high). In this mode there will be few, or no, structures in place to prevent opportunism, a position that NZBrand occupied. When the level of trust is low (t=low), alternate governance structures must be investigated as the level of trust does not allow network governance to proceed.

Where there is a high level of trust between the members and a mutual agreement is reached in the network governance mode, there may be little need for more formality. In larger clusters, where there is apprehension about working cooperatively, an alternative solution is required in order to ensure that information can be effectively shared between members. A centralised coordinator may be required when there is unwillingness to share information (i=low). This enables the members to work together and share information despite higher levels of distrust between them. This structure is typified by the HortCom cluster. When the members are willing to share information (i=high), despite the existence of distrust, a hybrid cluster structure may be required. Such a structure is typified by the new approach that may be taken by NZBrand in the near future, where structures may reduce and mitigate the damage of opportunism; however, members are able

to share information and work together relatively well and may make use of network governance modes.

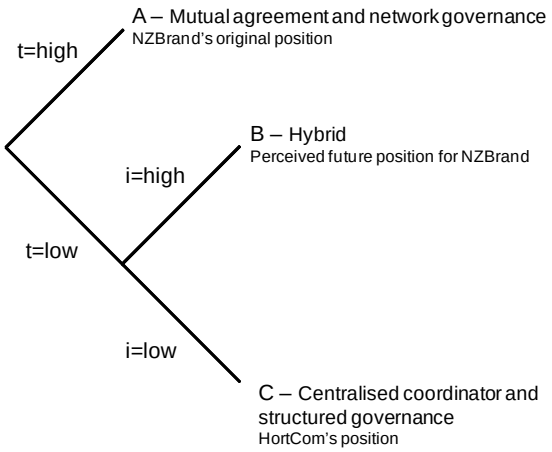

Figure 8.2: A schema for cluster governance decisions

The proposed operationalisation also presents the opportunity for the structure and governance of the cluster to evolve over time. As the members of the cluster work more closely together they will become accustomed to sharing information and begin to build capabilities relating to working with others in the cluster. At this point a cluster operating using the centralised coordinated mode may find that they are capable of sharing information more freely, and gravitate towards a hybrid structure.

A cluster that is able to operate using mutual agreement and network governance will face few costs preventing opportunism in the transactions. The net benefits accruing from the operation of the cluster that each member receives will be greater.

Clusters that find it necessary to employ a hybrid governance structure will find that there is some cost in preventing opportunism, through implementing and following procedures. This cost means that each of the members will receive slightly reduced net benefits from the cluster operations.

When a centralised coordinated governance structure is used the cluster will incur more significant costs to prevent opportunism. The costs of this structure results in the net benefits from the cluster being reduced.

Given the type of intense coordination of activity that NZBrand engages in, self-organisation may be appropriate for the smaller numbers of members. With larger clusters intense coordination may be achievable only with a coordinator. HortCom noted that a coordinator was initially useful as the role provided a means of overcoming issues related to trust. Some HortCom members also noted that they were extremely busy during season and thus the coordinator role helped with coordination of the larger number of members. Contrastingly, some members indicated that they

were capable of conducting this process themselves, on a member-to-member basis as only a few members had the operational flexibility to make required adjustments.

The coordinator role may also be useful in the coordination of large numbers of members, where the number of members creates too great a burden for a single member to coordinate. However, members may have the required industry expertise and knowledge to ensure effective and rapid coordination.

The implication is that the coordinator role is necessary to help overcome distrust, at least initially. If distrust is present but not a large number of members, the coordinator role will be necessary. If a large number of members is present but not distrust, then a coordinator role is less necessary.

Over time the cooperation/coordination mechanisms may shift or adjust. For example, improved trust between the members after a period of successful initial coordination has been completed, with the assistance of a coordinator, may result in a hybrid or network governance model being adopted and the role of the coordinator becoming unnecessary.

One implication of the schema in Figure 8.2 is that the clusters that are able to operate in modes A or B can realise more significant benefits more rapidly due to reduced costs of preventing opportunism. As greater benefits are more quickly evident, these governance structures will generate pressure to cooperate more quickly than if governance mode C is employed. As these pressures to cooperate increase, the cluster will have greater opportunity to continue to operate and create more value for the members. The lower costs of preventing opportunism result in benefits rapidly exceed costs. Net benefits quickly grow.

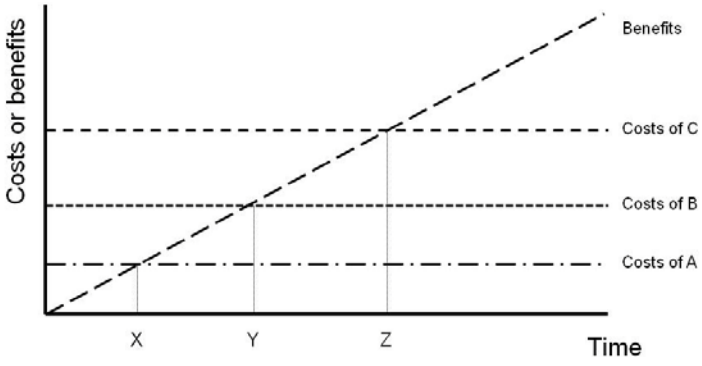

Figure 8.3: Benefits of different governance modes

8.2.4. The Resource-Based View of the firm

The resource-based view of the firm indicates that it is the resources and heterogeneity of resources between firms that generates competitive advantage. Applying this perspective to a cluster it can be seen that members would cooperate to access the resources that the other firms

possess. A cluster composed of competitors would have the widest range of resources, and thus the largest advantage, when the heterogeneity of members' capabilities is largest.

8.2.4.1. NZBrand resources and capabilities

Within NZBrand there is significant heterogeneity of capabilities and a distinct level of specialisation. Different firms have developed capabilities, whether in marketing or greater operational efficiencies working in specific industries. Among the members of this firm there are clear differences which complemented the other members. By working together in a cluster each of the firms is able to tap the capabilities of the other members of the cluster. This ensures that each firm does not have to invest resources and time to develop these capabilities themselves. Instead, roles within the cluster can be allocated to the member most able to effectively manage that task.

The small number of firms involved in NZBrand results in there being little overlap, or potential to overlap, in the required capabilities and little redundancy in member capabilities; with a greater number of firms there may be some redundancy among the capabilities of individual firms. In the present structure, with heterogeneity and complementariness of capabilities, each of the members can gain by being part of the cluster. The ability to gain provides a pressure to coordinate activities, which counterbalances the competitive forces between members.

8.2.4.2. HortCom resources and capabilities

In HortCom the members only coordinate volumes. As this is the extent of their coordination there is little opportunity to tap the capabilities of others. However, by working as a cluster they do engage a coordinator whose role can be seen as the development of a capability by the cluster in order to facilitate and organise the allocation of volume within the cluster, a task which members indicate they would not otherwise have time to achieve. Due to the limited nature of the coordination there is little potential for members to extend their coordination to a level where one would be able to make use of another's capabilities.

In the most recent season there has been a shift in responsibility for the coordination; Shipit is acting as the coordinator. Shipit's previous experience with groups, and its constant communication with the members during the season, makes it a sensible choice. However, the capabilities for organising the cluster may then develop in an outside partner, which may prevent the cluster from relying on these capabilities at a later stage as they become increasingly dependent on Shipit for them.

8.2.4.3. JEMCO resources and capabilities

Working within JEMCO, members are able to reduce costs and improve quality standards. Continuity of supply can be improved and members perform joint marketing. From the data available in the public domain it is difficult to tell whether specific capabilities reside within firms, or whether they reside within the cluster and have been jointly developed by members.

8.2.4.4. Developing resources and capabilities in the cluster

One aspect of RBV and capabilities that has not been investigated in the context of the present research is the ability of these clusters to develop new capabilities.[21] Such development may be stifled in a cluster preventing firms from gaining further competitive advantage through developing and deploying new capabilities.

As an example, two firms work closely together in horizontal coordination, as the members of NZBrand do, each firm specialising in different parts of the business and bringing specific capabilities to the relationship. The cluster, of two companies, assigns tasks to each member to take advantage of their specific capabilities. The incentives for either one of these companies to further develop capabilities will depend on the perception that these firms have concerning their ability to utilise these capabilities to derive greater benefit. If they develop a capability which is utilised by the cluster, the benefits, derived from that shared capability, must be split amongst the cluster members; the firm that developed the shared capability may derive only half the benefit from that capability.

Methods that may be used to counterbalance the reluctance to develop capabilities may involve a shared payment by the cluster to the firm that develops a new capability. Such an initial payment may cover the costs and expenses accrued in the development of a capability. The potential for opportunism may lead to a firm developing a capability for which they then over-charge the cluster.

An alternative may be that when the cluster, as a group, recognises that specific capabilities are lacking, the tasks for developing them are allocated to specific members. A member that has previously been ‘carried’ by stronger members may be given the opportunity to develop capabilities that would help the cluster achieve their objectives. This alternative lacks a mechanism to reward the member for the development of the capabilities, beyond the shared benefit derived from the benefits to the cluster. There was no evidence that firms attempted to

[21] To assess the development of capabilities would be best undertaken through a longitudinal study. This was beyond the scope of the present work.

replicate capabilities of other members or were developing management expertise to enable them to accomplish this (Knott, 2003). There is a focus on using capabilities within the cluster to create greater value in the supply chain (Kogut, 2000).

When a cluster works together as HortCom does, the ability to create capabilities could reside with the central coordinator. In order to make this effective, each member would incur greater costs to fund the development of the capabilities centrally. These costs could be split proportionally, as is the cost incurred by the retention of an independent coordinator. Capabilities may be developed by the cluster and controlled centrally. If members then find themselves reliant on this capability, they are able to 'rent' the capability to help them with their own businesses outside the cluster. The reliance on a capability that they do not control may create a stronger cooperative pressure as if the member is 'bound' to the cluster to ensure access, forming a barrier against opportunism.

8.2.4.5. Conclusions about cluster capabilities and resources

The presence of capability or resource sharing within the cluster was the biggest difference between NZBrand and HortCom. In NZBrand the capabilities are shared with the other members. This can occur through a more expansive focus than just gaining economies of scale through combining volume; the horizontal coordination created value that no firm could create separately (Kogut, 2000). This value lies in the cluster members being able to leverage capabilities available to them (Christopher & Towill, 2000). The capabilities required for effective horizontal coordination may differ between clusters and may involve subtly different forms of coordination capabilities (Möller & Svahn, 2003). Sharing capabilities in this manner draws the members closer together but may require higher levels of trust.

8.2.5. Resource dependency and power

In both cases where there is successful coordination in the clusters (NZBrand and HortCom) there are power differences between companies, as may be expected under RDT.

8.2.5.1. Power in NZBrand

In NZBrand there is explicit power relating to the volume contributions of members. Those with the greater volume contribution to NZBrand are perceived, even by themselves, as being able to exert greater control over the operations of the cluster. Another form of power is related to the contributions of capabilities; a member that is contributing a specific capability could threaten to withdraw that capability, providing a power implicit in the heterogeneity in capabilities between the members.

The volume that each firm may draw upon is seen as an important resource for the cluster; by coordinating their activities a member is able to access the volumes controlled by other members. In NZBrand this power is eschewed, with the members representing the larger share of volume treading carefully in order to preserve equality in power pertaining to volume contributions. The participants link ego to the power that large volumes can provide and assert that "ego must be left at the door," approaching the coordination in a spirit of cooperation.

Different firms in the cluster have different resources. There is no evidence that this resource heterogeneity has been leveraged as a source of power by members, or used to secure greater benefits when sharing the rewards of coordination.

8.2.5.2. Power in HortCom

In HortCom there are two sub-groups of members: the original cluster members and the newcomers. A shortage of Shipit's capacity to a specific destination has led to the old HortCom members securing the shipping capacity that they desired while preventing the newcomers from securing access. The negotiations for the split of this shipping capacity were supposed to be conducted openly and yet newcomers were excluded when the negotiations, concerning shipping capacity to a specific region, were conducted. In this case the members of the original cluster have used the volume of the entire cluster to negotiate for shipping and secured a large portion of the benefit, in the form of scarce capacity to a specific market, for themselves. The original cluster members have used the power asymmetries to their benefit. The new, enlarged, cluster has newer members that feel as though they have missed out on the opportunities offered by the cluster.

Members are satisfied that the use of an independent coordinator enabled effective horizontal coordination amongst members, despite sometimes being asked to contribute more or less than they had planned.

8.2.5.3. Conclusions about RDT in the clusters

In the two clusters that are successfully coordinating activities there are two approaches to power. In NZBrand the members are careful not to take advantage of power asymmetries and to share benefits equitably. In HortCom the original members have acted to secure better access to shipping capacity to a specific market, which was in short supply, through their leveraging of pre-existing relationships.

8.2.6. Conclusions about the theoretical perspectives

Several theoretical perspectives have been employed to understand the barriers and how they may be bridged. Examination of governance modes revealed that the established NZBrand cluster was able to use social mechanisms as a governance mode, while the youthful HortCom cluster resorted to structured penalties using a TCE approach. The implication is that over time, as a cluster becomes more successful, they will find themselves developing a stronger trust and ties between the firms that would enable them to shift towards the use of network governance, although some structural safeguards against rampant opportunism may still be required. As this occurs, the Type II TCs would become dominant, revealing greater opportunity to seek value through coordination within the cluster. In contrast, a cluster that relies on structures and rules to govern interactions may find themselves with higher Type I TCs, limiting the potential benefits that the cluster is able to secure. If the ratio between Type I & Type II TCs cannot be improved members may decide that the costs of maintaining the relationships are too high, relative to the benefits that they secure, and dissolve the cluster.

The experiences of NZBrand reflect the expectations based on Madhok's (2000) Type I / Type II TC framework and the management of the value perspective. Over time, in NZBrand there has been emphasis on increasing the value in the supply chain through careful coordination. In contrast, HortCom is locked in a focus on opportunism and coordination of volume, for cost savings. Managing value and coordination effectively may allow NZBrand to maintain longer-term competitiveness while HortCom may struggle to continue coordination with limited gains from cost savings.

8.3. Coopetition – a systems perspective

The process of coopetition could be considered to be comprised of two opposing pressures acting on each member: the force to compete and the force to cooperate. In practice, the fact that the firms have made the decision to coordinate activities with others in the cluster means that there is a predisposition towards cooperation. The tendency towards cooperation means that we could consider only how the force to cooperate may be impacted. Different variables will act on members to strengthen or weaken the propensity to cooperate. If there is greater pressure to cooperate among the firms effective coordination will occur; if the competitive pressure is stronger, then the cluster dissolves or fails to operate.

A driving force for cooperation with other members of the cluster is the ability to secure higher returns. Paradoxically, the primary reason to act competitively is also to secure higher returns.

These competing pressures are detailed in Figure 8.4, first as the archetype of fixes that fail, and then an illustration of the application to coopetition.

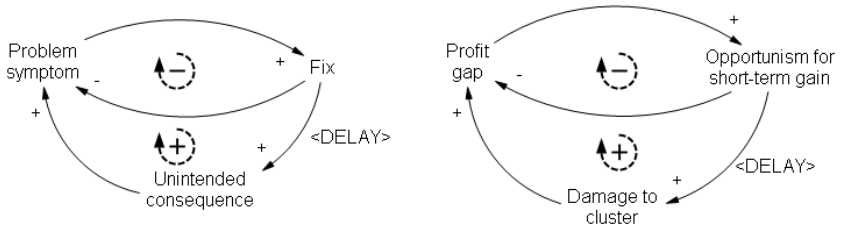

Figure 8.4: Fixes that fail - the case of coopetition

A member may seek to boost their short-term gains through engaging in opportunistic behaviours, reducing the gap between the profit that they want to make and the profit that they are making in the short term, reducing the continued need for opportunism. There is a delay, however, where the opportunism causes damage to the functioning of the cluster, which will reduce the benefits from clustering and lead to a reduced payout in revenue from cluster activities over the long term. The company has selected a short-term fix of generating profit from opportunistic behaviour, which has damaged their long-term ability to generate profits through the cluster. When the cluster ceases to function after such opportunistic behaviour it is a case where "[T]oday's problems come from yesterday's 'solutions' " (Senge, 1990, p. 57).

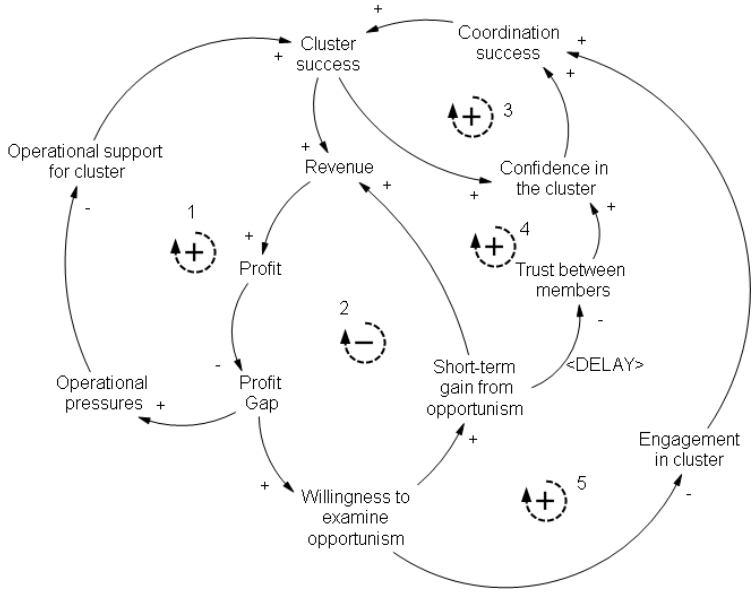

Figure 8.5: CLD demonstrating the impact of short-term opportunism

The greatest difference between these pressures, to strengthen the cooperation or weaken it, is the presence of a time-lag (shown in Figure 8.5 as the link between "short-term gain from opportunism" and "trust between members"). Firms will see more immediate results from the short-term gains. In contrast, the reduced trust and effectiveness of the cluster will impact on their profit only over a longer period of time.

The CLD is comprised of four reinforcing cycles and one dampening cycle.

Loop 1 in Figure 8.5 can be labelled “Operational Challenges” as it shows the impact of additional operational pressures that clustering generates on members. As a firm experiences a greater profit gap they find themselves under greater operational pressure to perform, reducing the operational support available for the cluster. This may reduce the capabilities that they contribute to the cluster or it may represent a neglect of duties such as reporting on crop expectations that may impact on the cluster flow plans. When the operational support for the cluster drops, the cluster is less successful and generates reduced levels of revenue, leading to an increase in the profit gap for a member firm.

Loop 2 in Figure 8.5 is a dampening cycle that can be labelled “Short-term Impact of Engaging in Opportunism.” When a cluster member faces a gap in profits and requires greater revenue quickly they are more likely to examine and engage in opportunism as a solution. These actions quickly reduce the perceived profit gap and reduce the future likelihood of opportunistic behaviours occurring.

Loop 3 in Figure 8.5 is a reinforcing loop that can be labelled “Positive Coordination Success” and shows how coordination success generates cluster success, which promotes confidence in the cluster. As this confidence grows, members actively support coordination, reinforcing the cycle of success.

Loop 4 in Figure 8.5 can be labelled “Opportunism Destroying Trust.” When a member engages in opportunistic behaviour and benefits, there is a delay before others realise this and the levels of trust drop, breaking confidence in the cluster, leading to reduced coordination and success. Finally, reduced success is followed by reduced revenue, causing a larger profit gap, and greater reason for resorting to opportunistic behaviours.

Loop 5 in Figure 8.5 can be labelled “Reduced Engagement Due to Opportunism.” If a member engages in opportunism they become less engaged in the cluster, reducing the success of coordination and cluster success. This reduces revenue, increasing the profit gap, and provoking opportunism.

8.3.1. Weakening the pressure to cooperate

The pressure to compete is frequently driven by a short-term benefit. This behaviour is opportunistic and reduces the ability to cooperate and contribute to the cluster success. When a member is presented with an opportunity that presents a favourable profit, or cost, benefit over a short-term period they may be tempted to engage in the opportunistic behaviour.

In HortCom not all members use Shipit's capacity exclusively. Those that have other options evaluate other opportunities to secure lower shipping costs.

In NZBrand a firm may allocate fruit, otherwise intended to be placed into the Japanese market through the NZBrand cluster, to another international market where they perceive that they can secure greater revenue.

The pressure to cooperate is driven primarily by the belief of members that they will gain long-term benefits by being part of the cluster. This provides self-generated motivation. There is little that members can do to increase the pressure on others to cooperate; efforts must be focused instead on curbing the desire to compete and ensuring that there are shared benefits from the cooperation. Over time benefits should provide members with incentives to continue coordination.

8.3.2. Weakening the pressure to compete

Several methods were used by the clusters to weaken competitive pressures:

1. getting 'early runs on the board' to reduce the desire to compete through reducing the profit gap;
2. well structured risk-reward sharing to reduce the profit gap and enhance satisfaction of members with the clustering approach;
3. demonstrating that a splintered approach offers lower returns as this weakens members' willingness to accept short-term fixes, demonstrating the ability for success through clustering increases confidence in the concept;
4. application of horizontal pressure in the short-term as this weakens members' willingness to accept short-term fixes;
5. developing of vertical pressure in the long-term as this weakens members' willingness to accept short-term fixes;
6. creating greater benefits to cooperating through improved returns by increasing revenue or decreasing costs to increase member profits;
7. having capabilities residing elsewhere in the cluster so that members are bound to the cluster in order to access, and benefit, from these capabilities;
8. structuring of penalties, procedures, and rules to assist with resolution of difficulties caused by opportunism.

8.3.3. Coopetition – a systems approach

The cluster structure must accommodate two dual objectives: to curb the pressure to compete over the short term while encouraging reasons to cooperate over the longer term. Many of the barriers to horizontal coordination in clusters are related to these forces and impact on key variables.

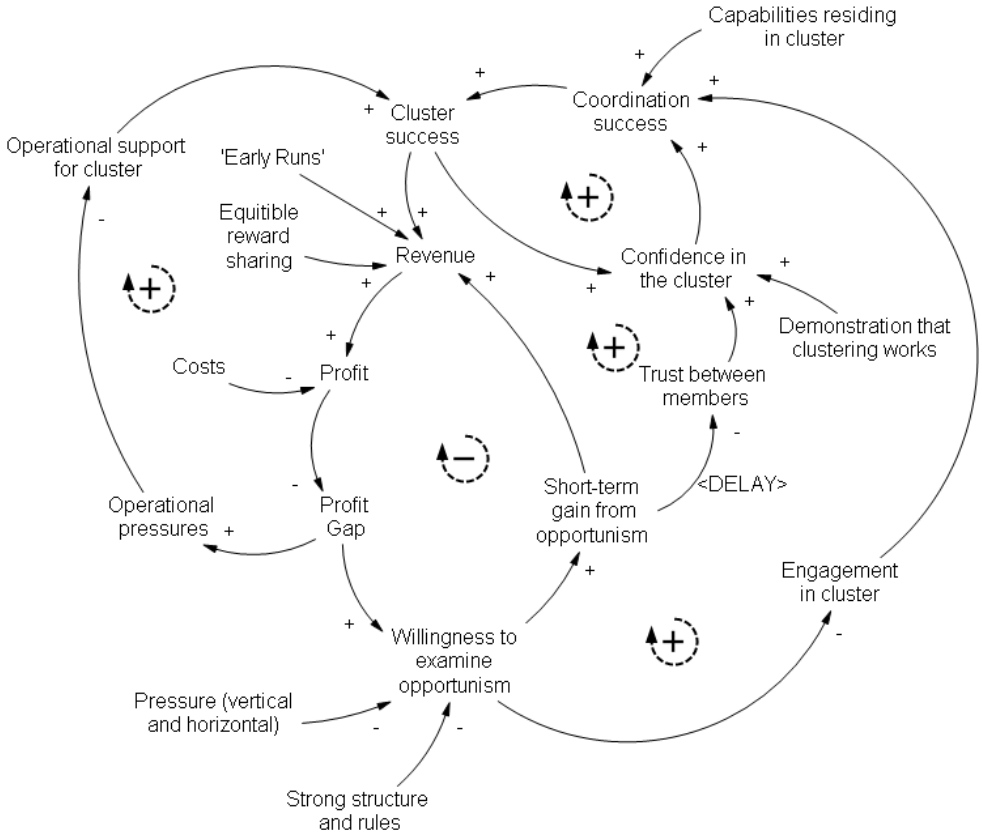

Figure 8.6: CLD demonstrating leverage points for managers

Many factors can be influenced by actors in the system to help generate the desired responses. There are certain variables that actors engaged in the system will be able to influence, which impact on variables embedded in the sequence of loops (as shown in Figure 8.6). These variables that are external to the loops can be influenced by the managers with the objective of trying to create the outcomes that they desire while also being aware of potential unseen impacts from their actions.

Having a structure in place and rules designed to equip the cluster to deal with opportunism will lead to a reduction in the willingness of members to engage in such behaviour. Over time this will reduce the desire to engage in opportunistic behaviour, leading to greater engagement with the cluster and more success in the cluster coordination.

Both horizontal and vertical pressure act similarly to curb willingness to engage in opportunistic behaviours, leading to long-term strengthening of the cluster. Members are capable of exerting pressure on each other initially to cooperate and coordinate, leading to successful actions which

can bring short-term benefits that in turn impel members to continue exerting pressure. Over the long term the coordination efforts can create increased value for other members in the supply chain, who will exert pressure vertically through the chain to pressure the cluster members to continue to cooperate and coordinate activities (Figure 8.7).

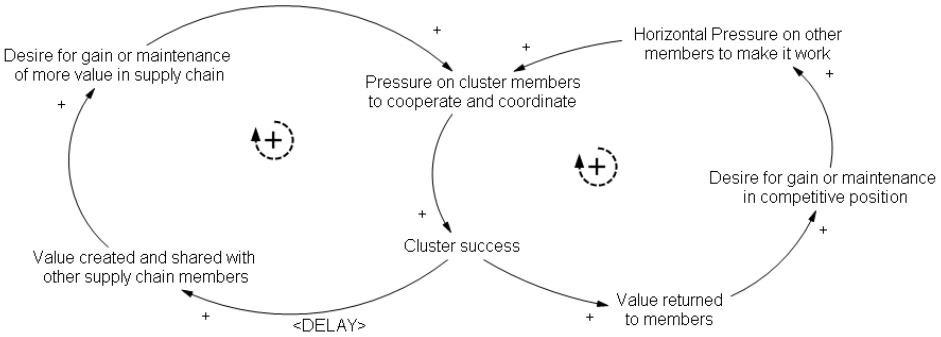

Figure 8.7: CLD showing the development of horizontal and vertical pressure in the supply chain

Initial successes, where firms "get a few runs on the board," leads to rapid gains in confidence in the cluster, reinforcing both coordination and cluster successes. In turn, this boosts revenues and profits, while also breeding greater confidence in the cluster.

Systems designed to equitably share risks and rewards enable members to access greater shares of revenue from the cluster reducing incentives to engage in opportunistic behaviour. Working with other members to reduce costs is also a way of impacting profit and reducing instances of opportunism.

When there are capabilities in the network that a member is able to access, they grow dependent on this access. In firms embedded in a network, or cluster, capabilities may shift between them or may be embedded in other firms in the cluster. Hanna and Walsh note that for any specific member, "this leads to a greater dependence on the network" (p. 315). A specific member could become less competitive as a stand-alone entity without the cluster. Distribution of capabilities throughout the cluster may act to weaken the pressure to compete through an increased dependence on the cluster.

8.4. Supply chain management

Within the domain of supply chain management the findings of the present research contribute to understanding barriers to horizontal coordination, the role of horizontal coordination in clusters, the role of clusters in sourcing and procurement, the role of capabilities in clusters, and the impact of clusters on competitive positioning.

8.4.1. Barriers to horizontal coordination

When these barriers to horizontal coordination are compared to those identified by Fawcett et al. (2008), several factors become clear. Firstly, the inter-firm rivalry barriers are more prominent in these horizontal relationships. Secondly, the managerial complexity tends to be reduced due to the relatively simple objectives and limited modes of coordination attempted by the clusters. Overall, the inter-firm rivalry barriers are most significant to horizontal coordination in clusters.

Of the four such rivalry barriers identified by Fawcett et al. (2008) - viz. inadequate information sharing, inconsistent operating goals, lack of willingness to share risks and rewards, and lack of willingness to share information - the most significant appears to be the lack of willingness both to share information and to structure a method for sharing risks and rewards within the cluster. It is demonstrated in this project how different clusters have bridged these barriers. Salient points have been drawn from the cases presented to help operationalise these aspects of cluster formation. Systems dynamics is used to understand the complex inter-relationships between variables that are important to coopetition, particularly in terms of bridging trust and increasing willingness.

As the firms were not geographically close, the question may arise as to whether or not this distance may be a barrier in their coordination, given that proximity is frequently considered key to clustering. With this concern in mind, it is useful to consider that while the physical distance between firms in New Zealand may seem large it is small relative to the distance spanned by the supply chain to reach export markets. The diversity of regions that the clusters operate over adds to their strengths by allowing overlapping or dissimilar harvest patterns and allowing risk pooling as there is lower correlation of weather in all regions. The increased physical distance, within New Zealand, may not be a barrier to success as the initial meetings may require greater engagement and face-to-face contact, yet when the cluster coordination is in process, sharing of information can take place using telephone, email, and email attachments such as spreadsheets, reducing the impact of physical distance between firms, and leading to physical distance between members not being identified as a barrier in this work.

When engaging in horizontal coordination the firms are acting as a single quasi-enterprise and are working towards a single goal. While engaging in this cooperative behaviour, however, they also engage in competitive behaviours. The nature of horizontal coordination is different to that of vertical coordination. The barriers to horizontal coordination in coopetitive structures of this type generally relate to inter-firm rivalry and not to managerial complexity. Barriers identified in extant literature include: inadequate information sharing; inconsistent operating goals; a lack of willingness to share risks, rewards, information; failure to identify potential benefits; a lack of alliance guidelines; poor cost appraisal of processes; organisational boundary uncertainty

(Fawcett, Magnan, & McCarter, 2008); lack of appropriate metrics, particularly relating to efforts of members and demand (Ballou, 2007); and the incompatibility of partners (Whipple & Frankel, 2000). The barriers identified in this research include power and capability imbalances and competitive pressures (both barriers associated with inter-firm rivalry and with coopetitive structures), which are not explored in extant literature.

8.4.2. The role of horizontal coordination in clusters

As DeWitt et al. (2006) assert, clustering improves supply chain management outcomes and there is synergy with the clustering concept proposed by Porter. The present research investigated clusters in horticulture industries while DeWitt et al. (2006) investigated an Amish furniture-making cluster, a manufacturing industry.

The findings of the present research indicate that further supply chain management benefits may be derived through clustering. These involve an expanded season of supply, greater certainty of supply, and greater consistency in the quality of products.

Through the presence of several sourcing regions with different seasons, the overall availability of supply for the cluster is expanded, stretching from the start of the earliest season through to the close of the last.

With this variety of different regions the likelihood of none being able to provide fruit is low. By pooling the risks associated with reduced (or no) supply from a region the cluster is able to increase the availability of supply and ensure that customers can be assured of greater certainty. Working with other members in the cluster can improve quality checks and the availability of fruit of acceptable quality can be enhanced through the risk pooling.

8.4.3. The role of clusters in sourcing and procurement

Wu et al. (2006) posit that supply clusters provide advantage as a source of supply, a claim that the present research affirms. Information sharing and trust, outlined by Wu et al. (2006) as required for the effective functioning of the supply cluster, were identified as critical factors in horizontal coordination in this project.

Trust was necessary between the members to ensure effective cluster integration and the sharing of information. In the absence of trust, a more structured centralised coordination role may be engaged to bring about similar benefits, though at greater cost to the members, exemplified by the approach taken by HortCom.

Working as a cluster enhances the ability of firms to meet customer requirements. As they can source and supply product from elsewhere in the cluster they increase their satisfying of customer requirements. The increased ability to ensure supply is a source of value (in the VPC framework) enhancing the competitiveness of the cluster as a whole, and allowing greater appropriation of returns for members.

Sharing of best practices, in processing, quality, or operations, allows rapid dissemination of knowledge throughout the cluster that improves the ability of members to lower production costs. The sharing of the capabilities developed by a member, so others may utilise them, also represents a method for enabling members in the cluster to produce more effectively. Sharing of capabilities in this manner is not merely gaining economics of scale through clustering; it is leveraging the strengths of partners in the cluster. Economies of scale that improve the cost-competitiveness of the cluster using the VPC framework provide a compelling reason to cluster.

8.4.4. Capabilities in clusters

While the present research did not explicitly investigate the role of capabilities in clusters, during the course of the research information on the capabilities revealed the role that they may play in bridging barriers to greater horizontal integration.

NZBrand leverages the capabilities of the members in the cluster. Small firms frequently engage in cooperation with others to access other resources (Hanna & Walsh, 2008; Shaw, 2006; Szarka, 1990) and the resources or capabilities available through joining a network are a significant predictor of frequency of joining networks (Gulati, 1999). The more successful cluster, NZBrand, has formed and operates in a way that ensures complementariness of capabilities. There are a small number of members with little redundancy in strong capabilities. By clustering, firms can take advantage of strengths residing in others as an alternative to developing these capabilities themselves, despite being in competition with them. Such an outcome is what we might expect from the literature generally; however, it is in contrast with expectations from Hanna and Walsh (2008) and Shaw (2006), who indicate that competitors are generally likely to be excluded from the cooperation.

The ability to work effectively together as a cluster may also be considered a capability, residing in each of the members, which is formed and developed over a period of time. Different types of clusters may require different capabilities to manage effectively (Svahn & Westerlund, 2007) and deserve to be further investigated. The exact methods of management within the cluster, and the capabilities that the individual companies possess that allow them to achieve this, has not been

investigated in the present research. The ability to coordinate and leverage the relationships is one that managers will need to develop (Hanna & Walsh, 2008).

Selection of governance modes may impact on the future development of capabilities. The ability to discern whether a capability evident in a cluster would have been developed in the absence of a cluster is challenging. As the focus of the present research was not on capabilities, this question, derived from the research findings, is left open for other scholars to answer.

Cooperating with members enables them to access resources and capabilities that they would otherwise be unable, or unwilling (due to the investment in time or cost), to develop, as Hanna and Walsh's (2008) results would indicate. Utilising the capabilities of other members is one way for SMEs to bridge the challenge of a lack of resources (Vaaland & Heide, 2007).

8.4.5. The interaction between clusters and competitive positioning

By investigating these cases it is clear that membership in a cluster will have implications for the competitive positioning of the individual firm, as well as the competitive positioning for the cluster itself.

Consider two identical companies, situated next to each other, that produce identical homogenous products. If they work together, in a cluster, they may be able to secure economies of scale in the manufacture of their product. A certain process in their operations may be combined to produce the product at a lower cost. Thus, the horizontal coordination benefits both firms as well as the cluster; one unit of output will be produced at a lower cost, impacting on the VPC profile for the firms and the cluster.

Consider two firms (illustrated in Figure 8.8) where Firm A has developed a strong capability in shipping and marketing. Firm B does not have these capabilities. Both Firm A and Firm B can produce the product at the same cost (C). Both firms are required to conduct shipping and marketing activities (S). By working together in a cluster, both Firm A and Firm B are able to reduce the cost of their products (through economies of scale) so that the C component reduces for both firms. The shipping and marketing component (S) for the cluster will be the same as it is for Firm A, as Firm B utilises the capabilities that A has developed. Firm A does not gain any benefit from the capabilities that Firm B possesses, while Firm B gains benefit from Firm A's capabilities. Both firms benefit from economies of scale; this is the only benefit that Firm A receives.

In terms of the VPC profile, both firms benefit through clustering. The price that the unit is sold for remains the same, although the cost reduces for both firms. This means that working in the cluster both firms are able to improve their VPC profile, although firm B improves the VPC

profile by a greater amount. Firm A still benefits from the inclusion of Firm B in the cluster, as it adds volume and reduces costs.

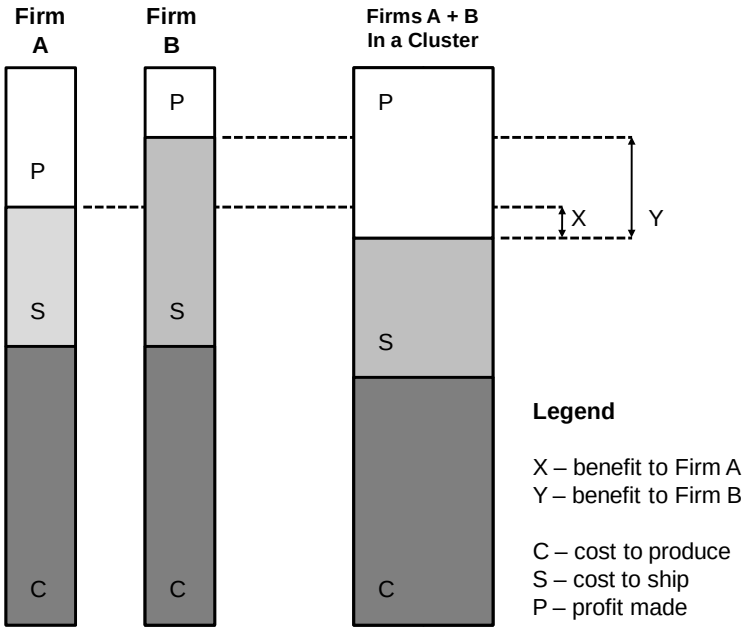

Figure 8.8: The asymmetry of benefits associated with clustering

The inclusion of other firms in this hypothetical cluster could be aimed at bringing in those with complementary capabilities. This would improve the VPC profile for all members. Alternatively, the cluster may be in a position to sponsor existing members to develop the capabilities, although this will take time and effort, and has an uncertain outcome.

Through the utilisation of volumes and capabilities within the cluster, the firms can adjust their overall performance to match market demands in a fluid fashion, such as the way NZBrand is able to better meet exacting customer specifications for fruit over a longer period of time. The ability to react responsively, drawing on supply from different member firms, could be considered a capability of the cluster. The ability to work together effectively as a cluster, in order to extract cost-saving benefits and to share capabilities, is a capability that the cluster developed. The ability of the clusters to draw capabilities developed by other members shows a high level of ability to leverage advantages offered by working in a network, asserted by Christopher and Towill (2000) to be important in global competition.

In the case of WineCom there is limited horizontal coordination, limiting the potential to reduce costs or increase value while cooperating. When a mobile bottling facility is used, the firms clearly reduce the costs, improving their VPC profile with horizontal coordination. Juicing Co. both emphasises reducing costs through providing economies of scale to smaller firms and also ensuring that the quality of product coming from the region is higher, jointly improving both cost

and value positioning. Both cases of horizontal coordination can be easily understood with the VPC framework.

Using the VPC framework it is possible to understand how the member firms in a cluster can work together and gain advantage. The sharing of both capabilities (as demonstrated by NZBrand) and volume (as demonstrated by both NZBrand and HortCom) can be shown to generate benefit to the cluster. The VPC framework is a useful tool for understanding clustering in supply chain management and how the relationships and coordination may be leveraged to improve competitiveness.

8.5. Managerial implications

The main managerial implications of this research relate to the operationalisation of coopetition and understanding how potential barriers to effective horizontal coordination may be overcome.

Firms are able to look at the number of members, aims for the cluster, history between members, and begin to establish the structure for cooperative relationships most likely to bring success to the cluster. Firms thus ensure opportunity for success when working with the other members. The structure and planning input will help to ensure that members share consistent goals. Working closely together will also help them to identify where their goals may be divergent and provide an opportunity for them to explore methods to create convergence between members and the cluster, and decide how to deal with ripples that may be caused by future opportunistic actions. Rules and procedures should be developed to allow the cluster to withstand difficulties that may arise if opportunism occurs or operational inefficiencies of members cause problems. This may take the form of penalties against members, or a set procedure and conflict resolution process.

A degree of homogeneity in the attitudes, goals, and operational procedures of cluster members is necessary to ensure effective horizontal coordination through reducing the cognitive distance between members and enabling a reduced investment in Type I TCs because of this (Madhok, 2000). However, homogeneity of capabilities, providing too much overlap between member capabilities, leads to a situation where the cluster gains little benefit from being able to leverage capabilities of members, beyond gaining economies of scale. In this way homogeneity of capabilities leads to an inability for members to capitalise on Type II TCs (Madhok, 2000) and create greater value in the supply chain. If homogeneity of capabilities is too great it may become difficult for the cluster to create value in the supply chain and create benefits great enough to ensure continued horizontal coordination. The presence of capabilities in other firms, leveraged by the cluster to create greater value and reduce costs, means that firms find themselves reliant on

others, which is a position that key decision-makers must be comfortable with if clustering is to deliver maximum value.

The competitive positioning that the cluster enhances, and the order of implementation, can affect the success of the cluster. Working with other members to reduce costs provides a simple method of quickly generating mutual benefits, which can help increase cooperative pressures within the cluster, providing a solid foundation for further work together. After achieving some quick successes the members may be able to target closer coordination to secure further benefits through the development of other sources of value for customers. The competitive positioning of the cluster can be improved by this coordination. Using the VPC framework, the cluster first improves the cost positioning of the members, and then works to improve the value provided to the customers that enables the cluster to secure a higher price for the output. By cutting costs and creating greater revenue, the cluster is able to create benefits for the members; while cost-based improvements may provide quick benefits the long term benefit provided by creating value in the supply chain is greater (Figure 8.9).

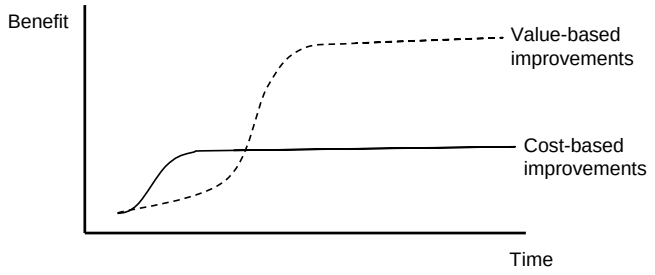

Figure 8.9: Cost and value based competitive priorities

One of the biggest barriers to effective horizontal coordination, that remains difficult to bridge, is a lack of trust between members without which the sharing of information becomes challenging. The employment of a centralised coordinator can overcome trust issues. Discussions create alignment between members regarding the types of information to be shared and methods of sharing, ensuring commonality between their processes. “Communication, communication, communication” is cited by a founding manager in NZBrand to be critically important in effective coordination. A framework for regular discussions between members and understanding the operational commitments that each must make contributes to effective communication. Communication within each firm is also important; decisions made within one part of a firm that are not adequately explained to the part of the firm engaged in coordination with the cluster can quickly impact on the ability of the cluster to coordinate effectively. If the representative of a member cannot, while dealing with the cluster, explain actions taken by their firm, these unexplained actions can erode the confidence of the cluster in that member, damaging the ability to engage in horizontal coordination.

Engaging in a cluster, embodying levels of coopetition between members, provides a method for managers of smaller firms to improve their competitive positioning and also improve their returns. However, the problems resulting from opportunism are significant. This research has indicated several points of leverage that may be used to control or reduce the likelihood of opportunism. Strong structures and rules governing communications and commitments to the cluster, the development of horizontal and vertical pressure, increasing returns and decreasing costs, demonstrating clustering rather than a splintered approach delivers benefits, equitable structuring of reward sharing, and getting 'early runs' on the board are all variables that managers can affect to help drive effective clustering.

8.6. Academic implications

A key contribution made by this research is the understanding of which barriers become the most significant to firms planning horizontal coordination in a cluster. This research highlights several factors that play an important role in bridging these barriers. These have been operationalised in the previous sections.

In terms of extant theory the findings from this research suggest that the most significant barriers to horizontal coordination are similar to those in supply chain integration, although they differ in significance. Methods for bridging these barriers, specific to horizontal coordination, have been outlined.

The role of capabilities and their development in the cluster requires increased examination. While capabilities were peripheral in this study, their influence is certainly of interest and appears to be important in the development and success of the cluster. Further research in this area may inform the current debate on dynamic capabilities. Of particular interest is whether or not clustering impedes the future development of capabilities in the cluster. The mechanisms suggested in the present research indicate why this may occur and also indicate some methods to help overcome this stagnation, through careful design of the sharing of risks and rewards, coupled with appropriate governance of the cluster. The level at which capabilities are held and exhibited, whether at the individual-, firm-, or cluster-level is also of interest as this may have implications on the ability of the cluster to maintain persistent stability.

8.6.1. Theory in supply chain management research

Throughout this research three theoretical perspectives have been employed: the RBV of the firm, the TCE view of governance and the network mode of governance. The VPC framework has been used in conjunction with RBV to understand the competitiveness of firms and clusters. This is in

response to scholars such as Halldorsson et al. (2007) and Stock (1997), who have called for increased use of other management theory in supply chain management research.

No one theory applied appeared to be adequate to explain the observations drawn from the research data. Both TCE and network governance inadequately explain the existing governance modes used in the clusters. In NZBrand there was great trust and little formal structure, although that is changing. Initially, they operated using many of the social mechanisms of network governance, but may in the future become increasingly formal, with greater use and enforcement of contracts, to curb opportunism. This may indicate a potential lifecycle in the governance modes of clusters: while a cluster may initially employ network governance modes, they will increase the level of formality and contract driven governance in order to thwart opportunism and to ensure they have the capabilities to resolve problems caused by opportunism. HortCom is shifting gears as the governance structure modifies to meet the needs of members to use an external force to overcome a lack of trust and goodwill in the cluster. There may, again, be an increased level of formality in the future as the members define clearer and stricter rules in order to protect their investments.

In terms of competitiveness, understanding the capabilities and resources available to the firms involved can be used with the RBV lens, and the VPC framework, to understand how and why the firms may seek to become involved in clusters. The clustering approach is capable of producing significant benefits to the members in terms of improving competitiveness.

8.6.2. Sampling in supply chain management research

Over the course of the investigation several clusters were approached. Early advances involved communication with a cluster-organising committee or group. Twice the offer to participate in the research was rebuked. Since this came from representatives of all members of the clusters it therefore became impossible to access the cluster members. With few examples of clusters engaging in horizontal coordination it is undesirable to be blocked from investigating exemplary cases.

The alternate approach was to identify and approach members separately. This approach enabled access to some members of the cluster, but the full complement is not represented in the research.

This approach could be called the Hub-Spoke Sampling Technique. Researchers must be wary of locking themselves out of a cluster by approaching the Hub, or organising committee. At the same time, when individual Spokes, or cluster members, are approached, it is unlikely that support of all members of the group will be secured.

Sampling at the spokes, approaching individual members, can exclude those who may share a common profile, creating a bias. Those firms that have chosen to remain outside the research, through self-selection, may have characteristics that could have added to the richness of the data gathered. In turn, they might have provided insight into how the clusters are able to bridge barriers to horizontal coordination, or how they might not. However, sampling at the spokes does allow data to be gathered from some of the members, which is superior to gathering no data.

The impact of those members that have not participated cannot be evaluated. In statistical sampling, tests can be performed to evaluate non-response bias. Prior research shows that the profile of non-respondents may resemble that of the late respondents (Malhotra & Grover, 1998); if an analysis of the responses of early and late respondents shows similarity then there is assumed to be no bias. Such an approach is not possible in the present research.

A similar issue may be found in the study of the vertical supply chain; the length and complexity of modern supply chains creates difficulties in gathering data from firms at different tiers. When participants agree to participate it is possible to gather data from many tiers of the supply chain but not necessarily all tiers. If research moves to address complete supply chains, the inability to secure data from all tiers may impact on the validity of the research.

8.7. Implications for planners

One of the outcomes of this research is the identification of barriers to effective horizontal coordination. When these barriers are listed it becomes clear that there is no one-size-fits-all model that can be applied to develop the coordination and governance of the clusters; HortCom and NZBrand use very different governance models with very different requirements for the use of a central coordinator. This indicates that a broad policy, such as allocating a coordinator for each cluster, may not be effective or desirable, although such policies may frequently be applied. The needs of each cluster are contextual and specific circumstances must be taken into account when the decisions are made to allocate resources in order to support further development of a cluster or industry. As the present research focuses on primary sector businesses the results may be less applicable beyond the primary sector and the needs for clusters in other sectors may be different.

The development of various industry groups, giving a well-disciplined industry, also appears to be important to the NZBrand cluster. This underlying structure within the industry assisted with the implementation and efforts to engage in effective horizontal coordination between NZBrand members. Developing such strong linkages and relationships within an industry may be an area that planners may consider as a starting point.

The development of structures to help clusters overcome opportunism may be an important area for consideration. Due to the challenges in reaching agreement on a set of procedures within the cluster this task may not be undertaken, leaving the cluster at a long-term disadvantage. Methods to encourage or ensure that such procedures are developed early in the cluster formation process may provide significant long-term advantage.

8.8. Conclusions

Throughout the last two chapters different analyses were used to answer the research questions. While these analyses occurred simultaneously they have been presented in separate chapters. In Table 8.1 the relationships between the findings of this research and the analyses are shown. For each of the findings in the research one or more analyses contributed. A tick (**√**) in the box indicates that the associated type of analysis contributed to this research finding.

Table 8.1: Comparison between contribution from cross-case analysis and other analytic techniques

Findings		**Chapter 7: Analysis** Cross-case analysis	**Chapter 8: Discussion** Other Analyses				
			TCE	**RBV**	**Network Governance**	**Systems Dynamics**	**SCM**
Barriers identified & methods to overcome	Lack of information sharing	√					√
	Distrust and unwillingness to work together	√			√	√	√
	Power and capability imbalances	√					
	Competitive pressures	√			√	√	
	Lack of risk and reward sharing	√				√	√
	Inconsistent goals	√					√
	Limited competitive focus	√		√			√
Other contributions	Role and relevance of cluster governance		√	√	√		
	Role of capabilities and resources in cluster competitiveness			√		√	
	Identification of key variables managers can impact to affect group pressure	√			√	√	√
	Role of clusters in sourcing						√
	Competitive positioning			√			√

The previous chapter contained the analysis of the research cases used in the study. This chapter discussed the research findings. Key findings were highlighted and the implications of the present research have been compared with extant literature. The theories where the research findings have the most impact are Transaction Cost Economics, the Resource-Based View of the firm, Dynamic Capabilities, and in Supply Chain Management. In the supply chain management domain the research complements the work performed by Fawcett et al. (2008), focused on general barriers to supply chain integration, through investigating horizontal supply chain coordination. The use of

the network governance mode has implications for further research on horizontal supply chain relationships and work on clusters.

Chapter 9. Conclusions

"The road of life twists and turns and no two directions are ever the same. Yet our lessons come from the journey, not the destination."

Don Williams, Jr., American Novelist

The earlier chapters in this manuscript have outlined the research motivation, articulated the research questions, discussed the methodology, presented the cases and analysis, and reframed the research findings in the wider body of knowledge. This chapter seeks to summarise the key findings, outline the value of this research and provide future directions for research, discuss the limitations of the research, and provide closure to the project.

9.1. The contribution made by this research

The primary contribution made by this research is identifying barriers to horizontal coordination in clusters and explaining how the barriers may be bridged. This has been accomplished through the identification of barriers and the analysis of methods used by exemplary cases to bridge them. The research thus contributes to extant supply chain management literature on integration and coordination through the examination of horizontal relationships, standing as a complement to the main body of research that focuses on vertical relationships.

Several other contributions have been made:

- the role and relevance of cluster governance has been explained in terms of supply chain management;
- the role of capabilities and resources in determining cluster competitiveness has been explicated;
- a systems perspective was used to generate CLDs that increased the understanding of the development of pressures to compete or cooperate;
- key variables that managers can influence that can impact on the development of group pressure have been identified;
- the role that clusters can play in sourcing has been highlighted;
- clusters have been shown to be a valuable tool for competitive positioning;
- the Hub-Spoke Sampling Technique has been developed and examined.

During the course of the research several theoretical lenses from other disciplines were employed. The use of TCE and network governance assists in analysing and understanding the methods used to prevent opportunism and limit damage from competition in the cluster. Consideration of the resources, capabilities, and the VPC framework focuses attention on benefits of cooperation.

9.1.1. Answers to the research questions

The primary contribution of this research has been to answer the two research questions explicated in the first chapter.

Research question one:

> *What are the barriers to improved horizontal coordination, between the members of a cluster, to improve supply chain management?*

The main barriers identified are:

- the lack of information sharing;
- distrust and unwillingness to work together;
- power and capability imbalances;
- competitive pressures;
- lack of risk and reward sharing;
- inconsistent goals;
- a limited competitive focus.

Identification of the barriers allows the second question to be addressed.

Research question two:

> *How can these barriers be bridged to allow successful coordination?*

The lack of information sharing can be overcome through careful selection of firms with strong personal relationships. A coordinator, or the use of joint planning, can overcome initial reluctance to share information.

Distrust and unwillingness to work together can be bridged by forming a small cluster or using a coordinator with a larger cluster. Coordinators can be seen as neutral; however, over time they may be phased out to reduce costs.

Power and capability imbalances can be bridged by the more powerful members not assuming superiority, but engaging with all members through involving them in activities. Creation and

adherence to rules can mitigate power imbalances. Accessing and utilising capabilities of all members can unite the cluster and create greater value in the supply chain.

Competitive pressures can be bridged by providing greater opportunity for firms to coordinate in long-term activities that create value. Demonstration of the value created by the cluster reduced the likelihood of members competing.

The lack of risk and reward sharing depends on the level of coordination in the cluster. Costs and revenues can be shared through proportionate allocations to the volume contributions. This, however, neglects the value of contribution of capabilities.

Inconsistent goals can be bridged by having all members understand and support the long-term objectives of the cluster by seeking 'buy-in' early in the process. Scoring 'quick wins' secures benefits quickly, consolidating support for efforts to build long-term benefit.

A limited competitive focus can be bridged by understanding how the cluster can work to create greater value in the supply chain. Moving from merely 'pooling resources' for cost savings to creating more value to customers can increase long-term profits for members.

9.1.2. The role of governance in supply clusters

The research revealed two different governance modes employed by the more successful clusters, these act to reduce opportunism by members, and their use by NZBrand and HortCom indicate that neither is exclusively superior. NZBrand uses social mechanisms and a high level of trust to reduce opportunism. Their few members, with mutual trust and shared history, make this possible. Recent events are forcing NZBrand to consider greater structure and rules surrounding opportunistic behaviours, to ensure that the cluster is able to deal with this problem in the future.

HortCom uses structure, including the use of an independent central coordinator, to reduce opportunism and to overcome a lack of trust and willingness to share information between members. Using structure may be required to prevent opportunistic behaviour, particularly with more members, and less trust, at the start of a relationship.

Through structures or network governance it is possible for a cluster to reduce the incidence of opportunism. NZBrand's gradual acceptance that network governance may need to be supplemented with further rules and structure indicates that at least some level of formal rules may be required to allow the cluster to deal with opportunism. Such a pragmatic position shows that the governance modes are not mutually exclusive and there may be a lifecycle associated with governance, where clusters converge on a combination of governance modes over time.

9.1.3. The role of resources and capabilities in competitiveness

There is greater heterogeneity in the resources and capabilities in NZBrand than there are in HortCom, at least in those that are shared or utilised by the group. This sharing of resources and capabilities allows the SMEs to act as if they had greater scale. The heterogeneity allows NZBrand members to gain greater value from the relationship as the cluster is able to create greater value in the supply chain. Members of NZBrand are careful and acutely aware of the power imbalances caused by differences in volume contributions.

Ultimately, there must be increased emphasis on creating value in the supply chain for longer-term success. Sharing only volume, as HortCom does, represents an adequate starting point but the returns may not be great enough for this to reduce the urge for members to compete, through opportunistic behaviour, over the long term.

9.1.4. Coopetition in supply chain management

Using a systems dynamics approach the complex inter-relationships between key variables can be understood and visually represented. Key leverage points can be identified so that managerial decisions can be evaluated by the potential long-term impact on the pressures to compete or to cooperate. The willingness to engage in opportunistic behaviour can be influenced by the generation of horizontal or vertical group pressures and the implementation of structures and rules in the cluster. Gaining early success boosts confidence in the cluster. Measures to reduce group costs, and to equitably share rewards and costs between members, act to improve profitability. Illustrating the key variables and the inter-relationships allows the systems dynamics approach to outline how issues surrounding coopetition can be examined and, to a degree, isolated and managed in an effective manner.

9.1.5. Clusters in supply chain management

The identification of barriers and bridges to horizontal coordination supplements the research by Fawcett et al. (2008), to present a more complete picture of the challenges of increasing coordination in supply chains. Horizontal coordination enables members to effectively combine volumes to reduce costs, and capabilities to create opportunities, and for all members to generate greater value in the supply chain. Heterogeneity in the capabilities of members creates greater benefit to the cluster and increases the likelihood of continued cooperation between members. Group pressures can strengthen cooperative forces in clusters.

9.1.6. The role of clusters in competitive positioning

While affirming earlier research on the importance of trust and information sharing in a supply cluster (Wu et al., 2006), the present research asserts that capabilities can also be shared throughout the cluster, allowing members to leverage the capabilities of others. SMEs are able to gain access to new capabilities and can improve the VPC profile for the cluster. This can improve both cost and value competitiveness by representing an improved source of supply for customers; forming a supply cluster can lower costs and create greater value for the downstream members of the supply chain.

9.1.7. Hub-Spoke Sampling Technique

Difficulties in sampling from clusters arise from the risk of being rejected by the entire cluster when approaching the hub. However, if sampling occurs at the spokes there is the risk of gaining insufficient data. Sampling at the spoke in these circumstances is dubbed the 'Hub-Spoke Sampling Technique'. The approach allows collection of data that may not otherwise be available, at the cost of potential non-response bias that is difficult to safeguard against.

9.2. The research in a wider context

These results inform the discussions on coordination between partners in a supply chain. While the broad base of supply chain management research focuses on vertical coordination the present research complements this through the focus on horizontal coordination. The situation is particularly important in clusters of SMEs, where firms work with their competitors to gain greater scale as a cluster than any individual member is able to achieve.

Understanding how horizontal coordination between members of a cluster can be achieved, through bridging barriers, aids the clusters as well as the regions or nations within which they are embedded. Effective governance and coordination in a cluster brings results by improving the competitiveness of the cluster, and thus raising the competitiveness of the nation. A key to this improved competitiveness is the ability to balance cluster tensions caused by coopetition. When the paradoxical situation of cooperating with a competitor can be successfully managed, significant benefits accrue. Previous research has looked at coopetition strategically; in contrast, the present research examines the impact of managerial decisions on the relationship, and how members are able to successfully coordinate activities in day-to-day operations. The governance structures of the clusters have been examined, in light of the coopetitive tensions, and are worthy of continuing research.

In relation to the literature on clustering, this research focuses not on cluster development or the development or sharing of knowledge, but on the coordination of activities among the members to improve the outcome for the cluster. While it has been accepted that cluster members can act as if they have greater mass, the subject of how such coordination may be achieved has been unsatisfactorily addressed. The results of this research provide a starting point for discussion on how this greater coordination may be achieved.

While it is difficult to quantify the benefits of successful coordination the present research does offer some assistance. The successful clusters studied are in the horticulture industries where there are many sources of uncertainty. However, the experience of NZBrand, having created adequate value to secure 30% higher returns over a ten-year period, indicates that there are significant benefits to unlocking greater value in the supply chain. These benefits must be shared throughout the chain; capturing the full value created at one level of the supply chain, where the cluster operates, is unlikely.

Understanding horizontal coordination can provide an aid to members of the cluster in understanding the tensions that they are embroiled in, as well as indicating how greater cooperation, and revenues, may be generated. Through clustering and horizontal coordination SMEs are able to gain access to resources or capabilities and volume that they are otherwise unable to obtain, improving their competitiveness.

9.3. Limitations

Since this research relates to regions within one country there are limitations. Theoretical generalisation should be scrutinised for its applicability to other settings and different contexts. Comparisons between producers of products with different natures, particularly between primary producers and manufacturers, may show that there are inherent features of the industries that may impact on the ability to overcome barriers to creating effective horizontal coordination in a cluster. Particularly, manufacturers of discrete items, such as mechanical devices, may find that effective horizontal coordination in a cluster is more challenging as the tasks of coordination between members is more complex. Thus, the findings from the present research may not be generalisable beyond commodity products. The presence of strong personal ties and relationships between the members in a cluster may reflect an underlying culture in New Zealand that is not present elsewhere. Some of the results may not be generalisable beyond New Zealand.

Generalisation from this case may only be applicable to groups of firms agrarian/primary output only. The members sampled have two distinct series of attributes and are thus members of two populations: they are primary-sector or producing as well as being members of clusters. The

results are intended to be generalised from these cases to other firms involved in the primary sector, which will share the largest number of similarities to firms involved in this research and where sharing the information considered in this research may be considered to be relatively risk-free. These results are not intended to be generalised to clusters, which may be considerably different to the cases studied, particularly with regards to the numbers of members.

During the course of the research the continued reflection on the Hub-Spoke Sampling Technique raised several issues. Sampling at the spoke is likely to invoke a non-response bias as some members of the cluster may choose not to participate. This may impact on the generalisability of the research.

9.4. Future research

Future research may pursue principles emerging from this study, particularly methods to generate group pressure and related provisioning of incentives and penalty systems within clusters. Future research may also focus on the operationalisation of these aspects and would benefit from a rigorous quantitative study of important factors. Research on the mechanisms employed to successfully introduce simple guidelines that are effective in overcoming managerial complexity, presents an interesting and important avenue for further research.

The creation of several CLDs has generated a causal view of coopetition in clusters and may serve as a basis for further work. Several variables critical to understanding the collaborative relationships in clusters were identified. These include mediating variables that may be incorporated into a future study using structural equation modelling to understand which of these barriers is most significant and whether certain barriers are more significant in specific industries or in different phases of a supply chain.

While the present research has emphasised horizontal coordination between competitors within a cluster there are other forms of horizontal relationships that may be explored. Firms that produce complementary products may also find themselves able to gain from effective clustering and coordination of activities. Whether or not similar barriers and bridges exist in these situations would be of interest as the future subjects would lack the intense inter-firm rivalry that is common in the clusters examined in the present research.

This research has represented a static image, or several images, over a short period of time. A longitudinal study would enable an understanding of whether the governance mode changes over time and swings between a hierarchical structured approach to a network governance mode, or vice versa, or stabilises in a position where a cluster utilises both forms of governance mode. The

study could also investigate the dynamism behind the genesis of capabilities within firms and the capabilities shared between firms in the cluster. Does a cluster approach inherently limit the potential to develop new capabilities in the cluster?

Drawing upon the CLDs developed during this research, simulation approaches could extend the development of the concepts further. Agent based modelling or multi-agent simulations may be used to understand the interactions between the firms in a cluster and the patterns that emerge. In agent based modelling each agent can represent an individual firm, embodying different characteristics and values, which may be modelled on the data from the present research. Understanding how the agents interact in the operation of the cluster can help illuminate important characteristics of horizontal coordination, particularly when some values are changed. In this way the model can be used as a laboratory to understand the clusters more effectively, without the need to have a cluster on which to experiment.

The Hub-Spoke Sampling Technique may suffer from non-response bias. There may be methods that can be utilised to reduce this bias, or to determine whether the bias does exist. The development of a tool for researchers using this sampling technique when investigating clusters would be valuable.

9.5. Final remarks

This research was motivated by the apparent ability of a group of small companies to work together in a cluster to improve outcomes for all parties. Like many apparently straightforward ideas, the implementation of such a strategy is beset by challenges. The approach has been utilised by several clusters of companies in New Zealand but many of the firms, and individuals, that join such clusters experience difficulties in making the concept work and unlocking value for their own business. The concept of clustering with competitors is valuable and it may return significant benefits to members when managers are able to skilfully cope with the tensions and difficulties associated with coopetition to effectively coordinate activities of the cluster members to create value in the supply chain.

Appendix I: JEMCO Oysters

Trading on the clean and green image of New Zealand is common for many producers of food products destined for export. In the case of seafood the advantage of being able to advertise that the food comes from clean oceans surrounding the islands of New Zealand proves to be very beneficial in marketing.

The three largest aquaculture species in terms of export are Greenshell™ mussels (77% of exports), king salmon (17%), and Pacific oysters (6%); (NZ, 2009). One of the most successful and fast-growing groups in the aquaculture industry exports is the Pacific oyster, the most commonly grown oyster in New Zealand, renowned world-wide for being a clean, green, sustainable product. In 2008 the export value of the product was nearly $17m, with the majority of the product going to Australia.

Stories state that the Pacific oyster was an undesired stowaway on ships that came to New Zealand from Hiroshima 30 years ago, clinging to the bottom of ships carrying the extensions to the Auckland Harbour Bridge. At the time, rock oysters and wild Bluff oysters were harvested around New Zealand but the industry was not commercial. Locals quickly realised the value of the Pacific oyster and were soon harvesting their spat (juveniles) to cultivate. Cultivation initially occurred in North Island harbours in areas such as Mahurangi, Coromandel, parts of the Bay of Islands, and Whangaparoa. Pacific oysters rapidly became the dominant variety of oyster cultivated within New Zealand.

The growth and harvesting of oysters

Wild Pacific oysters have spread throughout New Zealand and can be found throughout the North Island and in the Marlborough Sounds in the northern reach of the South Island. The wild spat are collected every summer. Stakes are placed in the harbour, providing an area for the spat to congregate naturally. When an adequate amount of spat have been collected the stakes are bundled together for transport to regions that are better for farming. To grow oysters with specific characteristics it is possible to source oyster spat from specialised hatcheries where spat are selectively bred to ensure that the desired characteristics of the grown oysters will be dominant (Aquaculture.govt.nz, 2009).

Whether bundles of stakes with spats are collected locally or purchased from elsewhere, the bundles are nailed out on inter-tidal growing racks where they are left to grow for 12-30 months. The density of placement of the stakes is carefully considered to ensure that the growing

conditions remain favourable while maintaining the natural environmental benefits. If the area is overstocked, or sited in a location which does not flush well, adverse environmental impacts may occur. These situations are avoided through careful planning of the oyster farm developments, or extensions to existing sites, in accordance with RMA (1991) requirements. Stakes are placed in an inter-tidal pattern, where they will be visible for four hours a day at low tide. The inter-tidal pattern encourages development of stronger adjunct muscles in the oyster, which enhance shelf-life when the oysters are harvested. Alternatively a sub-tidal farm may be used, where oysters are grown on 'longlines' suspended in bags, baskets, or grown on dropper ropes. They require no feed as they are filter feeders, filtering and removing plankton from the seawater, and needing little care as they grow. In contrast to land-based crops, there is no need to fertilise them. Around 5-10,000 dozen oysters can be harvested from a single hectare, with more intensively farmed areas providing as many as 15-20,000 dozen. Accessing the crops is possible by foot with inter-tidal operations or by barge; when sub-tidal farms are established, only barges may be used because of the depth of the water (Aquaculture.govt.nz, 2009). The positioning of farms in more isolated areas provides benefits to local communities. The factories tend to be located close by and together these facilities provide many jobs for locals. In this way the organisations support their local communities.

The best locations for growing oysters tend to be muddy estuaries, areas considered unpopular by people buying real estate. However, with increasing numbers of people looking for a better lifestyle, and a powerful tourism industry, there have been many objections to the establishment of new areas for oyster cultivation. Originally leases were provided only after large sums of money and a great deal of time had been invested in the application process, including an environmental impact report.

To ensure the supply of good and clean water the farms must be established away from areas with large populations (Aquaculture.govt.nz, 2009). In turn, oysters are harvested only after checks have been performed on the sanitary status of the water, to ensure that there has been no biotoxin accumulation in the oysters and that they will be safe to eat.

Challenges

Planning

One of the issues that most concerns the industry is the present structure generated by past aquaculture reforms. In the past, oyster farmers have found it extremely difficult to lease more

space and the industry has been wracked by uncertainties regarding whether farmers will have a right of refusal over current leases (Howarth, 2006; McCallum, 2003).

Food safety

Being filter feeders, oysters suffer from problems common to this type of shellfish. Their method of feeding results in an accumulation of material present in the water from which they are feeding. Hazardous concentrations of viruses, pathogens, toxins, or biotoxins can accumulate in levels harmful to human consumption. Widely recognised, these problems are addressed in most countries through regulations relating to the collection of shellfish for sale, in particular oysters which are farmed in estuary waters where they will be susceptible to land-based run off. Oysters are frequently eaten raw, which further complicates food safety problems (Aquaculture.govt.nz, 2009).

Areas that are potential farm sites are carefully evaluated to determine the impact of the surrounding countryside on the farms. Samples are taken over a year-long period to understand any seasonal influences relating to humans, birds, or animals. A risk profile is generated and determines whether the area is suited to becoming a food production area. During heavy rainfall the run-off can increase substantially in some areas which may be closed for several days after the rainfall, providing the oysters with an opportunity to cleanse themselves before harvesting begins (Aquaculture.govt.nz, 2009).

Each oyster-growing area must undergo regular monitoring of the water and the shellfish flesh, using approved laboratories to ensure that harvest can proceed. If concerns are raised from the testing, the farm in question may be closed and harvest delayed until the levels reduce to a safer level. Oysters are hardy shellfish and may be transferred to alternate growing regions if there are concerns about pollution levels at their source. In the new site they are able to filter out the pollutants that they had previously accumulated. The levels are confirmed by further testing before harvest to ensure that there are no remaining contaminants (Aquaculture.govt.nz, 2009).

Both during the period that the oysters are being harvested and processed, as well as afterwards, there are mandatory standards regarding transportation techniques and the management of the climate to which the oysters are exposed. When these procedures are followed the oysters reach processing factories in a fresh condition. All bags are labelled with harvesting details so that if there are any complaints downstream by a consumer the issue can be traced back and rectified (Aquaculture.govt.nz, 2009).

Appendix I – JEMCO Oysters

The formation of JEMCO

Around the turn of the century JEMCO was formed. It is now New Zealand's foremost grower, processor, and exporter of Pacific oysters. The organisation was "specifically formed to develop new long term markets" (JEMCO, 2009a). It now represents over 70% of the entire annual production of Pacific oysters in New Zealand.

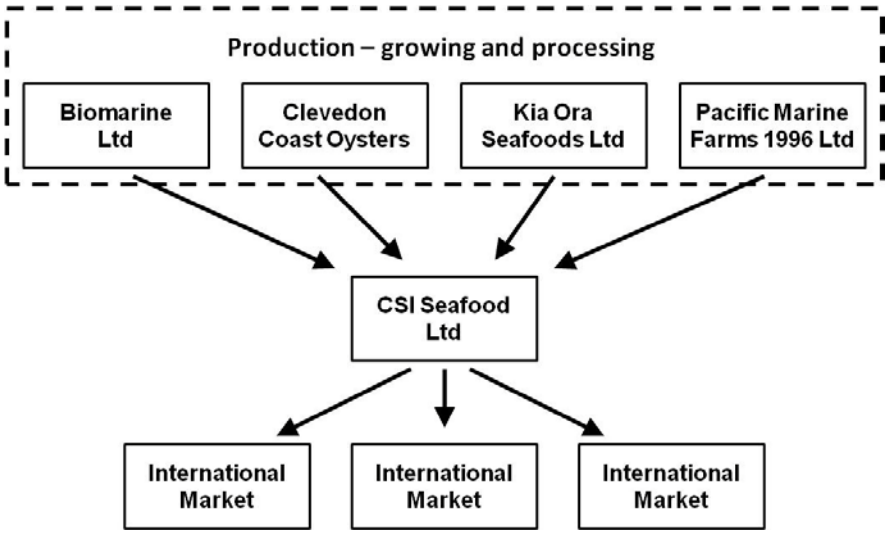

Figure Appendix I.1: The structure of JEMCO. Based on JEMCO (2009a)

Figure Appendix I.1 illustrates the structure of JEMCO. It involves four firms that are grower-processors. A fifth firm sits between the producers and the market in order to coordinate the international marketing and supply under the JEMCO brand. Using this structure the JEMCO oysters have been able to create a premium space in the Japanese market.

The New Zealand producers export a relatively high-cost product in the international marketplace. The cost is partly explained by the high costs of labour and transportation and is exacerbated by the distance from export destinations. Costs are further increased through compliance with regulations and difficulties in creating economies of scale; issues interlinked by a concern for the environments in which the farms are situated. In terms of scale, the New Zealand production is equivalent to 1% of that from only the Hiroshima region in Japan (McCallum, 2003).

Being unable to compete on the basis of a low-cost product the JEMCO oysters are instead marketed as a quality product. The emphasis and concern with quality permeates many of the practices within the supply chain. Instead of a focus on high-volume and cost-efficient high-density growing practices, the density of oysters is reduced. However, focusing on a lower-density production may not reduce volume considerably. One owner noted that, "Very often, by giving oysters space we have a higher yield per hectare, because our reject rates are very low" (Howarth,

2006, p. 21). Alternatively, the oysters may be grown in deeper water, which reduces the benefits associated with the use of inter-tidal growth methods.

Supply chain benefits

Working with this structure in place, drawing supply from four cooperating suppliers, has several benefits in terms of the supply chain. The peak season is during April through to December; however, as with many grown and harvested products, the exact seasons will differ for each region (SITO, 2004). This heterogeneity is exploited through the use of farms sited in different regions with complementary seasons for harvesting. This pooling of supply allows a greater period of supply of fresh oysters to the markets. Further benefits can be found by mitigating the impact of supply disruptions that may occur, whether these relate to toxins or pollutants, or mechanical problems. Issues impacting on one region do not affect other sources of supply.

As a southern hemisphere product, the JEMCO oysters become available during the period when the northern hemisphere producers are in their off-peak season. This complementary nature allows the consumers in northern hemisphere countries to continue their consumption throughout the year by importing JEMCO oysters.

Frozen half shell

Exporting oysters as ‘frozen half-shell’ accounts for 76% of exports, while exports of live chilled oysters represent just under 15% of exports. Frozen half-shell oysters are important in terms of supply chain management. This form presents the “most practical, safest and cost effective way of exporting oysters,” (McCallum, 2003, p. 15), but it is considered by many in the industry to be inferior to live chilled oysters. However, the quality of the oysters from New Zealand is high enough that professionals have difficulties discerning the difference in taste between JEMCO branded frozen half-shell oysters and live chilled oysters. Oysters in this frozen half-shell form are heavily marketed and there are further benefits. Since the product is frozen it can be stored for an extended period of time, allowing thorough and extensive testing before consumption. Problems will be identified before the oyster is consumed. In contrast, chilled oysters have a limited shelf-life and need to be consumed soon after harvest, reducing the potential to confirm that the shellfish is free from any toxins or pathogens. The ability to hold stock in a frozen form also means that the oysters can be shipped year-round, while chilled oysters must be air freighted to ensure they are consumed quickly. JEMCO growers use the inter-tidal method to produce oysters that possess strong adductor muscles, ensuring a good seal between the shells and increasing the shelf life of product. JEMCO’s live chilled oysters have a minimum dry shelf life of seven days (JEMCO, 2009b).

Appendix I – JEMCO Oysters

Fresh oysters are traded internationally on a commodity basis, despite being respected as a high-value meat product, and there is little room for added-value developments in this form (SITO, 2004). Value can be added, however, through creating prepared products. One JEMCO director is looking at creating a range of "easy-eat meals, ones with minimal preparation and this is where we can create a range of oyster dishes" (Howarth, 2006, p. 22), that can give greater opportunity to generate greater value in the supply chain.

Water quality

"Water quality is our main advantage when dealing in the global markets," a spokesperson for the NZ Oyster Industry Association asserts, and notes that the shellfish are grown in "an environment that allows oysters to be consumed raw. This is a distinct advantage that our product has over oysters produced in many parts of the world" (Burrel & Meehan, 2006, p. 5). The fact that New Zealand oysters are sourced from clean and green estuaries is used to promote the product, creating an important point of difference when compared to other oysters. A director of JEMCO says that, "We really use the clean green NZ image to the max in all of our marketing and this creates our major selling point: that you can eat our product raw with confidence because it comes from non polluted waters, unlike most of our competitors" (McCallum, 2003, p. 15). Customers, particularly restaurants, desire oysters that may be consumed raw – yet businesses need to ensure that there are no cases of food poisoning, for both regulatory reasons and to preserve their reputations. The JEMCO oysters are capable of filling this strict dual requirement.

Oyster farmers need to be constantly vigilant. With the number of large pleasure boats near some of the areas where the oyster farming occurs, there is an increased dumping of on-board sewage that is creating degradation of the water quality. Carelessness on the part of local authorities can also result in inappropriate discharge of sewage that may have an adverse impact on the harvesting of oysters in the area (Howarth, 2006, p. 22).

Meeting consumer demands

In addition to the health issues surrounding the serving of oysters, the shellfish must be well presented. While the use of wild spat reduces the control over the results, the inter-tidal method generally ensures creation of "a clean well-shaped product, with a harder shell and a higher meat to shell ratio than other methods" (JEMCO, 2009b). The result has been improved size and appearance of oysters, aligning well with customer requirements for "rounder and more uniformly shaped oysters to arrange on plates" (McCallum, 2003, p. 16).

Appendix I – JEMCO Oysters

There is growing customer awareness not only about the attributes of the oysters but also their source, and the conditions employed during farming and harvesting. Customers can create a picture of where the food comes from, and in turn, the grower-processors feel that they can work with well-informed customers (Howarth, 2006, p. 21).

Situating factories near to the harvesting areas ensures that oysters are processed fresh. Further work has been conducted to ensure that all factories are registered and approved by the Ministry of Agriculture and Forestry. The internationally accepted procedure for minimising risks of contamination during food processing is also followed; each stage of the processing is performed to the highest standards. The factories are USFDA and EU approved in addition to receiving approval for the raw consumption of food from the Japanese Ministry of Health and Welfare. The high standards that are maintained enable JEMCO products to be accepted world-wide (JEMCO, 2009c).

Regulatory issues

The biggest on-going problem facing oyster growers is that of adapting to new legislation. Whether it is the difficulty in expanding, or opening new sites, or being faced with a new charge in the form of a "coastal occupancy charge", the issues pile up. One JEMCO director declared, "I should be spending my time on marketing, growing new species and profile building for the industry, not fighting battles with bureaucracy" (Howarth, 2006, p. 22).

Conclusion

Working within the JEMCO structure has allowed the four smaller firms to improve their ability to supply, work together to improve quality of the product and water, and present a larger and more unified presence when working to resolve regulatory issues. The group is able to coordinate their supply procedures and processes in order to better meet customer demands over a longer period of time, demonstrating positive benefits to their joint activities.

Appendix II: Sources of Primary Data – Interviews

This appendix contains a list of initial interviews including approximate duration of the recorded portion of each interview. In some cases the recording was corrupted, or a participant asked not be recorded for some portions. In other cases when the recording device was switched off the participant revealed more interesting information which was captured with notes. On average the discussions before and after each interview lasted 10 minutes. Frequently, follow-up calls were made or received and these were not always recorded and transcribed and are not listed.

Recorded initial interviews

Year	Month	Cluster	Position	Company type NAMES	Duration
2008	August	WineCom	Director	Juicing Co.	45 mins
2008	September	WineCom	Managing Director	AB Wines	36 mins
2008	September	WineCom	Managing Director	Heritage Wines	37 mins
2008	September	WineCom	Managing Director	River Wines	21 mins
2008	September	WineCom	Managing Director	Dynamic Wines	35 mins
2008	September	WineCom	Logistics officer	Growth Vines	40 mins
2008	September	WineCom	Logistics administrator	Growth Vines	35 mins
2008	September	WineCom	Managing Director	Golden Grape Wines	35 mins
2008	September	WineCom	Managing Director	VineCom	10 mins[22]
2008	September	HortCom	Export Manager	Healthy Fruit	40 mins[23]
2008	September	NZBrand	Export Manager	Healthy Fruit	10 mins[24]
2008	September	NZBrand	Export Manager	Best Fruit	49 mins
2008	December	HortCom	General Manager	Delicious Fruit	37 mins
2008	December	NZBrand	Managing Director	World Fruit	42 mins
2009	February	HortCom	Managing Director	Good Fruit	42 mins
2009	July	NZBrand	Manager	Pack Well	44 mins[25]

[22] Audio file was truncated due to technical problems. Field notes indicate length of meeting was 45 minutes.

[23] No recording due to background noise in a shared office. Field notes show length of meeting was 40 minutes.

[24] No recording due to background noise in a shared office. Field notes show length of meeting was 10 minutes.

Appendix II – Sources of Primary Data – Interviews

2009	July	NZBrand	Chairman of packers	Packer Group	52 mins
2009	August	HortCom	Cluster Originator	Donald	14 mins
2009	August	HortCom	Managing Director	Good Fruit	23 mins
2009	August	HortCom	Shipping Manager	Shipit	29 mins[26]

Unused interviews

Year	Month	Cluster	Position	Duration (approx.)
2009	April	Aerospace	Managing Director	10 mins
2009	April	Aerospace	Managing Director	15 mins
2009	April	Aerospace	Engineer	15 mins

[25] Noted duration is time for formal interview in an office; much time was spent in facilities where recording was not possible. In total 115 minutes were spent with this Manager in a variety of settings.

[26] This recording was truncated due to technical problems but the interview spanned 45 minutes.

Appendix III: Example of Coding

This appendix demonstrates how codes may be drawn from a segment of text. The following extract is drawn from an interview with Matt, the Managing Director of World Fruits.

> . . . initially it was contact between myself and the other large exporter, [X]. Saying, "let's work together in some of the more difficult off-shore markets where, as individuals, we were potentially too small to be significant whereas together we can make some noise." And then [Y], of course, and we began working in Japan under the one umbrella from that discussion. So it was [X], [Y] & [Z] in this first instance in Japan and then we carried it into the USA shortly afterwards. We are competitors, so right up until ship side we are in competition. From shipside onwards we are not, we are one brand, or one desk.

In this passage the member is discussing setting up the cluster. Several codes are immediately obvious.

Firstly, Matt says that "We are competitors, so right up until shipside we are in competition. From shipside onwards we are not, we are one brand, or one desk." Since this indicates that he is speaking about the concept of 'coopetition' this section is coded there.

Secondly, Matt says, "From shipside onwards we are not, we are one brand, or one desk." This indicates that they are benefitting by using a 'single point of contact' for the cluster.

Thirdly, Matt says "let's work together in some of the more difficult off-shore markets where, as individuals, we were potentially too small to be significant whereas together we can make some noise . . . ." This indicates that they are concerned that the scale of their operations is too small as individuals; one of the benefits of clustering is an increase in scale. This was initially coded as 'initial scale' but was later re-coded under 'new venture' under 'scale' as a category.

Fourthly, Matt says "initially it was **contact** between myself and the other large exporter . . . and we began working in Japan under the one umbrella from that **discussion**". The language used to describe this formation is 'contact' and 'discussion', indicating an 'informal start' to the cluster.

Appendix IV: Questions Used in Semi-Structured Interviews

This appendix details the questions used in the semi-structured interviews. In many cases the listed question initiated a more intense discussion or further questions to better understand what the participant was trying to communicate.

The process

Focus: challenges/barriers and how overcome.

What are your motivations for collaboration? What do you hope to gain?

What were the objectives for a successful collaboration? (How do you know if you have been successful?)

How was the collaboration organised? (Did you initiate it, or were you approached, or did you hear about the collaboration and approach someone and asked to be included?)

Who led/championed the project?

What sequence of actions/steps was planned?

What sequence has been taken? (How much divergence was there from the plan, and why?)

Why was it approached in this manner?

What were the concerns/fears/worries that your organisation had at start?

How have these been addressed during the organisation of the collaborative venture?

Were there any legal issues? (Ownership of stock, shared technology or improvement of processes of partners in the collaboration? Ownership of the collaborative venture/firm?)

How are arrangements being made for shared use of facilities, inventory, transportation, sourcing?

What information is passed between partners in the collaboration and how is it handled? (Telephone, automatic transfer over computers, email, etc.)

How are issues relating to pricing handled?

To be successful, what would your firm be required to do? (Would you need to upgrade equipment, re-train workers, etc.)

How do the partners plan to sharing of costs & benefits from the collaboration?

How do partners compete? (Low-cost, differentiation, niche market etc.)

What do you perceive to be the key drawbacks of the planned structure?

What changes or alterations would you like to see implemented?

The technology

Focus: the role of technology in the coordination

What are the technology requirements for the collaboration to proceed?

Are there shared IT systems (for sharing information) or shared processes for preparing inventory for transportation (uniform pallet preparation, wrapping, stacking etc.)?

The willingness

Focus: the role of the willingness to coordinate

Are there any concerns with the willingness of each party to collaborate in this manner?

Do all members see the benefits to them? Or did some need more coaxing or convincing than others?

Did you need greater sharing of information internally?

How do you get buy-in from members of your own organisation?

Appendix V: Code Information

The following table provides information about the codes generated and used in the research. It uses three levels of codes. The table shows the number of documents that each code draws from as well as the number of references that each code contains.

Codes

Codes				Code Name	Docs	Refs
1	1			Coopetition		
2	1	1		Coopetition\Clustering		
3	1	1	1	Coopetition\Clustering\Benefits-Advantages	15	46
4	1	1	2	Coopetition\Clustering\Certainty of arrangements	3	10
5	1	1	3	Coopetition\Clustering\Challenges	7	24
6	1	1	4	Coopetition\Clustering\Efficiencies	2	14
7	1	1	5	Coopetition\Clustering\Evaluating opportunities	2	2
8	1	1	6	Coopetition\Clustering\measure success	4	6
9	1	1	7	Coopetition\Clustering\negotiations	3	6
10	1	1	8	Coopetition\Clustering\Reasons for ability	2	12
11	1	1	9	Coopetition\Clustering\Single point of contact	7	8
12	1	1	10	Coopetition\Clustering\Trust and reciprocation	6	12
13	1	1	11	Coopetition\Clustering\Working outside cluster	4	8
14	1	2		Coopetition\Governance-working relationship		
15	1	2	1	Coopetition\Governance-working relationship\Accepting problems	1	3
16	1	2	2	Coopetition\Governance-working relationship\Activities involved in cooperation	4	5
17	1	2	3	Coopetition\Governance-working relationship\Arrogance	2	2
18	1	2	4	Coopetition\Governance-working relationship\Balancing competition and cooperation	6	13
19	1	2	5	Coopetition\Governance-working relationship\Capabilities-structuring	3	5
20	1	2	6	Coopetition\Governance-working relationship\Central coordination	3	7
21	1	2	7	Coopetition\Governance-working relationship\Communications	9	29
22	1	2	8	Coopetition\Governance-working relationship\Consensus-easier with smaller group	1	2
23	1	2	9	Coopetition\Governance-working relationship\Humbleness-People	3	3
24	1	2	10	Coopetition\Governance-working relationship\Macroculture	1	1
25	1	2	11	Coopetition\Governance-working relationship\Personal vs Group	5	14
26	1	2	12	Coopetition\Governance-working relationship\Ripples	3	8
27	1	2	13	Coopetition\Governance-working relationship\Risk pooling	3	3
28	1	2	14	Coopetition\Governance-working relationship\Self-organising	2	2
29	1	2	15	Coopetition\Governance-working relationship\Social mechanism	4	6
30	1	2	16	Coopetition\Governance-working relationship\Structure	5	12
31	1	2	17	Coopetition\Governance-working relationship\Understanding the objective or goal	4	6
32	1	3		Coopetition\Growth		
33	1	3	1	Coopetition\Growth\Care-attention	3	3
34	1	3	2	Coopetition\Growth\Deciding to grow	3	3
35	1	3	3	Coopetition\Growth\Flexibility-Collaborate	3	5
36	1	3	4	Coopetition\Growth\Growth in cluster	4	6
37	1	3	5	Coopetition\Growth\innovate	4	4
38	1	3	6	Coopetition\Growth\Momentum	1	2
39	1	3	7	Coopetition\Growth\Organic growth	6	13
40	1	3	8	Coopetition\Growth\Path-dependence	5	6
41	1	3	9	Coopetition\Growth\Planned Growth	7	12
42	1	3	10	Coopetition\Growth\Problems	3	10
43	1	3	11	Coopetition\Growth\Trials-experimentation	4	9
44	1	4		Coopetition\Initial drivers for collaboration		
45	1	4	1	Coopetition\Initial drivers for collaboration\industry focus	5	6
46	1	4	2	Coopetition\Initial drivers for collaboration\international competition	1	1
47	1	4	3	Coopetition\Initial drivers for collaboration\Longer-term benefits of collaboration	4	4
48	1	4	4	Coopetition\Initial drivers for collaboration\Mass-size	7	14
49	1	4	5	Coopetition\Initial drivers for collaboration\Shipping	3	5
50	1	4	6	Coopetition\Initial drivers for collaboration\unique circumstances	4	6
51	1	5		Coopetition\Sharing of risks and rewards		
52	1	5	1	Coopetition\Sharing of risks and rewards\Benefits sharing	11	25
53	1	5	2	Coopetition\Sharing of risks and rewards\Careful structuring of benefits sharing	9	25
54	1	5	3	Coopetition\Sharing of risks and rewards\Early benefits	3	3

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55	1	5	4	Coopetition\Sharing of risks and rewards\Penalties	7	20
56	1	5	5	Coopetition\Sharing of risks and rewards\Problem with collaboration NOT working	1	2
57	1	5	6	Coopetition\Sharing of risks and rewards\Reputation	1	1
58	1	5	7	Coopetition\Sharing of risks and rewards\Unfavourable situation explodes	1	3
59	1	5	8	Coopetition\Sharing of risks and rewards\Vertical spread of benefit	1	1
60	2			Flex-Control		
61	2	1		Flex-Control\Inflexibility		
62	2	1	1	Flex-Control\Inflexibility\Capacity	4	11
63	2	1	2	Flex-Control\Inflexibility\Contractual	6	9
64	2	1	3	Flex-Control\Inflexibility\Freedom of action	3	6
65	2	1	4	Flex-Control\Inflexibility\Labour	3	5
66	2	2		Flex-Control\Market forces		
67	2	2	1	Flex-Control\Market forces\Customer Requirements	9	10
68	2	2	2	Flex-Control\Market forces\Self-imposed	1	2
69	2	3		Flex-Control\Stock-Processes		
70	2	3	1	Flex-Control\Stock-Processes\Control in SC	4	9
71	2	3	2	Flex-Control\Stock-Processes\Customised	3	3
72	2	3	3	Flex-Control\Stock-Processes\Integrated process	2	9
73	2	3	4	Flex-Control\Stock-Processes\Need to change processes	6	22
74	2	3	5	Flex-Control\Stock-Processes\Systematic-codify	1	2
75	2	3	6	Flex-Control\Stock-Processes\Technology	2	3
76	3			Marketing		
77	3	1		Marketing\Education-Interaction	5	19
78	3	1	1	Marketing\Education-Interaction\Branding value	3	6
79	3	1	2	Marketing\Education-Interaction\Demonstration	1	3
80	3	1	3	Marketing\Education-Interaction\Personal relationships	4	8
81	3	1	4	Marketing\Education-Interaction\Working with customer		
82	3	2		Marketing\Mediation		
83	3	2	1	Marketing\Mediation\Balancing	2	12
84	3	2	2	Marketing\Mediation\Change of processes	3	7
85	3	2	3	Marketing\Mediation\Commitment to product	2	3
86	3	2	4	Marketing\Mediation\Forecasting	3	3
87	3	2	5	Marketing\Mediation\Market swings	3	3
88	3	2	7	Marketing\Mediation\Timing	4	4
89	3	3		Marketing\Niche Marketing		
90	3	3	1	Marketing\Niche Marketing\Diversity	5	12
91	3	3	2	Marketing\Niche Marketing\Leading Market	1	2
92	3	3	3	Marketing\Niche Marketing\Market Selection	2	3
93	3	3	4	Marketing\Niche Marketing\Premium-Boutique	4	6
94	3	3	5	Marketing\Niche Marketing\Pricing	6	14
95	3	3	6	Marketing\Niche Marketing\quality	3	4
96	3	3	7	Marketing\Niche Marketing\reputation	4	8
97	3	3	8	Marketing\Niche Marketing\Specialisation	6	13
98	3	4		Marketing\Quality		
99	3	4	1	Marketing\Quality\Assurance	4	7
100	3	4	2	Marketing\Quality\Choice	2	2
101	3	4	3	Marketing\Quality\Contingencies	2	3
102	3	4	4	Marketing\Quality\Education increase	2	2
103	3	4	5	Marketing\Quality\External influences	2	3
104	3	4	6	Marketing\Quality\Holistic	4	6
105	3	4	7	Marketing\Quality\Issues	3	5
106	3	4	8	Marketing\Quality\Path dependency	1	1
107	3	4	9	Marketing\Quality\Premium	6	9
108	3	4	10	Marketing\Quality\Pricing	1	2
109	3	4	11	Marketing\Quality\Process change	2	3
110	3	4	12	Marketing\Quality\R&D	1	2
111	3	4	13	Marketing\Quality\Reputation	7	10
112	3	4	14	Marketing\Quality\Scale diff	2	3
113	3	4	15	Marketing\Quality\Standards	4	10
114	3	5		Marketing\Reputation		
115	3	5	1	Marketing\Reputation\Attracting customers	5	10
116	3	5	2	Marketing\Reputation\Inflexibility of brand	2	5
117	3	5	3	Marketing\Reputation\Market Req	4	6
118	3	6		Marketing\Segments-products		
119	3	6	1	Marketing\Segments-products\Complementary	4	7
120	3	6	2	Marketing\Segments-products\Costs associated	1	4
121	3	6	3	Marketing\Segments-products\Growth Plans	4	7

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122	3	6	4	Marketing\Segments-products\Niche	7	10
123	3	6	5	Marketing\Segments-products\Pricing	4	8
124	3	6	6	Marketing\Segments-products\Process Differences	5	6
125	3	6	7	Marketing\Segments-products\Product Variety	5	17
126	3	6	8	Marketing\Segments-products\Timing of market	2	5
127	3	6	9	Marketing\Segments-products\Variety	4	6
128	4			Relationships		
129	4	1		Relationships\Associations		
130	4	1	1	Relationships\Associations\Broad Skill Base	3	8
131	4	1	2	Relationships\Associations\Joint efforts	6	18
132	4	1	3	Relationships\Associations\Knowledge sharing	6	11
133	4	1	4	Relationships\Associations\Strengthen Relationships	6	15
134	4	2		Relationships\Cluster-Community		
135	4	2	1	Relationships\Cluster-Community\Barriers	5	19
136	4	2	2	Relationships\Cluster-Community\Goals and expectations	9	22
137	4	2	3	Relationships\Cluster-Community\Humble	2	5
138	4	2	4	Relationships\Cluster-Community\Informal Start	5	6
139	4	2	5	Relationships\Cluster-Community\Internal to firms	1	4
140	4	2	6	Relationships\Cluster-Community\Past History	3	6
141	4	2	7	Relationships\Cluster-Community\Peer Pressure	3	9
142	4	2	8	Relationships\Cluster-Community\Philosophy	3	13
143	4	2	9	Relationships\Cluster-Community\Reciprocation	8	13
144	4	2	10	Relationships\Cluster-Community\Regulations	4	18
145	4	2	11	Relationships\Cluster-Community\Social network	8	12
146	4	2	12	Relationships\Cluster-Community\Structure	2	2
147	4	2	13	Relationships\Cluster-Community\trust	9	32
148	4	2	14	Relationships\Cluster-Community\Working relationship	13	28
149	4	3		Relationships\Customers		
150	4	3	1	Relationships\Customers\Education	8	21
151	4	3	2	Relationships\Customers\Information sharing	6	8
152	4	3	3	Relationships\Customers\Long-term relationship	6	12
153	4	3	4	Relationships\Customers\Many customers	3	7
154	4	3	5	Relationships\Customers\Short-term problems	3	4
155	4	3	6	Relationships\Customers\Working relationship	9	23
156	4	4		Relationships\Formality		
157	4	4	1	Relationships\Formality\Clarity of information	3	4
158	4	4	2	Relationships\Formality\Collegiality	7	14
159	4	4	3	Relationships\Formality\Contracts	10	21
160	4	4	4	Relationships\Formality\hierarchy	1	3
161	4	4	5	Relationships\Formality\Meetings	5	12
162	5	1		Supply Chain Issues		
163	5	1	1	Supply Chain Issues\Capacity		
164	5	1	2	Supply Chain Issues\Capacity\Insufficient	4	7
165	5	1	3	Supply Chain Issues\Capacity\Variety problems	4	7
166	5	2		Supply Chain Issues\Forecasting		
167	5	2	1	Supply Chain Issues\Forecasting\For planning	4	13
168	5	2	2	Supply Chain Issues\Forecasting\Information through SC	8	12
169	5	2	3	Supply Chain Issues\Forecasting\Understanding external factors	5	12
170	5	2	4	Supply Chain Issues\Forecasting\Understanding market	4	9
171	5	3		Supply Chain Issues\Information		
172	5	3	1	Supply Chain Issues\Information\Accessibility	5	9
173	5	3	2	Supply Chain Issues\Information\Driver for information visibility	2	3
174	5	3	3	Supply Chain Issues\Information\Opportunities	2	5
175	5	3	4	Supply Chain Issues\Information\Requisite levels	2	7
176	5	3	5	Supply Chain Issues\Information\Technology	7	22
177	5	3	6	Supply Chain Issues\Information\Traceability	2	11
178	5	3	7	Supply Chain Issues\Information\Visibility	7	16
179	5	4		Supply Chain Issues\Linkages		
180	5	4	1	Supply Chain Issues\Linkages\Certainty of supply	8	16
181	5	4	2	Supply Chain Issues\Linkages\Commitment	10	17
182	5	4	3	Supply Chain Issues\Linkages\Communication	9	31
183	5	4	4	Supply Chain Issues\Linkages\Cultural Difference of market	1	1
184	5	4	5	Supply Chain Issues\Linkages\Domino effect	11	16
185	5	4	6	Supply Chain Issues\Linkages\Focus differential	1	1
186	5	4	7	Supply Chain Issues\Linkages\interface	2	9
187	5	4	8	Supply Chain Issues\Linkages\Inventory movements	9	26
188	5	4	9	Supply Chain Issues\Linkages\Pressure	2	3

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189	5	4	10	Supply Chain Issues\Linkages\Pricing-Billing-Invoicing	6	6
190	5	4	11	Supply Chain Issues\Linkages\Sharing problems	4	5
191	5	4	12	Supply Chain Issues\Linkages\Shop-around	4	11
192	5	4	13	Supply Chain Issues\Linkages\Specialist	11	14
193	5	4	14	Supply Chain Issues\Linkages\Suppliers-RM	9	17
194	5	4	15	Supply Chain Issues\Linkages\Variety increase	3	5
195	5	5		Supply Chain Issues\Requirements		
196	5	5	1	Supply Chain Issues\Requirements\Complexity	2	3
197	5	5	2	Supply Chain Issues\Requirements\Tension in requirements	2	4
198	5	6		Supply Chain Issues\Scale		
199	5	6	1	Supply Chain Issues\Scale\Advantages of small scale	12	23
200	5	6	2	Supply Chain Issues\Scale\Complementary	4	4
201	5	6	3	Supply Chain Issues\Scale\Decisions on scale	5	5
202	5	6	4	Supply Chain Issues\Scale\Differences in scales	2	4
203	5	6	5	Supply Chain Issues\Scale\Outsourcing	6	16
204	5	6	6	Supply Chain Issues\Scale\planning	5	15
205	5	6	7	Supply Chain Issues\Scale\Production volume	7	13
206	5	6	8	Supply Chain Issues\Scale\Scale and costs	6	10
207	5	6	9	Supply Chain Issues\Scale\Scale and quality	5	6
208	5	6	10	Supply Chain Issues\Scale\Sharing for scale	6	9
209	5	6	11	Supply Chain Issues\Scale\Technology considerations	4	7
210	5	6	12	Supply Chain Issues\Scale\Variety	5	7
211	5	7		Supply Chain Issues\Transportation-Distribution		
212	5	7	1	Supply Chain Issues\Transportation-Distribution\Difficulties	7	22
213	5	7	2	Supply Chain Issues\Transportation-Distribution\Expense	5	6
214	5	7	3	Supply Chain Issues\Transportation-Distribution\Requirements	11	19
215	5	7	4	Supply Chain Issues\Transportation-Distribution\Specialisation	6	10
216	5	8		Supply Chain Issues\Uncertainty		
217	5	8	1	Supply Chain Issues\Uncertainty\Market demands	3	5
218	5	8	2	Supply Chain Issues\Uncertainty\Timing constraints	7	19
219	5	8	3	Supply Chain Issues\Uncertainty\Weather-Seasons	11	16

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