

Relationship quality and supplier performance in agri-food supply chains

Abstract

The purpose of this study is to evaluate the influence of relationship quality on the performance of suppliers in the context of agri-food supply chains. The paper aims to provide a greater understanding of relationship management in agri-food supply chains which has increased in importance due to issues of food safety, changing consumer preferences and awareness of the environmental impact of agricultural production.

The resource-based view (RBV) and the relational view (RV) were used to provide the theoretical basis for examining relationship quality and supplier performance. The research involved both qualitative research and an empirical investigation of suppliers in agri-food supply chains. The data was analysed using principal component analysis and structural equation modelling. The results supported the theoretical framework indicating that relationship quality is a valuable relational resource that can provide firms with a competitive advantage. The findings showed that improving relationship quality would influence supplier performance by increasing supplier communication and loyalty. It confirmed the hypothesis that relationship quality has an important effect on supplier performance in the context of agri-food supply chains. The results can provide buyers of agri-food products with ways to affect the way suppliers communicate and increase their loyalty by building enduring high quality relationships. Improving relationships between suppliers and buyers can enable improved quality and reliability of food value chains. This can benefit both consumers and producers. The research addresses the lack of empirical studies of supply chain relationships in agri-food supply chains. Further research needs to attempt to identify what additional factors influence supplier quality.

Introduction

Significant changes have recently occurred in agri-food supply chains. Many buying firms have moved away from a transactional approach to procurement that focused on short-term cost minimisation and adversarial supplier relationships. Many firms now aim to develop long-term partnerships with suppliers that enable them to improve performance and deliver differentiated products that meet changing consumer

requirements (Fearne, Duffy, & Hughes, 2001). Furthermore, food safety issues have increase public pressure for greater transparency and traceability throughout the agri-food supply chain (Matopoulos, Vlachopoulou, Manthou, & Manos, 2007). At the same time there is greater awareness of the impact of agriculture production on the environment which is forcing change agri-food production systems. This has brought the study of supplier relationships and performance in agri-food supply chains to the fore. This has highlighted the need for a greater understanding of these factors in the specific context of agri-food supply chains

The relationship between buyers and suppliers has long been recognised as important to business performance (Anderson & Narus, 1984; Dyer & Singh, 1998; Ganesan, 1994; Geyskens, Steenkamp, Scheer, & Kumar, 1996; Morgan & Hunt, 1994). For example, Lambert (2006, p. 1) states, “one of the most significant paradigm shifts in modern business management is that individual businesses no longer compete solely as autonomous entities but rather as supply chains”. Furthermore, he argues that the ultimate success of an individual business is based on the ability to manage and integrate the company’s complex network of relationships. This focus on relationship management has also been identified as an important topic of research in agri-food supply chains due to the complexity that arises as a result of the distinct features of food production and consumption. Grimm, Hofstetter, and Sarkis (2014) support this argument by stating that in comparison to other industries, the agri-food industry has some unique features which result from the production and distribution of vegetable and animal-based products (Haasis & Ldic, 2008). For instance, Van der Vorst, Van Dongen, Nouguier, and Hilhorst (2002, p. 124) list a number of these distinctive characteristics, such as “shelf life constraints, food safety, and variable quality and quantity. These arise from biological variations, seasonality, random factors connected with weather and pests and other biological hazards”. This creates greater uncertainty than in supply chains with more functional products where supply and demand is more stable (Lee, 2002). These features of agri-food supply chains create inelasticity in supply and therefore significantly increase complexity in the supply chain, which in turn can impact on buyer-seller relationships.

Furthermore, agri-food supply chains typically comprise a number of different partners, such as retailers, wholesalers/distributors, various traders, processors, marketers, retailers, farmers and farm suppliers (Roth, Tsay, Pullman, & Gray, 2008). There is also, frequently, a large and fragmented supply base (Haasis & Ldic, 2008). Additionally, suppliers are often individual producers rather than companies or corporations. As a result managing supplier relationships in agri-food supply chains can be more costly and complex. Further complexity is created because of food safety and environmental sustainability concerns that are important to stakeholders and consumers (Lees & Saunders, 2015). These issues then drive regulatory requirements for environmental management and traceability in all stages of production, processing and distribution (Grimm et al., 2014). Combined with this there are also significant changes occurring in agri-food supply chains. For example, food production has moved from primarily undifferentiated commodity goods to products with diverse characteristics for specific market segments. This increases search and monitoring costs for buyers and suppliers (Baker & Smyth, 2012; Duffy & Fearn, 2004). Young and Hobbs (2002, p. 429) identified that some of the driving forces of these changes include “changing consumer preferences, biotechnology, information technology, environmental pressures, credit and risk issues, and the reduction of global trade barriers”. For example, consumers are now demanding greater variety and quality in the food they eat. This involves delivering a consistent year-round supply of high-quality and safe food (Fischer et al., 2009; Van der Vorst, 2000). Consumers are also concerned with how their food is produced. This includes credence attributes such as environmental sustainability, animal welfare, fair trade, and organic production (Wognum, Bremmers, Trienekens, van der Vorst, & Bloemhof, 2011). As agricultural products have become more differentiated more pressure is put on supplier performance. As a result, individual suppliers are less able to be substituted. This change means greater use of long term contracts and other forms of vertical coordination (Young & Hobbs, 2002). These issues give rise to the potential for opportunistic behaviour. Suppliers and buyers may take advantage of their position by providing incomplete or incorrect information to achieve a self-interested gain (Williamson, 1987; Ziggers & Trienekens, 1999).

All these factors highlight the complexity and difficulty of managing relationships with suppliers in agri-food supply chains. This situation is compounded by the lack of published research on buyer-supplier relationships in the agri-food industry. This emphasises the importance of buyer-supplier relationship management in these supply chains and the need for further research to address some of the knowledge gaps in this area.

Literature review

The resource based view (RBV) and the relational view (RV) provide the theoretical basis for examining relationship quality and supplier performance in this research. Although these approaches do not explicitly deal with buyer-seller relationships, they do so indirectly by focusing on the firm's resources that provide a competitive advantage. The relational view of the firm put forward by Dwyer, Schurr, and Oh (1987); Dyer and Singh (1998) and Lusch and Brown (1996), expands the RBV beyond the boundaries of the firm to encompass the capabilities and resources that exist within a firm's network of relationships. It is these inter-firm linkages and the combining of resources in unique ways that enable them to achieve competitive advantage. In this view, firms engage in relationships to gain access to complementary resources that they do not have, or do not want to have (Dyer and Singh, 1998). A partner can offer a range of valuable resources, including technical capability, organisational capability, flexibility, reliability, knowledge, innovative capability, network position, international presence and low risk of discontinuity (Dyer & Singh, 1998, p. 660). This places human resources (supplier characteristics), and relationship resources (relationship quality) as fundamental constructs in this extended RBV.

Relationship quality

Relationship quality (RQ) is a central variable in this research. However, it is often poorly defined and is used with a variety of meanings in the literature. The actual concept of relationship quality emerged from the literature on relationship marketing and is now a core concept within the marketing discipline (Leonidou, Samiee, Aykol, & Talias, 2014). The specific use of the term relationship quality was introduced by Dwyer et al. (1987) and was also used by Crosby, Evans, and Cowles (1990) in research on service quality. Robicheaux and Coleman (1994) also referred to the concept of "relationship quality" (p. 43) in

their analysis of marketing channel relationships. Subsequent authors have studied relationship quality from different perspectives as well as at different stages in the supply chain (Figure 1).

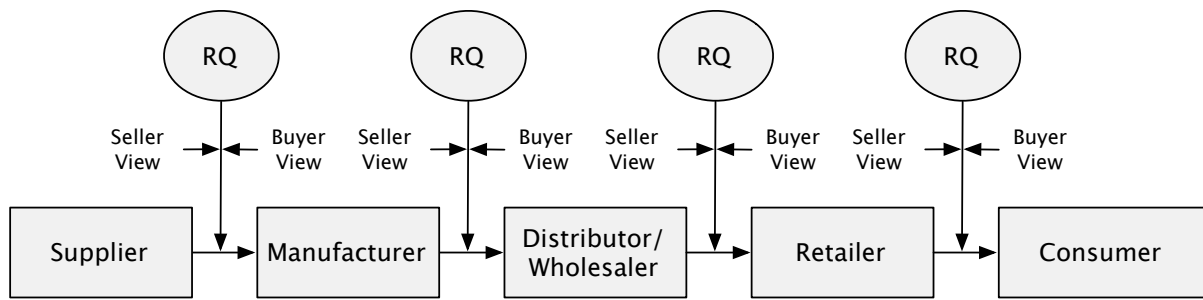


Figure 1: Differing perspectives on relationship quality in the supply chain

Despite the complexity of the relationship quality concept, there is some consensus in describing the concept. For example, Lages, Lages, and Lages (2005, p. 1041) define relationship quality as a construct that, “reflects the overall strength of a relation”. It is commonly defined as a higher order construct made up of a number of distinct, but related, dimensions (Crosby et al., 1990; Dwyer et al., 1987; Kumar, Scheer, & Steenkamp, 1995; Lages et al., 2005). The most common of these dimensions are trust, commitment and satisfaction (Crosby et al., 1990; Dorsch, Swanson, & Kelley, 1998; Hewett, Money, & Sharma, 2002; Schulze, Spiller, & Theuvsen, 2006; Ulaga & Eggert, 2005). This research uses trust, commitment and satisfaction as the three main dimensions of relationship quality as these are the most commonly used variables. This research interprets relationship quality as an attitude towards the buyer/processor incorporating trust, commitment and satisfaction, which leads to the behavioural supplier performance outcomes.

Trust

This research builds on the original definition of trust described by Blau (1964, p. 940) as interpersonal, and firm specific trust which is “the belief that a party's word or promise is reliable and a party will fulfil his/her obligations in an exchange relationship”. This definition incorporates the dimensions relating to credibility, honesty and competence, as well as benevolence or goodwill (Mishra, 1996; Nahapiet & Ghoshal, 1998). Credibility and competence refer to the belief that the other party has the ability to perform the required tasks effectively and efficiently, whereas benevolence, goodwill and honesty mean they can trust their

partners intentions and motivations (Ganesan, 1994). Benevolence also implies the belief that each partner will act in the best interest of the other. This includes the expectation that the other party will not take advantage of the others' vulnerability or dependence and will behave in a way that is honest, sincere and fair. Trust is the most researched aspect of relationship quality and is frequently used as the central construct to assess the quality of buyer-supplier relationships. It is recognised as a key factor that decreases uncertainty in exchange relationships (Geyskens et al., 1996; Morgan & Hunt, 1994). The scale items for trust were adapted from (Anderson & Weitz, 1992; Kumar et al., 1995; Sako & Helper, 1998; Tsai & Ghoshal, 1998). These items were selected to cover the three dimensions of trust, which included honesty, benevolence and goodwill, as well as competence (Table A1).

Commitment

Similar to trust, commitment is consistently understood to be an essential indicator of relationship quality and reflects the positive value of the relationship (Geyskens, Steenkamp, & Kumar, 1998). It is considered a measure of the desire for the relationship to continue and the willingness to make an effort on the other party's behalf. This comes through in the description of Geyskens, Steenkamp, and Kumar (1999), who define commitment as a "desire to continue the relationship in the future and a willingness to make short-term sacrifices to maintain the relationship" (p. 225). Based on this definition, relationship commitment involves an expectation that the relationship will continue, with the desire to maintain and strengthen the relationship. This means more than just a short-term evaluation of benefits and costs. It reflects a willingness to invest financial, physical or relational resources in a relationship and make short-term sacrifices to achieve long-term benefits (Geyskens et al., 1998; Morgan & Hunt, 1994; Wilson, 1995). The scale items for commitment (Table A2) were adapted from Kumar, Scheer, & Steenkamp, (1995); Sako & Helper, (1998); Tsai & Ghoshal, (1998) and Villena, Revilla, & Choi (2011).

Satisfaction

Satisfaction is the third dimension of relationship quality. It is an important concept within exchange relationships and is a central tenant of relationship marketing, as well as channel and organisational research. Most definitions of satisfaction focus on an overall evaluation of the relationship. For example,

Dwyer and Oh (1987) draw on the conceptualisation of Ruekert and Churchill Jr (1984, p. 227) who define satisfaction as the overall assessment of the characteristics of the relationship, which are “rewarding, profitable, instrumental and satisfying or frustrating, problematic, inhibiting, or unsatisfying”. In this way satisfaction is a summary psychological state that involves the evaluation of the past outcomes of the relationship (Andaleeb, 1996; Oliver, 2010). It is multi-dimensional and incorporates economic and non-economic psychological aspects including: social interaction and financial performance as well as features of the service and assistance provided by the partner (Gassenheimer & Ramsey, 1994; Geyskens et al., 1999; Homburg & Rudolph, 2001; Ruekert & Churchill Jr, 1984). These aspects are evaluated in terms of conformity or disconformity with expectations (Oliver, 1981, 2010; Parasuraman, Zeithaml, & Berry, 1988; Wilson, 1995). Scheer and Stern (1992), as well as Ulaga and Eggert (2006), specifically emphasise an overall positive evaluation and approval of relationship performance against some comparison or standard. This standard can reflect different dimensions of the relationship; for example, Benton and Maloni (2005, p. 2) define satisfaction as “a feeling of equity with the supply chain relationship no matter what power imbalances exist within the buyer–seller dyad”. The economic evaluation includes evaluation of the financial rewards and considers such things as volume, margins and overall achievement of goals. The non-economic aspects relate to the how the parties relate on a personal level, that means they enjoy working together (Geyskens et al., 1999). The scale items for satisfaction were based on three dimensions of satisfaction, which included satisfaction with price, support, communication and the performance of the buyer. The scale items were adapted from Anderson and Weitz (1992); Kumar et al. (1995); Anderson and Narus (1984); Micheels and Gow (2011) and Nooteboom, Casson, and Godley (2000).

Supplier performance

There is considerable literature on the importance of relationship quality as a way to improve supplier performance. The concept of supplier performance emerged from the literature on supplier development (Dorsch et al., 1998), which describes the efforts of manufacturers to improve the performance of their suppliers. Supplier development is defined as any effort of a buying firm to increase the performance and/or capabilities of their supplier to meet the buying firm's supply needs (Wilson, 1995). This study

focuses on relationship quality and how this can improve the performance of supplier, enabling them to better meet the needs of the buying firm. Performance is therefore, from the buyer's perspective and refers to a supplier's improvements in communication, product quality and reliability that benefits the buying firm (Laaksonen, Jarimo, & Kulmala, 2009). As supplier performance is highly context specific, the supplier performance items were refined from the literature and interviews with the buyers. The supplier performance variables were defined as communication, quality and loyalty.

Supplier communication

Communication and information sharing are important aspects of cooperative behaviour and supplier performance. For example, Anderson and Narus (1990, p. 44) define communication as, "the formal as well as informal sharing of meaningful and timely information between firms". Effective supplier communication (as well as buyer communication) is an essential coordinating activity and is critical to overall supply chain performance. Information from suppliers enable firms to respond to customers' needs, reduce inventory costs and improve competitive advantage (Stank, Crum, & Arango, 1999). In agri-food supply chains, production volume, timing and quality, can be highly variable and affected by environmental factors as well as management decisions. Therefore, effective flow of production information from suppliers can benefit buyers through reduced variation and sorting costs plus greater ability to meet customer requirements (Micheels & Gow, 2011). From these considerations the supplier communication scale items (Table A4) were identified and adapted from those used by Anderson and Narus (1990).

Loyalty

Loyalty is a measure of the suppliers ongoing willingness to supply the buyer. Loyalty goes beyond calculative commitment and means that a supplier will continue to support a buyer even when it may no longer be economically rational to do so. Loyalty is defined as a state of attachment that is experienced as an allegiance or faithfulness (Gilliland & Bello, 2002; Liu, Su, Li, & Liu, 2010). If a supplier has a strong sense of loyalty towards a buyer then the supplier may sacrifice short-term benefits to achieve long-term objectives (Gilliland & Bello, 2002). A loyal supplier will try to resolve conflict in the relationship rather than

existing. A fundamental component of loyalty is the forsaking of alternatives and becoming less sensitive to price, at least in the short term. The scale items for loyalty (Table A5) were adapted from Liu et al. (2010) and Bensemann, Shadbolt, and Conforte (2011). Many of these items relate to the choice to continue to supply despite a difference in price and the importance of commitment to a single buyer as well as a choice to be committed to a buyer rather than participating in the spot market.

Quality

This ability to deliver product in a timely manner that meets the buyer's requirements for quantity and quality is a critical component of supplier performance. Meeting quality specifications reduces sorting costs and ensures the buyer can meet their customers' requirements. Having suppliers with the ability to achieve quality standards is, therefore, a key factor in providing competitive advantage and, as a result superior performance for the buyer. Product quality is a highly context-specific and defining quality differs depending on the type of product and production system. This required that for this research the product quality scales items define quality from an animal production and product perspective. The scale items were developed to incorporate delivery reliability in terms of numbers of animals and quality required in terms of product specifications (Table A6).

Research Framework

The research framework was developed to look specifically at the interaction between relationship quality and supplier performance (Figure 2).

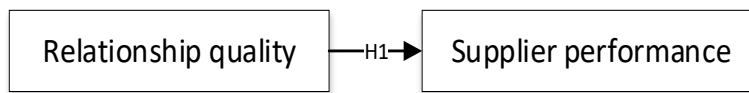


Figure 2: Hypothesised relationship between relationship quality and supplier performance

Hypothesis H1 evaluates the overall relationship between relationship quality its relationship to supplier performance.

H1: Improving relationship quality will have a positive impact on supplier performance.

This was then further developed to into the sub-hypotheses H1a – H3c (Figure 3):

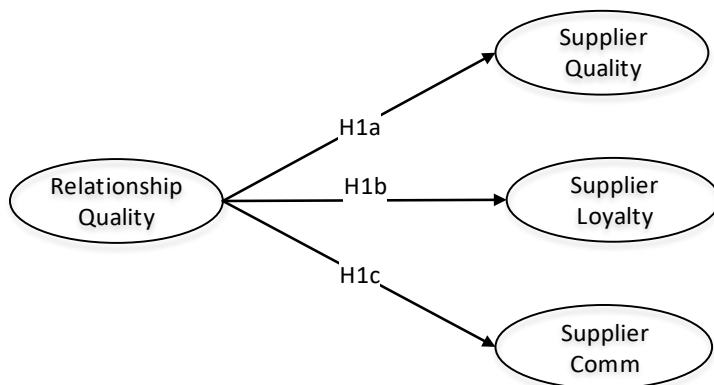


Figure 3: Research hypotheses

H1a: Improving relationship will have a positive impact on supplier product quality.

H1b: Improving relationship will have a positive impact on supplier loyalty.

H1c: Improving relationship will have a positive impact on supplier communication.

Research objectives

The objective of this research is to contribute to the knowledge and understanding of supply chain relationships in the agri-food sector. Specifically, the research aims to study the influence of relationship quality on supplier performance. 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.

Methodology

The first stage of the research involved data collection from in-depth semi-structured interviews with 25 suppliers and key informants from three New Zealand agri-food companies (Lees & Nuthall, 2015). These companies exported beef, lamb and venison; their key markets were in the European Union, North America, China and the Middle East. The interviewees were selected from the company's supplier database and were chosen to provide a diversity of farmer and farm types. The key informants from the agri-food companies were accessed by approaching personnel within these businesses and explaining the purpose of the research. These face-to-face, on-site interviews were complemented by 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. The interviews were recorded, transcribed and then coded using Nvivo research software, which enabled the organisation and analysis of the unstructured qualitative data. The case analysis enabled the description of emerging constructs and their relationships through detailed descriptive write-ups of each case. Secondly, cross case analysis was able to compare and contrast the patterns emerging from the detailed case write-ups (Yin, 2003).

Based on Churchill (1979), the development of the survey instrument followed a four step process. Firstly an extensive literature review was conducted to obtain established scale items to develop the initial pool of measures. Following this, as described above, interviews were carried out with farmers supplying beef, venison and lamb to the three agri-food companies. These interviews with suppliers and processing

company personnel helped select and develop the scale items used in a pre-test survey. The pre-test survey was sent to the agri-food company personnel and also administered in person to ten farmer suppliers. This enabled the survey to be tested for structure, readability, ambiguity and overall completeness.

Data collection

The sampling frame for the survey was the New Zealand AsureQuality registered farmer's database. The data came from 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. 5944 surveys were sent out in the first mail out and 4720 in the second mail out. A total of 688 surveys were returned in the first mail out, representing a 12 percent total response rate. The second mail out was done six weeks later, and a further 537 surveys were returned (11 percent total response rate). This brought the combined total response rate up to 20 percent. The responses were tested for representativeness non-response bias. Both these confirmed that the data was representative of the sample populations and did not show any non-response bias. The response rate was considered sufficient for the purpose of the principle component analysis and structural equation modelling. This was because the data was not being used to estimate parameters for the total population (Hair et al., 2010).

Analysis and results

Descriptive analysis identified differences between suppliers on a range of factors (Table 1). The data showed that sheep farms were significantly larger than beef and venison farms. The most common type of farm ownership was family farms (88 percent), indicating that most of the respondents were individual farmers. There was a considerable spread in the length of time farmers had been supplying their processor, this ranged between 19 percent (0-4 years) to 31 percent for farmers supplying for more than 20 years (Table 1). 30 percent of farmers had been supplying their processor for more than 30 years indicating a high level of loyalty among these suppliers. Approximately 20 percent of farmers supplied at least some stock on contract. None of these suppliers committed all their stock on contract. These suppliers on average committed 49 percent of their total stock on contract. From this it can be estimated

that approximately 20 percent of all stock were sold on contract. This implies that contract supply was not the most common supply relationship.

Table 1: Descriptive analysis

Farm Type	Mean of farm size (Ha)
Beef	276 Ha
Sheep	991 Ha
Deer	284 Ha
Ownership Type	%
Corporate Farm	3%
Family farm	88%
Maori trust/corporation ¹	1%
Other	8%
Years supplying stock the processor	%
0 – 4 years	19%
5 - 10 years	31%
10 - 20 years	20%
20+	30%
Supplied stock on contract	%
Percentage of farmers who supply stock on contract	39%
Percentage of stock supplied on contract ² (mean)	49%

Following the descriptive analysis, the data was analysed using exploratory factor analysis (EFA). This enabled the underlying common variables to be identified by evaluating the common variance among the scale measures (Table 2). Measurement items were retained where they had an Eigen value of greater than one and had a factor loading of greater than 0.45. Measurement items that cross loaded onto multiple factors were also deleted. This resulted in eight common factors with a total variance explained of 70 percent (Table A7). Scale reliability and internal consistency was measure using Cronbach's Alpha and in the confirmatory factor analysis by the critical ratio (CR). Cronbach's Alpha scores ranged from 0.66 for supplier quality to 0.94 for trust (Table 2). There are a variety of acceptable alpha values reported in the literature, ranging from 0.70 to 0.95 (Tavakol & Dennick, 2011). Values as low as 0.60 are considered acceptable in exploratory research (Hair, Black, Babin, & Anderson, 2010). The number of items in a scale also significantly affect the alpha value (Meyers, Gamst, & Guarino, 2006) with more scale items increasing

¹ A Maori Trust or Corporation is an organisation that manages land in common ownership by Maori Iwi (tribes)

² Average percentage of stock supplied on contract by those suppliers who commit to a contract.

the value of Cronbach's Alpha. This may explain the lower Cronbach's Alpha value for supplier quality.

Based on these considerations the values were deemed acceptable for the purpose of this research.

Table 2: Exploratory factor analysis

	Factor Loading	Cronbach's Alpha	Critical Ratio	Variance extracted
1. Trust		0.94	0.94	16.4%
Trust2_Welfare	0.79			
Trust5_Advantage	0.78			
Trust4_Fair	0.77			
Trust1_Explain (Truth)	0.77			
Trust6>Returns	0.71			
Trust3_Agree	0.70			
Trust8_Honest	0.70			
Trust9_Inform	0.65			
2. Commitment		0.83	0.88	9.4%
Commitment4_Invest	0.71			
Commitment2_Resources	0.65			
Commitment1_LongTerm	0.58			
Commitment3_Proud	0.56			
3. Satisfaction Price		0.80	0.80	7.6%
Satisfaction9_Expect	0.75			
Satisfaction4_Price	0.73			
Satisfaction10_PriceStock	0.72			
Satisfaction5_Schedule	0.66			
4. Satisfaction Organisation		0.91	0.90	12.0%
Satisfaction1_NetReturn	0.80			
BuyAbility3_Premium	0.79			
BuyAbility1_Market	0.76			
BuyAbility2_SupplyChain	0.75			
Satisfaction3_Policies	0.67			
Satisfaction 2_Support	0.62			
5. Satisfaction Communication		0.88	0.88	7.5%
Satisfaction7_CommTime	0.83			
Satisfaction8_CommQual	0.81			
Satisfaction6_Support	0.72			
6. Supplier communication		0.83	0.84	4.9%
SupplierComm2_Plans	0.87			
SupplierComm1_Delivery	0.81			
6. Loyalty		0.78	0.77	7.6%
Loyalty_L3_PriceOnly	0.76			
Loyalty_L4_SpotMarket	0.70			
Loyalty_L1_Options	0.70			
Loyalty_L5_SupplyOne	0.66			
Loyalty_L2_PriceCompetition	0.58			
7. Supplier Quality		0.66	0.66	4.2%
Quality2_Specs	0.82			
Quality1_Reliability	0.80			

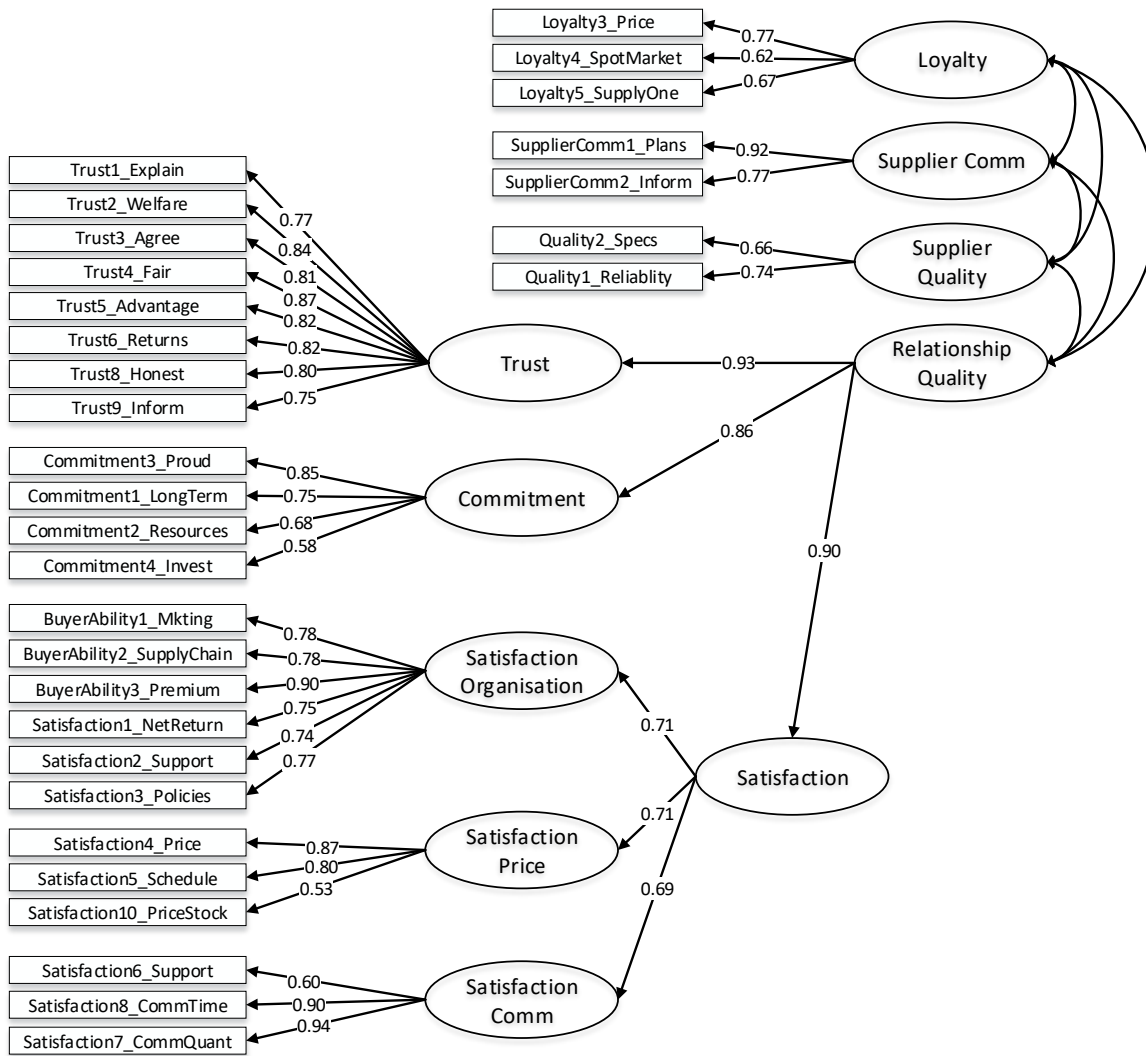


Figure 4: Measurement model (CFA)

Confirmatory factor analysis (CFA) was used to test the measurement model (Figure 4). Following this, structural equation modelling identified the relationships between the independent variable (relationship quality) and the three supplier performance variables (Figure 5). According to (Hair et al., 2010) measurement model validity depends on establishing an acceptable level of goodness-of-fit as well as finding evidence of construct validity. Goodness-of-fit (GOF) determines how well the specified model (in this case the measurement model) reproduces the covariance matrix produced from the observed data. IBM Amos software was used to evaluate construct validity and estimate the model fit of the measurement model. The results of the CFA model show excellent model fit on all the fit criteria (Table 4). All the composite reliability (CR) scores were greater than 0.70, other than the CR for supplier quality.

Table 3: Correlations, reliability (CR) , average variance explained (AVE) and maximum shared variance (MSV)

	CR	AVE	MSV	1	2	3	4
1. Supplier Communication	0.84	0.72	0.19	-			
2. Supplier Loyalty	0.73	0.48	0.27	0.44	-		
3. Supplier Quality	0.66	0.49	0.13	0.36	0.19	-	
4. Relationship Quality	0.92	0.79	0.27	0.37	0.52	0.21	-

The results of the CFA can also be used to identify any concerns regarding the validity of the measures. The criteria for discriminant validity is met when items share more common variance with their specific construct than with any other construct. This evaluated by comparing the squared correlation between two constructs and the AVE. All items met the requirements for discriminant validity. Convergent validity requires the AVE to be greater than 0.50. Both supplier loyalty and supplier quality did not meet this standard cut off criteria. However as the AVE for these variables were only slightly below this cut off they were considered acceptable (Table 3).

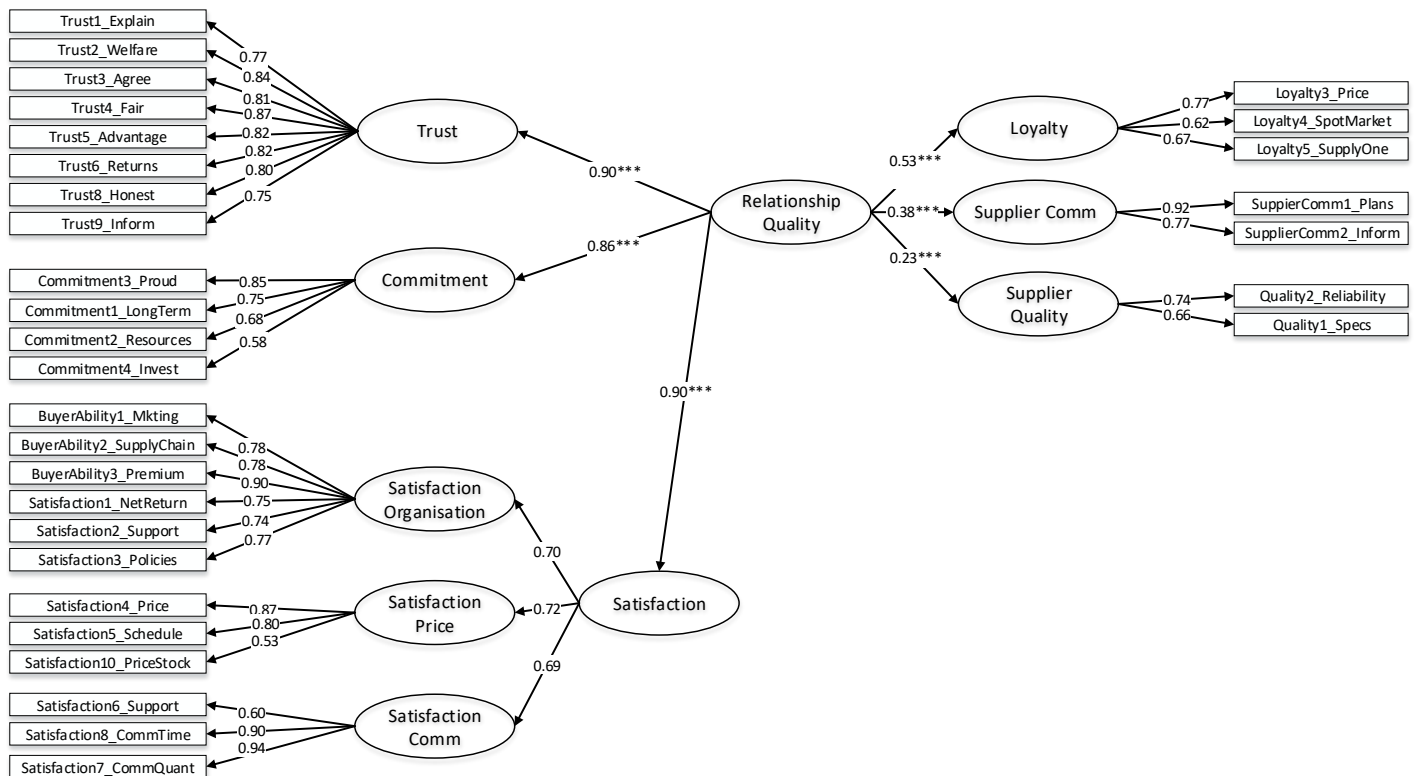


Figure 5: Structural model

Table 4: Model fit criteria for measurement and structural models

Measure	Measurement Model	Structural Model
Chi-square/df (cmin/df)	2.7	3.0
CFI	0.96	0.96
GFI	0.92	0.93
AGFI	0.90	0.91
RMSEA	0.042	0.05
PCLOSE	0.99	0.96

The testing of the structural model showed significant paths from relationship quality to all three of the supplier performance variables, confirming the model hypotheses. The overall fit statistics shown in (Table 4) exceeded the required values that indicate a good model fit (Hu & Bentler, 1999). The path from relationship quality to supplier loyalty had the greatest standardised regression value (0.53***) followed by supplier communication (0.38***). There was a significant relationship with supplier quality ($p < 0.001$) however this was lower than the values for the other two variables (0.23***). These results indicate that increasing relationship quality will increase all three of the dependent variables. This therefore confirms the hypotheses H1-3 (Table 5). However, the R^2 values reveal differences in the explanatory power of relationship quality on the dependent variables. For supplier communication and supplier loyalty relationship quality explains a significant amount of the variance (Table 5 and Figure 6). There is also evidence from the regression weights that improving relationship quality will improve supplier communication and supplier loyalty. The results for supplier quality are less conclusive. Though there is a significant ($p < 0.001$) relationship with the independent variable, the low R^2 value indicates that there are other factors other than relationship quality that affect supplier quality.

Table 5: Standardised effects and R² values for relationships between Relationship Quality and Supplier Performance

Path to:	Path from:	Estimate	Standardised Estimate	SE	CR	R ²	Hypothesis	Supported
Supplier Loyalty	Relationship Quality	0.58***	0.53***	0.05	12.6	0.28	H1a	Yes
Supplier Quality	Relationship Quality	0.16***	0.23***	0.03	5.2	0.04	H1b	Yes
Supplier Communication	Relationship Quality	0.58***	0.38***	0.04	11.2	0.18	H1c	Yes

Significance levels: p<0.001 ***, p<0.05 **, p<0.10 *.

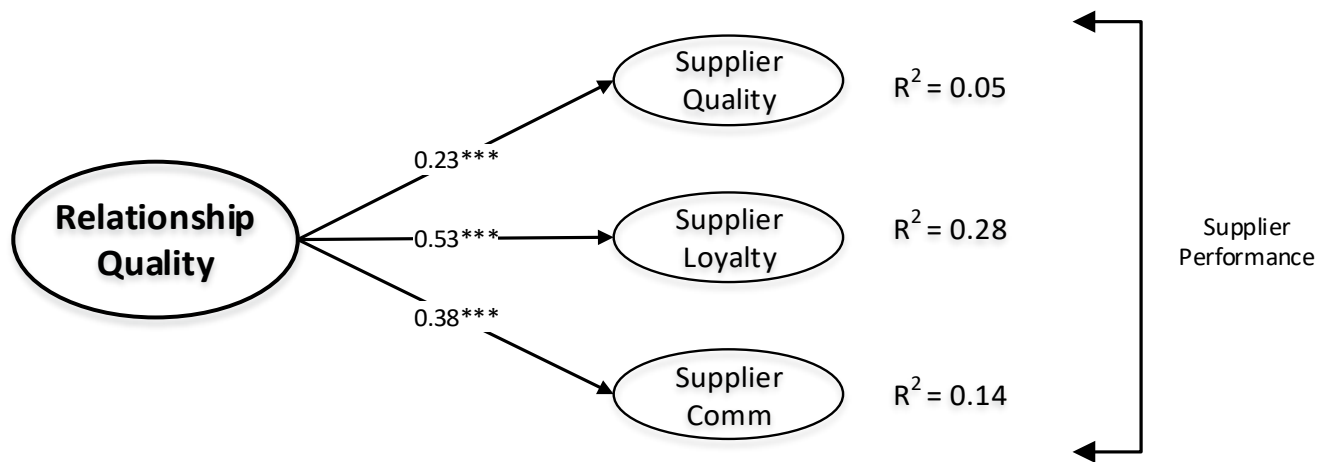


Figure 6: The effect of relationship quality on supplier performance

Discussion

This research contributes to the knowledge and understanding of supplier-buyer relationships in agri-food supply chains. Specifically, it adds to the understanding of how relationship quality affects supplier performance. The findings indicate relationship quality has a positive impact on supplier performance in this context. In particular higher quality relationships improve supplier communication and loyalty and to a lesser extent supplier quality. This suggests that buyers in agri-food supply chains can increase supplier loyalty and information sharing by improving the quality of the relationships with their suppliers.

The positive impact of relationship quality on loyalty is consistent with the results of Palmatier, Dant, Grewal, and Evans (2006) who emphasised that increased loyalty is one of the most common outcomes resulting from relationship management efforts. Cannon and Homburg (2001) emphasise that supplier

loyalty is important for maintaining security of supply, reducing supplier acquisition costs and for processors to capture the benefits of supplier development efforts.

The results of this study are consistent with previous research that shows that positive relationships affect a supplier's willingness to share information; this has a significant effect on the buyer firms performance (Hsu, Kannan, Keong Leong, & Tan, 2006; Kannan & Tan, 2002; Paulraj, Lado, & Chen, 2008). For example, Cousins and Menguc (2006) argue that supply chain integration and stronger relationships lead to higher levels of communication as well as operational performance. Micheels and Gow (2011) also emphasise the importance of communication for providing benefits to buyers by sharing production information which can decrease product variation and reduce sorting costs. The importance of communication and information sharing has also been emphasised for effective organisational relationships (Modi & Mabert, 2007; Mohr & Nevin, 1990; Monczka, Petersen, Handfield, & Ragatz, 1998). Despite these benefits Kannan and Tan (2002) state that many buying firms do not consider it important to assess the willingness and ability of suppliers to share information.

Supplier quality relates to the quality of animals supplied and the quantity and timing of delivery. The results indicate that processors, who require higher quality animals delivered at specific times, do need to build stronger relationships with suppliers. However, the results indicate that there are other variables that are more important than relationship quality. Delivering quality animals may be a result of other factors such as a supplier's ability as well as farm resources and climate. Delivering the required quality and numbers of stock at specific times in a pastoral system is difficult as the producer may have little control over the environment. Less flexible delivery schedules can directly affect profitability by increasing costs and effort. Relationship quality is therefore important as suppliers need to trust that they will be sufficiently rewarded for meeting the required quality and delivery specifications. This is consistent with the work of Kannan and Tan (2002) who indicate that it is easier to address supplier delivery problems if there is a good relationship between buyer and supplier. They also reinforce the need to see suppliers as an extension of the buying firm itself and not as individual entities. Furthermore, they state that while cost

may be important criteria for buyer's quality, delivery and service are also important. However, while quality is an important supplier performance variable it is important to also consider other supplier performance outcomes. This is clearly stated by Simpson, Siguaw, and Baker (2001) who assert that "a certain level of quality may be necessary to compete, quality in and of itself may not necessarily provide a competitive advantage in today's marketplace" (p. 120).

These findings support the view that relationships between buyers and sellers are an essential component of supply chain performance (Lambert, 2006). Furthermore, the research highlights that these relationships are important in the context of agri-food supply chains. This is consistent with the work of Grimm et al. (2014) and (Van der Vorst & Beulens, 2002) who assert that high quality relationships are required to manage the greater uncertainty and complexity that arise in the production, distribution and consumption of food products. This uncertainty and complexity is compounded by agri-food supply chains moving from producing undifferentiated commodity food products to products with diverse characteristics that target specific consumer requirements. Supplier loyalty and information sharing are necessary to enable differentiated products with specific market requirements to be produced and delivered to consumers. This is especially important where consumers require credence attributes to be communicated along with physical product characteristics (Wognum et al., 2011). The findings also support the RBV and RV theoretical perspective by showing relational resources enable firms to access valuable resources from their exchange partners (Dyer & Singh, 1998). The research is also consistent with research that demonstrates the importance of the relationship quality in supply chain theory. Specifically, the research addresses the research gap in the application of this concept in agri-food supply chains.

Conclusion

From a managerial perspective the research indicates that developing quality supplier relationships characterised by high levels of trust, commitment and satisfaction is crucial to improve performance in agri-food supply chains. These high-quality relationships are an important to enable agri-food supply chains to move away from commodity products and adversarial relationships and compete with higher value differentiated products. This requires suppliers to be loyal and to freely share information with their

buyer. Improved supplier communication enables to buyers to improve their competitive advantage by responding to consumer needs and reduce costs (Stank et al., 1999). The research indicates that buyers can affect the way their suppliers communicate plus their loyalty by building enduring high quality relationships. In addition to these factors it is important for buyers to know how they can influence the quality of the product that suppliers deliver. Further research needs to attempt to identify which additional factors influence supplier quality. These factors may include supplier specific factors that may not be easily influenced by supplier development programmes. These characteristics may need to be taken into account when selecting suppliers. For example, supplier ability and personality may impact supplier quality but there may be little a buyer can do to modify these factors.

This study provides empirical validation of the links between relationship quality and supplier performance in the agri-food context. In particular, it provides evidence for the influence of relationship quality on supplier communication and supplier loyalty. The results indicate that these relationships in agri-food are consistent with research in manufacturing supply chains. The research also provides a reliable instrument for measuring relationship quality between buyers and suppliers in agri-food supply chains. It also developed measures for supplier communication, loyalty and quality specific to this context. The research emphasises that relationship management is just as important for supplier performance in agri-food supply chains as in other industries. More work needs to be done to define the supplier quality construct and to identify factors that influence this variable. Product quality and supply is a complex construct for agricultural products due to the unique features of the production systems and evaluation of quality. The research illustrates that relationship quality is important in light of the significant challenges facing agri-food supply chains. This research addresses the lack of research on buyer-supplier relationships in agri-food supply chains and identifies some important areas for future research.

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Appendix A

Table A1: Trust scale items

Dimension	Code	Description
Honesty	Trust1_ Explain	Even if our <u>current processor</u> gives us a rather unlikely explanation we are confident that they are telling the truth (Kumar, Scheer, & Steenkamp, 1995).
	Trust8_ Honest	Communications from our <u>current processor</u> are open and honest.
	Trust9_ Inform	I feel informed about the organisation and the activities of <u>current processor</u> .
Benevolence /Goodwill	Trust2_ Welfare	When making important decisions, our <u>current processor</u> is always concerned about our welfare (Anderson & Weitz, 1992; Kumar et al., 1995).
	Trust3_ Agree	We can rely on our <u>current processor</u> to help us in ways not required by our agreement with them (Sako & Helper, 1998).
	Trust4_ Fair	We believe that our <u>current processor</u> will always treat us fairly (Sako & Helper, 1998).
	Trust5_ Advantage	We can rely on our <u>current processor</u> without any fear they will take advantage of us even if the opportunity arises (Tsai & Ghoshal, 1998).
Trust - Competence	Trust6_ Returns	We can rely on our <u>current processor</u> to always deliver the best returns from the market.

Table A2: Commitment scale items

Dimension	Code	Description
Expectation of continuity	Commitment1_ LongTerm	We expect our relationship with <u>our processor</u> to continue for a long time (Sako & Helper, 1998).
Identification	Commitment3_ Proud	We are proud to tell other farmers that we are a supplier to <u>our processor</u> .
Willingness to Invest	Commitment2_ Resources	We are willing to dedicate time, effort and resources to support <u>our processor</u> in growing their markets and sales (Tsai & Ghoshal, 1998).
Willingness to Invest	Commitment4_ Invest	We are willing to make long term investments and changes to our farm to better meet the requirements of <u>our processor</u> and their customers (Kumar et al., 1995; Villena et al. 2011).

Table A3: Satisfaction scale items

Dimension	Code	Description
Satisfaction with price		
Price Expectations	Satisfaction9_Expect	How would you rate the actual returns you achieve from supplying <u>your processor</u> , compared to what you would expect to achieve for your animals (Anderson & Weitz, 1992)?
Price satisfaction	Satisfaction10_PriceStock	The returns we received for our stock were satisfactory last year (Anderson & Weitz, 1992; Kumar et al., 1995).
	Satisfaction4_Price	How would you rate the price received for the animals you supply?
Price Structure	Satisfaction5_Schedule	How would you rate the seasonal structure of the pricing schedule?
Satisfaction with support and communication		
Supply manager	Satisfaction6_Support	How would you rate the support provided by the stock buyer/supply manager?
Quantity	Satisfaction7_CommQual	How would you rate the quantity; (amount, frequency) of communication?
Timeliness	Satisfaction8_CommTime	How would you rate the timeliness of communication?
Satisfaction with organisation		
Net return	Satisfaction1_NetReturn	How would you rate the net return to supplying stock (Anderson & Narus, 1984)?
Support services	Satisfaction2_Support	How would you rate the support services provided (Micheels & Gow, 2011)?
Policies	Satisfaction3_Policies	How would you rate your processor on having reasonable policies (Anderson & Narus, 1984)?
Processor competence	BuyAbility1_Market	How would you rate your processor in their marketing and sales skills (Anderson & Narus, 1984)?
	BuyAbility2_SupplyChain	How would you rate your processor in their skills for improving quality and efficiency in the supply chain (Anderson & Narus, 1984)?
	BuyAbility3_Premium	How would you rate your processor in their ability to get a premium price from the market (Nooteboom, Casson, et al., 2000)?
These items were measured using 6 point Likert scales that ranged from <i>very satisfied</i> to <i>very dissatisfied</i> , <i>much better</i> to <i>much worse</i> and <i>far short of expectations</i> to <i>far exceeds expectations</i> .		

Table A4: Supplier communication scale items

Dimension	Code	Description
Production plans	SupplierComm2_Plans	We keep <u>our processor</u> informed on our production plans is very important to us (Anderson & Narus, 1984).
Problems	SupplierComm1_Delivery	We always let <u>our processor</u> know as soon as possible of any unexpected problems with things such as, delivery or product quality (Anderson & Narus, 1984).
These items were measured using a 6 point Likert scale ranging from: <i>strongly agree</i> to <i>strongly disagree</i> .		

Table A5: Supplier loyalty scale items

Code	Description
Loyalty_L1_Options	Reverse score of: It is important to have more than one option to sell our stock (Bensemman et al., 2011).
Loyalty_L2_PriceCompetition	How would you react if one of <u>processor</u> competitors consistently offered a higher price for animals of equal quality/specifications?
Loyalty_L3_PriceOnly	Reverse score of: If the price was good it doesn't matter who we supply our stock (Bensemman et al., 2011).
Loyalty_L4_SpotMarket	Reverse score of: You will always get better prices over the season if you play the market (Bensemman et al., 2011).
Loyalty_L5_SupplyOne	It is important to us to be committed to one company to supply our stock (Bensemman et al., 2011).
These items were measured using 6-point Likert scales that ranged from: <i>strongly agree</i> to <i>strongly disagree</i> and <i>switch to a competitor as soon as technically feasible</i> to <i>a competitor's price would have no influence on our current commitment to our current processor</i> .	

Table A6: Supplier quality Scale items

Dimension	Code	Description
Quantity	Quality2_Reliability	We always deliver the number of animals we agree to supply to our <u>processor</u>
Quality	Quality1_Specs	We always deliver the quality of animals our <u>processor</u> requires
These items were measured using a 6-point Likert scale ranging from: <i>strongly agree</i> to <i>strongly disagree</i> .		

Table A7: Eigen values and % of variance explained

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.0	37.5	37.5	6.8	21.1	21.1
2	2.4	7.4	44.9	3.8	11.7	32.8
3	1.9	6.1	51.0	2.9	9.0	41.8
4	1.8	5.5	56.5	2.8	8.7	50.5
5	1.5	4.5	61.0	2.2	7.0	57.5
6	1.3	3.9	65.0	1.9	6.0	63.5
7	1.1	3.4	68.3	1.5	4.8	68.3

Table A8: Standardized regression weights

Path From	Path To	Estimate
Satisfaction	Relationship Quality	0.91
Trust	Relationship Quality	0.93
Commitment	Relationship Quality	0.85
Satisfaction Organisation	Satisfaction	0.70
Satisfaction Communication	Satisfaction	0.69
Satisfaction Price	Satisfaction	0.72
Trust2_Welfare	Trust	0.84
Trust4_Fair	Trust	0.87
Trust5_Advantage	Trust	0.82
Trust3_Agree	Trust	0.81
Trust 1_ Explain	Trust	0.77
Trust6_Returns	Trust	0.82
Commitment2_Resources	Commitment	0.68
Commitment1_LongTerm	Commitment	0.75
BuyAbility3_Premium	Satisfaction Organisation	0.90
Satisfaction1_NetReturns	Satisfaction Organisation	0.75
BuyAbility1_Market	Satisfaction Organisation	0.78
BuyAbility2_Efficiency	Satisfaction Organisation	0.78
Satisfaction3_Policies	Satisfaction Organisation	0.77
Satisfaction2_Support	Satisfaction Organisation	0.74
Satisfaction7_CommTime	Satisfaction Communication	0.94
Satisfaction8_CommQual	Satisfaction Communication	0.91
Satisfaction6_Support	Satisfaction Communication	0.61
Loyalty3_Price	Loyalty	0.77
Loyalty5_SuplOne	Loyalty	0.67
Loyalty4_SpotMarket	Loyalty	0.62
Satisfaction10_PriceStock	Satisfaction Price	0.53
Satisfaction4_Price	Satisfaction Price	0.87
Satisfaction5_PriceSchedule	Satisfaction Price	0.80
Quality1_Specs	Supplier Quality	0.74
Quality2_Reliability	Supplier Quality	0.66
COMM_S1Del_1	Supplier Communication	0.93
COMM_S2Plan_1	Supplier Communication	0.77
Trust8_Honest	Trust	0.81
Trust9_Inform	Trust	0.75
Commitment4_LongTerm	Commitment	0.58
Commitment3_Proud	Commitment	0.85