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Collaboration, cooperation and power in food supply chains

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Abstract

This research develops an integrated framework of long-term agri-food supply chain partnerships and the cooperation and collaboration this requires. It specifically investigates the effects of supplier characteristics and relationship quality on supplier performance in agri-food supply chains. It builds on existing frameworks within the economic, managerial and sociological literature, clarifying the conceptual definitions of these constructs and develops these to provide a more comprehensive understanding. The results have wide application and expand the understanding of cohesive and beneficial food supply chains. A multi-disciplinary approach is used, drawing from constructs in transaction cost economics, resource dependence and social exchange theory. Both qualitative and quantitative methods are used to explore supplier characteristics and relationship quality variables that contribute to supplier performance.

The main objective of this research is to contribute to the knowledge and understanding of supply chain relationships and performance in the global food system. This will help develop long-term partnerships between the various stakeholders in order to meet the higher product specifications and delivery schedules required by international consumers. It will also enable policy makers to support the multiple stakeholders in food supply chains to create a better and fairer system in the delivery of food choices for all.

Key Words: Supplier Relationships, Commitment, Trust, New Zealand, Competitive advantage, Resource Based View, Social Capital

Background

The New Zealand economy is highly dependent on agri-food exports and is unique among the world's developed economies in that nearly two thirds of exports come from the agricultural sector. For example, Denmark and the Netherlands are the nearest comparable developed economies with significant agri-food export sectors, yet their agri-food exports represent only around 20% of these countries' total exports. The most significant of New Zealand's agri-food exports are dairy and red meat products. The dairy sector generated US\$ 10.7 billion in export earnings in 2013, representing 28 per cent of total merchandise export value; while the red meat sector generated US\$ 4.2 billion in export earnings (Statistics New Zealand, 2013). New Zealand's efficient pasture based production system and small population provide a low cost competitive advantage in the export of high quality meat and dairy products. This dependence, however, makes New Zealand vulnerable to changes in foreign government's policies and consumer demand in the importing countries, as well as competition from other low cost agri-food exporters.

New Zealand has traditionally relied on this low cost competitive advantage (Porter, 1998) and focused on improving productivity and efficiency to preserve its position as one of the world's most efficient agricultural producers. This is now becoming more difficult to maintain with rising production costs and regulatory constraints on agricultural intensification. Because of this, many people are questioning if New Zealand still has a sustainable long-term, low cost competitive advantage. The alternative to maintaining this low cost position would be focusing, instead, on increasing the value of the product (Porter, 1985). This would require a fundamental shift in the focus of New Zealand agriculture. Instead of an emphasis on efficient farm production and increasing scale, the focus would need to be on meeting the needs of selected high value consumers. These consumers are demanding greater variety and quality in the food they eat. They require a consistent year-round supply of high quality, safe food (Fischer et al., 2009; Van der Vorst, 2000). They also want food that aligns with their own personal values, which includes credence attributes such as environmental sustainability, animal welfare and fair trade, as well as local and organic production.

Meeting these consumer demands is difficult within the constraints of New Zealand's pasture based agricultural production system, where production volume and product specifications are highly dependent on climate. This leads to a fundamental question. Should New Zealand agriculture continue to focus on low cost, efficient production systems? Or, should it focus instead on developing higher value products, with innovative production systems that can deliver a consistent year-round supply of high quality, safe food and also address consumers' concerns for animal welfare and environmental stewardship? This change would be a significant challenge for the relationships in the supply chain. The New Zealand agricultural sector has traditionally relied on short-term spot market exchange relationships (McLeod, Mair, Parker, & Belworthy, 2011). While these are efficient for large volumes of undifferentiated products they are less effective in meeting consumer needs for differentiated products (Sonka, 2003). In a spot market transaction there is little information flow.

Information flow is important with differentiated products where credence quality attributes, such as animal welfare are not visible in the physical product at purchase or, even, after consumption (Dyer & Singh, 1998; Nelson, 1970). Therefore, to meet these consumer needs the New Zealand agricultural industry would need to move away from relying predominantly on a traditional commodity model with short-term, competitive, spot market relationships to a partnership model with increased supply chain commitment involving long-term contracts and to delivering of high quality products to meet customer demands (Fischer et al., 2009).

This would require suppliers who are willing to commit to meeting higher product specifications while working with less flexible delivery schedules. It would mean moving from a competitive model to a partnership model (Dwyer, Schurr, & Oh, 1987; Jae-Nam & Young-Gul, 1999; Srinivasan, Mukherjee, & Gaur, 2011). These partnerships are relationships based on mutual trust, openness, and where the responsibility, authority and decision-making are shared more evenly and there is often an agreement between the parties to share both risks and benefits. (Lambert, Emmelhainz, & Gardner, 1996; UK Audit Commission, 2012). In one of a number of reports on the New Zealand red meat sector it was identified that the sector was dominated by commodity supply chains as opposed to differentiated value chains (McLeod et al., 2011). These authors indicated that to address the industry's problems there needed to be greater trust between processors and suppliers and incentives needed to aligned so that one sector did not profit at the expense of the other. There is, currently, little research on what influences farmers to commit to long-term supply chain partnerships. There is significant descriptive research on the characteristics of supply chain partnerships but little explanatory research. This research aims to address this.

New Zealand exports a high proportion of its agri-food products and, despite significant diversification, still relies on a small number of key markets.

Table 1: Proportion of NZ Products Exported

Product	Per cent exported	Main market	Per cent to main Market 2013
Dairy products	97 per cent	China	32 per cent
Sheep meat	90 per cent	European Union	44 per cent
Beef	80 per cent	USA	43 per cent
Venison	90 per cent	European Union	76 per cent

(Statistics New Zealand, 2013)

China has recently become New Zealand's largest market for dairy products. Over the last 20 years China has moved from being the 31st largest export destination for New Zealand dairy products to the first. This market continues to grow strongly due to rising incomes and urbanisation in China. In contrast, the majority of lamb and venison is exported to the European Union (though China has recently become the largest market for sheep-meat outside of the European Union). Lamb benefits from being counter-seasonal to the European Union domestic supply and 40 per cent is exported by sea freight as chilled cuts. New Zealand has preferential market access for lamb to Europe, with a tariff-free quota of 228,254 tonnes. Venison is supplied

into the European Union market primarily in the Northern Hemisphere autumn during the traditional game season, with Germany, the largest single market, taking 40 per cent of total venison exports (Statistics New Zealand, 2013). The United States is the main market for New Zealand beef receiving forty per cent of exports with much of it destined for further processing into ground beef.

While dairy production is primarily pasture based there is increasing use of supplementary feeding and irrigation to reduce the impact of climate and to increase production. In contrast, New Zealand meat production is primarily produced on un-irrigated pastures with little use of supplements. This enables low cost, year-round outdoor grazing that produces natural, high quality meat products. It also means that production is highly seasonal with significant variation due to the climate (Bensemann, Shadbolt, & Conforte, 2011; McLeod et al., 2011). Changes in pasture supply, driven by variations in temperature and rainfall play an important role in supply chain dynamics, affecting price, quality and timing of supply (Bensemann et al., 2011). This is compounded by seasonal and structural overcapacity in the meat processing industry, creating a highly competitive environment for procurement of supply.

The Resource Based View

The resource based view (RBV) states that competitive advantage comes from valuable and rare resources, and capabilities. If these are also hard to imitate and not substitutable then they can provide a long-term sustainable competitive advantage (Barney, 1991; Poppo & Zenger, 1997). RBV identifies that it is the different resources these firms have that determines the differences in performance between them (Wernerfelt, 1984). Examples of the resources are brand names, technical knowledge, skilled human resources, inter-firm relationships, machinery, efficient operating procedures and financial capital. The RBV regards specific assets and, in particular, human assets as being critical to a firm's performance. These provide valuable knowledge and capabilities (Poppo & Zenger, 1997). The RBV proposes that companies choose greater integration and more hierarchical governance mechanisms, because with greater investment in specific assets these forms of governance are more efficient (Poppo & Zenger, 1997). Originally, the RBV focused only on the resource capabilities located within the individual firm (Barney, 1991; Molina & Dyer, 1999). However, later developments acknowledged evidence that firms can achieve supply chain productivity gains by making relational investments. Inter-firm relationships enable the combining of resources in unique ways that provide these partnerships with greater competitive advantage. This incorporates the relational exchange perspective into the RBV (Dwyer et al., 1987). This extends the original view of the RBV framework to incorporate intangible resources that exist beyond the boundaries of individual firms (Molina & Dyer, 1999).

Firms engage in relationships with other firms to obtain access to complementary resources (Bart Nooteboom, De Jong, Vossen, Helper, & Sako, 2000). A partner can offer a range of valuable resources, including technical capability, organisational capability, flexibility, reliability, knowledge, innovative capability, network position, international presence and a low risk of discontinuity (B. Nooteboom, 1999). Oliver (1997) suggests that strategic alliances allow firms to obtain assets, competencies or

capabilities that cannot be easily purchased in a competitive market for resources. These are, in particular, intangible assets such as specialised technical knowledge, expertise or reputation. Collaboration creates a unique combination of resources that, when combined, have greater value than when on their own. These combinations mean that these resources are more valuable, rare and difficult to imitate (Molina & Dyer, 1999).

Therefore, long-term supply chain partnerships create a competitive advantage through a number of activities. Partnerships' investment in tangible and intangible relationship-specific assets not only includes specialised machinery but also includes relational assets such as trust. A significant exchange of knowledge and joint learning takes place that is specific to the relationship. Firms are able to combine scarce resources in complementary ways that enable them to improve quality and efficiency as well as to develop new products and technologies. Through relational governance mechanisms, they are able to lower transaction costs (Dyer & Singh, 1998; Molina & Dyer, 1999). These create relational rents, which are profits achieved through collaboration that are not able to be produced by each individual firm in isolation.

Social Capital Perspective

Social capital theory has become an important perspective within social exchange and social network theory. In incorporating a relational view of social exchange theory, social capital describes the relationship-specific resources that enable the relational rents and is concerned with the nature, structure and resources embedded in a person's network of relationships (Burt, 1992; M. S. Granovetter, 1973; Lin, Ensel, & Vaughn, 1981; Seibert, 2001). Social capital was initially described by Jacobs (1965), who referred to the networks of community relationships developed over time that provided a basis for trust, co-operation and collective action. Social capital includes the actual and potential resources as a result of relationship networks (Nahapiet & Ghoshal, 1998a). Social capital between buyers and suppliers allows them to gain access to, and leverage from, resources residing in their relationships. It reduces the likelihood of conflicts and promotes co-operative behaviour through trust, common goals and social bonds (Villena, Revilla, & Choi, 2011).

Social capital is categorised as either cognitive, relational or structural (Nahapiet & Ghoshal, 1998b). Cognitive social capital involves shared visions, goals and culture or, in other words, what you have in common. Structural social capital refers to the overall pattern of connections between actors, in other words, who you have contact with and how you have contact with them (Nahapiet & Ghoshal, 1998a). Relational social capital refers to personal relationships of trust, friendship, respect and reciprocity developed through a history of interactions that influences behaviour (M. Granovetter, 1992; Nahapiet & Ghoshal, 1998a) .

Social capital theory is closely aligned with the network view. It assumes that inter-firm relationships are embedded in a network structure (structural social capital), and this affects the behaviour and expectations of firms (Omta, Trienekens, & Beers, 2001). Relational and cognitive social capital describes the characteristics of these network relationships. Many traditional studies of supply chain relationships take a

limited linear view and only analyse the dyadic relationships between firms in the supply chain. This approach ignores the complex interdependencies and relationships between firms that exist in a larger supply network (Choi & Wu, 2009; Wilson, 2011)

Theoretical Framework

Based on the literature review, it is proposed that suppliers seek to maximise the long-term value of their resources and capabilities. This means they seek to develop and acquire valuable and rare resources and capabilities that are difficult to copy, and this leads to a sustainable competitive advantage. This is based on the resource based view and incorporates social capital theory. It is proposed that this involves not only the individual firms' resources, but also the resources that are jointly owned and reside in the network of connections between the partners. Suppliers who are committed to long-term relationships seek to maximise the value of their productive resources by seeking complementary resources in their supply chain partners that can add value to their existing resources as well as create new resources and capabilities.

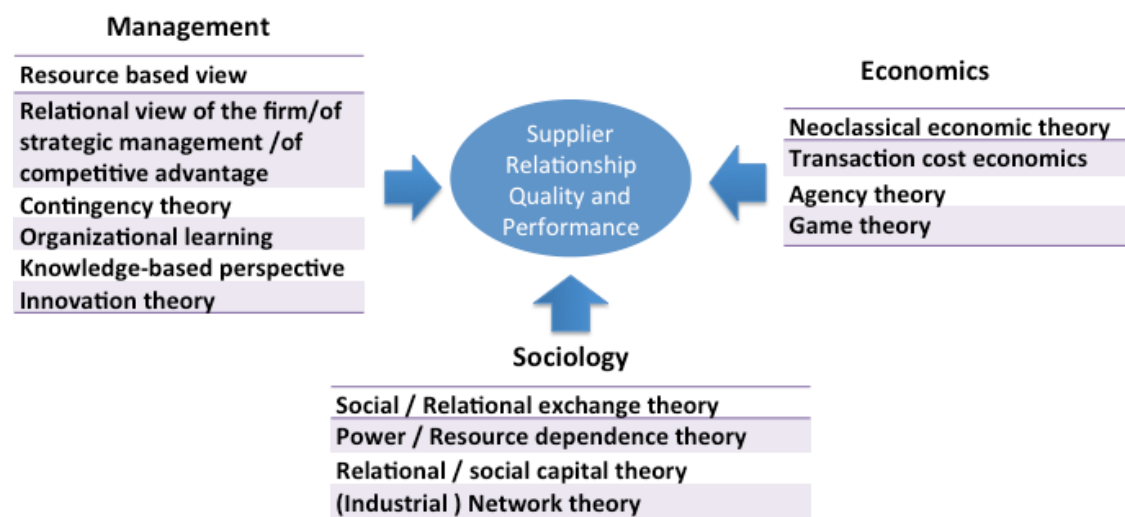


Figure 1: Contribution of different disciplines to supplier relationship quality and performance (Schulze & Lees, 2014)

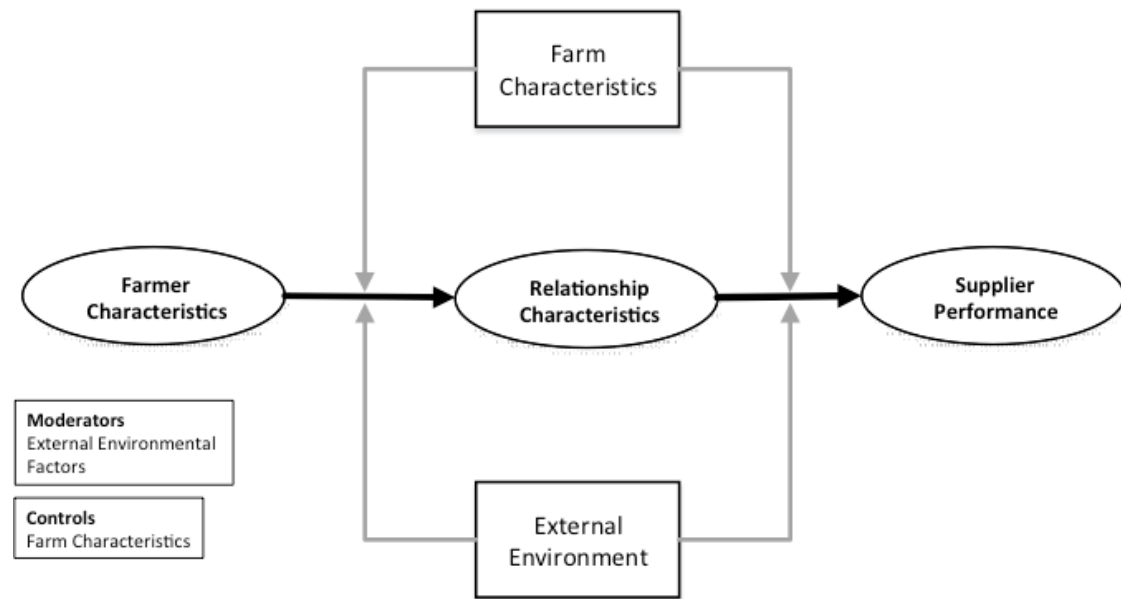


Figure 2: Theoretical Model

Problem Statement

How can New Zealand increase the value of its agri-food exports by consistently meeting consumer demands for quality, availability and credence attributes such as sustainability and provenance?

Objectives of this research

The main objective of this research is to contribute to the knowledge and understanding of supply chain relationships in the agri-food sector. This will provide a better understanding of how to create long-term committed partnerships between suppliers and buyers in order to meet the higher product specifications and delivery schedules required by international consumers

Research Aims

- To understand how New Zealand agri-food supply chains can develop cooperative partnerships to improve long term supply chain performance
- To understand the effects of supplier characteristics and relationship quality on supplier performance in agri-food supply chains.

Research Methodology - Phase 1: An exploratory case study method

Semi-structured interviews were undertaken with suppliers from three New Zealand agri-food exporting companies between May 2012 and October 2013. The study employs a qualitative case study approach to explore the factors that attract suppliers to be committed to long-term supply relationships in agri-food supply chains where suppliers are required to consistently deliver to high product specifications. An exploratory case study method was used in order to gain insight into the complex

factors that contribute to the formation of long-term supply commitments in agri-food supply chains. Case study research can involve single or multiple cases (Yin, 2003). Multiple case studies provide advantages in identifying patterns and enable the triangulation of the results. Semi-structured interviews were undertaken with suppliers from three New Zealand agri-food exporting companies between May 2012 and October 2013. The companies selected all had a focused-differentiation strategy (Porter, 1985) and the products exported included dairy, beef, lamb and venison, and their key markets were in the European Union, North America, Asia and the Middle East. The suppliers were required to meet high product specifications in terms of timing of delivery, food safety, traceability, environmental sustainability, animal welfare and product quality.

Validity

The study was exploratory in nature and attempts were made to ensure validity. External validity was achieved through proximity and similarity (in the selection of companies that had similar strategies but different products and markets (Campbell, 1986). Internal validity was assured through the number of supplier informants selected within each group while suppliers were selected to provide a broad range of perspectives.

Case selection

The case studies were selected to provide perspectives about different companies exporting different products to a range of different markets (Eisenhardt, 1989). The criteria for a company's selection was that the company had suppliers who committed to supply on contract with specific product specifications in terms of timing of delivery, food safety, traceability, environmental sustainability, animal welfare and product quality. The companies had to be exporting to high end wholesale or retail customers in the European Union, North America, Asia and the Middle East. The companies were selected to cover dairy, beef, lamb and venison export supply chains such that the main dairy and meat exports were covered.

Data Collection

Face-to-face semi-structured on-site interviews were the primary method of data collection. These were complemented with secondary data such as published company information, supply agreements and newspaper reports. Other secondary data included observations at supplier field days and informal personal communication with suppliers and company personnel. Secondary data provided additional information and validation of the interview data.

Research Methodology - Phase 2: Quantitative survey of sheep, beef and deer farmers

Survey instrument development

Based on (Churchill, 1979) the development of the survey instrument followed a four step process. An extensive literature review was conducted to obtain the initial pool of scale items. Following this interviews were carried out with farmers supplying beef,

venison and sheep meat to processing marketing companies. Interviews were also held with selected processing company personnel. This helped select a specific number of scale items to be used in developing a pre-test survey. The pre-test survey was sent to processing/marketing company personnel and also administered in person to 10 farmer suppliers. This enabled the survey to be tested for structure, readability, ambiguity and overall completeness.

Construct Validity

Construct validity relates to how accurately the scale measures reflect the concept that is being examined. It also refers to what degree the scale measures relate to theoretical constructs (Calder, Phillips, & Tybout, 1982). This is identified by (Netemeyer, Bearden, & Sharma, 2003) as the “overarching quality of a research study, with other categories of validity being subsumed under construct validity” (p71). This involves establishing that the construct measures the direction and size of the effect of a construct and is not affected by factors from the domain of other constructs or error (Netemeyer et al., 2003). Construct validity cannot be directly assessed but is inferred from the quality of the procedure in the development and validation of the scale measures. Content and face and criterion validity are three important criteria for establishing content validity (Netemeyer et al., 2003).

Content and face validity

The process recommended by (Churchill, 1979) was followed to ensure content and face validity. Content and face validity refer to how well the constructs being measured are translated into the scale measures used in the survey instrument (Netemeyer et al., 2003). Firstly in an extensive literature review was conducted to define the domains of the constructs and to obtain the initial pool of scale items that had been used in previous research. This ensured that the domains were clearly defined and that the scale items adequately represented the dimensions of the constructs. Following this interviews were carried out with farmers supplying beef, venison and sheep meat to processing/marketing companies. Interviews were also held with selected processing company personnel. This helped select a specific number of scale items to be used in developing a pre-test survey. The pre-test survey was sent to processing/marketing company personnel and also administered in person to 10 farmer suppliers. This enabled the survey to be tested for structure, readability, ambiguity and overall completeness.

Criterion Validity

Criterion validity involves using measures external to the measurement instrument are used to support the validity of the instrument. The survey was administered to the supplier groups that were delivering to higher product specifications and under contracted supply arrangements. These specific groups require higher trust and commitment than is normal for meat industry suppliers enabling an evaluation of predictive validity. The survey also measured factors such as length of supply, type of supply arrangement, and ownership of shares which can also provide some external validity by correlating with the theoretical constructs.

Data collection

The sampling frame for the survey was the New Zealand AsureQuality registered farmers data base. A stratified sample of 5944 farmers with farms over 30 ha. The sample was stratified according to location, size and farm type using the Statistics New Zealand data to ensure representativeness. There are two main categories of sampling methods these are probability and non-probability sampling. Probability sampling is the main method used to select a large representative sample in research. This method enables generalisation of the results to the population as a whole. Non-probability sampling techniques are used in situations that where probability sampling is not possible or appropriate (Babbie, 1992). Non-probability sampling techniques involve convenience or personal judgement and the probability of each observation is unknown. This research used a stratified probability sampling. Stratification is a method to increase the degree of representativeness by decreasing the probability of sampling error. In this method the population is divided in to homogenous groups and then different numbers are randomly drawn from each group such that they represents the proportion of the population as a whole (Babbie, 1992)

Data collection was undertaken by a mail survey sent out to farmers between October 2013 and March 2014. The survey was sent out with a letter explaining the purpose of the research with a free-post return envelope.

Results and Discussion

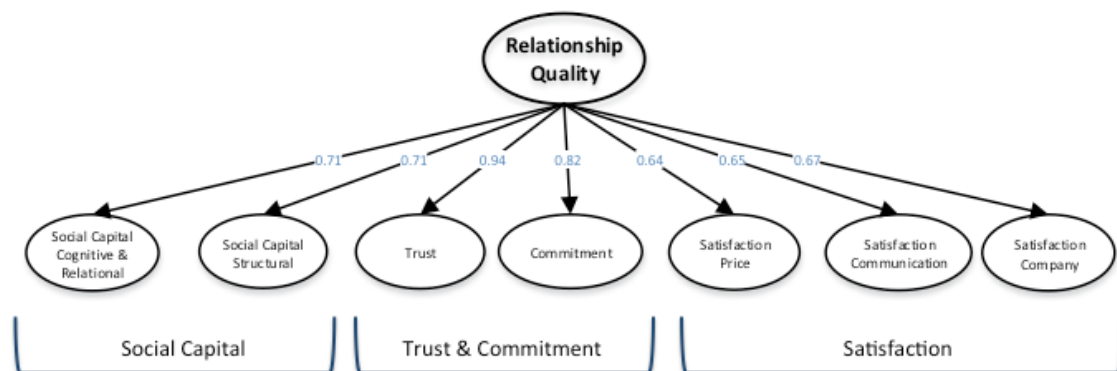


Figure 3 Relationship Quality Construct

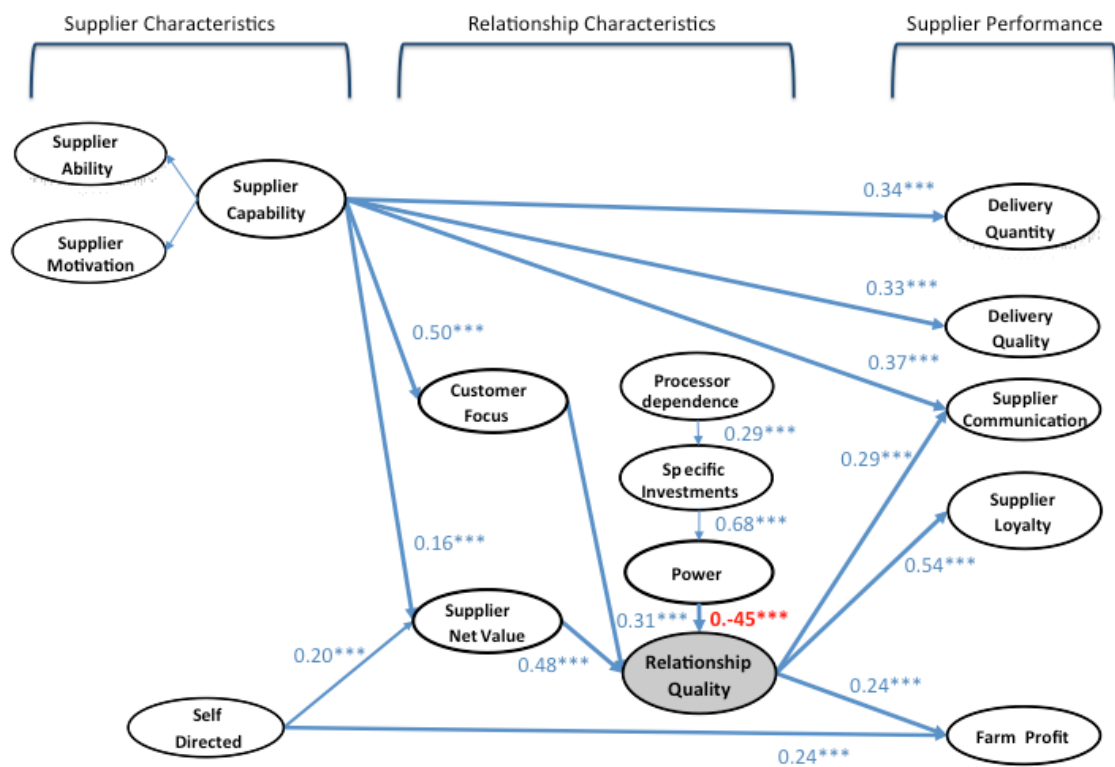


Figure 4 Structural Model

Conclusions

- The relationship between supplier characteristics and supplier performance is partially mediated by relationship quality
- There is a direct relationship between supplier capability and delivery quality and quantity of product
- The relationship between supplier self-direction and farm profitability, is partially mediated by relationship quality
- The relationship between supplier characteristics and supplier loyalty is fully mediated by relationship quality
- The relationship between supplier characteristics and supplier communication is partially mediated by relationship quality
- The positive relationship between supplier characteristics and relationship quality is mediated by customer focus and supplier net value
- There is a negative relationship between processor use of power and relationship quality
- Specific investments increase the likelihood of processor use of power
- The positive relationship between supplier customer focus and relationship quality is partially mediated by processor dependence, specific investments and processor use of power

Managerial Implications

Relationship quality is an important mediating variable for supplier performance (loyalty, communication and profitability). Therefore to achieve sustainable supplier performance you need to improve relationship quality

Authors' contributions

Nic Lees conceived and designed the study, undertook the interviews, analysed and wrote up the results and produced the manuscript. Peter Nuthall provided advice and input into the research design the analysis of the results and reviewed the final manuscript.

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