



# A conceptual framework for supply chain governance

## An application to agri-food chains in China

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### Abstract

**Purpose** – Chinese agri-food chains consist of the millions of small scale farmers, who are not well structured and organized in the supply chain. Owing to market liberalization and globalization, one of the most challenging issues along agri-food chains in China is becoming the issue of how to link these small-scale farmers into the modern chains. Consequently, it is essential for both policy makers and private sectors to understand the governance structure in agri-food supply chains. Therefore, the purpose of this paper is to develop a theoretical framework for supply chain governance, including its antecedents and consequences, as well as a series of hypotheses for empirical testing.

**Design/methodology/approach** – A conceptual framework of chain governance is proposed in this study, where governance structure consists of two dimensions: contractual governance and relational governance. The study intends to propose a complementary relationship between contracts and relational aspects, such as trust, in the Chinese context. Future research is needed to empirically test this model.

**Findings** – The proposed conceptual model is unique, since the majority of the articles addressing this topic focuses on contract farming while limited research touches upon the issues of trust and relations. However, a combination of both contracting and relationships are seldom addressed.

**Originality/value** – This paper evaluates a novel concept of two dimensional governance structure in the agri-food supply chain, where transaction cost economics theory and relational theory are combined to study the governance relationships between small scale producers in China and their buyers.

**Keywords** China, Agriculture, Farms, Supply chain management

**Paper type** Research paper

### Introduction

Trade liberalization around the world has resulted in the integration of agricultural supply chains in the global markets. This development allows the linkage of traditional agricultural productions with modern, niche markets, such as export markets or domestic supermarkets. One of the institutional innovations during the process is the so-called contract farming (CF). Key and Runsten (1999) view the formation of such new institutions as a response to imperfections in markets such as credit, insurance, information, production factors, etc. CF has been widely applied in the Africa international agro-chains and its major impacts and challenges are often discussed in the Africa context as well (Warning and Key, 2002; Glover, 1987; Porter and Phillips-Howard, 1997).

A central debate during agricultural industrialization is whether small scale farmers from developing countries have been excluded from the process. Studies from Africa and



**JEL classification** – Q12, D21, O13

The authors would like to thank the EU 6th research framework project “Chinese Agricultural Transition: Trade, Social and Environmental Impacts” (Contract No. 44255) for financial support.

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Latin America suggested mixed results, ranging from the positive impacts of an “agribusiness for development” model (Williams and Karen, 1985; Warning and Key, 2002) to probably only rich, large farmers benefitting from the emerging of supermarkets (Hernández *et al.*, 2007; Weatherspoon and Reardon, 2003; Reardon and Barrett, 2000).

The supply chain in China is experiencing much more rapid revolution than anywhere in the world (Hu *et al.*, 2004). In their studies on the impacts of these changes on farmers in China, Huang *et al.* (2007a, b) conclude that both small and large farmers and rich and poor ones have equal opportunities to participate in modern marketing channels in China. Furthermore, farmers do receive much higher prices for their products from the modern marketing channels. They attribute their results to the characteristics in China, such as the equitable distribution of land among farmers limited the emerging of large farmers, as well as high competition in the domestic markets.

The agribusiness supply chain may involve various actors and cover long stages from input suppliers to final consumers. Chinese agri-food chains consist of the millions of small scale farmers (suppliers), which are not well structured and organized in the supply chain. Not long ago the whole agri-food supply chain in China was operated under governmental planning, where every investment in new market outlets was provided by government. Over the three decades of market liberalization, it has been suggested that the most challenging part along these agri-food chains in China is how to link these small holders into the modern chains. Therefore, it is paramount that both policy makers and the private sector understand the status of the chain governance and its antecedents and consequences.

Most chain governance studies focus mainly on the transactional aspects of the relationships between farmers on the one hand and modern agribusiness on the other hand. Within the framework of transaction cost economics (TCE), the supplier-buyer relationships should structure itself in such a way to minimize the transaction costs (Williamson, 1975, 1993a, b). However, TCE has been criticized for its simplicity since it ignores the informal, socially embedded relationships in producing stable contract conditions (Demsetz, 1988; Ring and van den Ven, 1992, 1994). Nevertheless, the social relationships, such as network and trust, are such important concepts in Asian culture that they should not be excluded in our China study in analyzing relationship exchanges.

In this paper, we seek to combine both TCE theory and relational theory to study the supply chain governance between small scale producers in China and their buyers. We propose that the governance relationships consist of two dimensions: contractual governance and relational governance. The traditional contractual governance represents the hard, explicit and formal side of the relationships. By including the relational exchange aspects in this study, we look at the soft, normative and informal side of the relationships between farmers and their buyers as well. The study intends to clarify the relationships between contracts and relational aspects, such as trust, in the Chinese context. The results would provide evidence-based support to strategic policy making for both governments and private sectors. If the results indicate a complementary relationship between contracts and trust, policy makers and the private sector should combine resources and efforts to reach farmers from both a formal, legal perspective as well as through social relational networks. If the two concepts are substituting for one and the other, it is recommended to concentrate the resources on either formal or informal relationships.

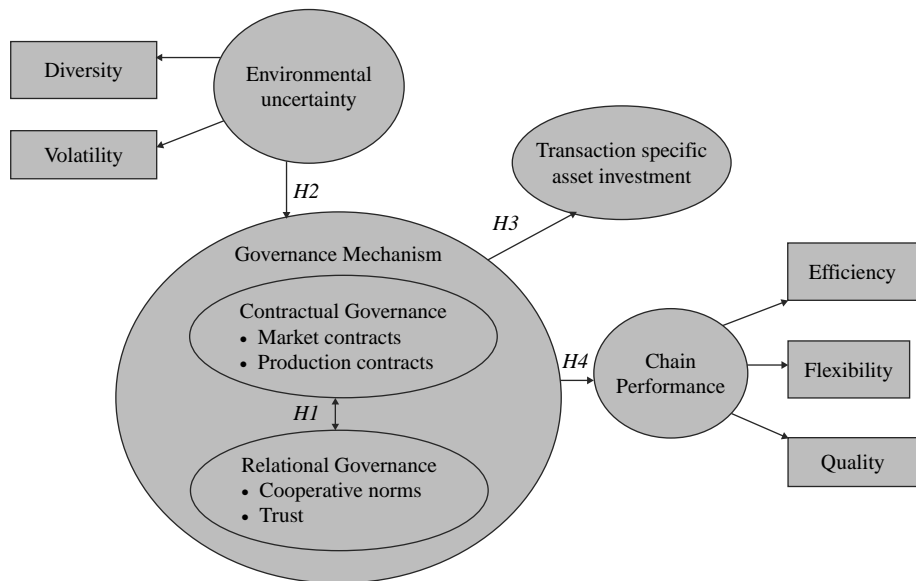
The overall goal of this study is to develop a theoretical framework for supply chain governance, including its antecedents and consequences. In other words, how farmers are linked in the chain, why they are linked in certain ways, what are the external influencing factors for their choices and what are the consequences of their choices? Specifically, this research aims to examine the following set of questions:

- Can supply chain governance be conceptualized from both contractual as well as relational aspects? If so, is the relationship between contractual governance and relational governance one of substitution or complementary? The hypothesis is that they are complementary in the Chinese context.
- Will external environments impact on the choice of supply chain governance? If so, in what kind of relationships? Will higher environmental uncertainty encourage closer cooperation between small scale producers and their buyers?
- What are the relationships between chain governance and transaction specific investment (TSI)? Will a more closed governance relationship induce more TSI from the farmers?
- How does the two dimensional (contractual and relational) governance mechanism affect the final chain performance? Will a more closed governance relationship generate better chain performance?

Figure 1 shows the proposed conceptual framework for the governance structure in agri-food supply China and its antecedents and consequences.

### Governance structure in agri-food supply chain

Williamson (1996) defines governance structures as “the institutional matrix within which transactions are negotiated and executed.” Hence, supply chain governance refers to the institutional framework in the supply chain where transactions are carried out. In order to



**Figure 1.**  
A conceptual framework  
for governance structure  
in agri-food supply chain

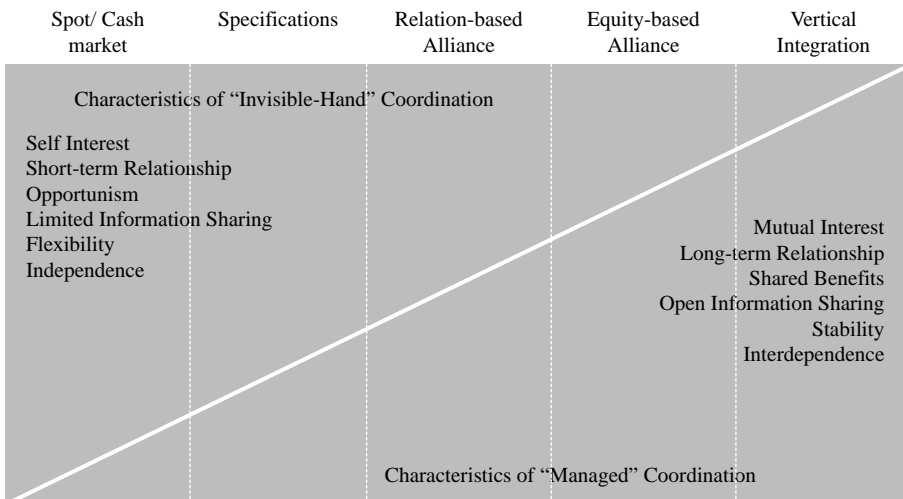
better understand the supply chain governance, we first need to touch upon an important theory: TCE. TCE is deeply rooted in two recent fields of research, new institutional economics and economics of organization (Williamson, 1991, 1993a, b, 1998).

Based on Williamson’s (1991) polar concept, governance structure can be viewed as a continuum. At one extreme lies spot markets, where transactions are solely determined by prices, while, at the other end lies full vertical integration, where all transactions are carried out under one ownership. In between these two extremes lie various hybrid forms of governing economy activities, such as contracts, strategic alliances, joint ventures, etc. Different types of organizational form are differentiated by different coordinating and control mechanisms, different type of contract laws, etc.

The most elaborated study on chain governance classification can be found by Peterson *et al.* (2001). In their paper, they distinguished five major categories of vertical co-ordination strategies, namely spot/cash markets, specification contracts, relation-based alliances, equity-based alliances, and vertical integration (Figure 2). As the vertical co-ordination continuum moves from the far left spot market to the far right vertical integration, the characteristics of “invisible hand” co-ordination are gradually replaced by the characteristics of “managed” co-ordination.

TCE has been widely applied in industrial marketing and management, such as buyer-seller relationships (Cannon and Perreault, 1999; Jap and Ganesan, 2000), the choice of organizational structure (Johnson and Houston, 2000), as well as marketing channel integrations (Klein *et al.*, 1990).

In recent years, TCE has been presented to agri-food markets (Sporleder, 1992; Henderson, 1994; Schulze *et al.*, 2007), particularly in the context of supply chain management (Hobbs, 1996; Hobbs and Young, 2000; Hanf and Dautzenberg, 2006; Zuniga-Arias and Ruben, 2007). According to TCE, one of the determinants of governance structure is the nature and level of transaction costs that is the degree of uncertainty, asset specificity and frequency of the transaction. It seems sensible to suggest that “simple governance structures should be used in conjunction with simple



**Figure 2.**  
The vertical coordination  
continuum

Source: Peterson *et al.* (2001)

contractual relations and complex governance structures reserved for complex relations” (Williamson, 1996). Several studies have confirmed the hypothesis that transaction costs were a primary motivation for vertical coordination (Hobbs, 1996; Frank and Henderson, 1992).

*Contracts*

One important concept in governance structure and TCE is contracts. Macneil (1978, 2000) classified three types of contract laws: classical contract law, neoclassical contract law and relational contract law. Classical contract law supports the autonomous market form of organization and is based on a set of legal rules with formal documents and self-liquidating transactions. Neoclassical contracts allow flexibility in longer-term economic relations by including additional governance structures (e.g. arbitration). Relational contracts are agreements in principle, which circumscribe the contracting parties’ relationship, including tacit as well as explicit arrangements (Frank and Henderson, 1992). The neoclassical contract is more elastic than classical one but more legalistic than the relational one.

In relation to Macneil’s three-way classification of contracts, Williamson (1996) proposes a schema which matches governance structures with commercial transactions (Figure 3). Classical contracting applies to market governance, the main structure for nonspecific transaction. Neoclassical contracting applies to trilateral governance, where occasional transactions of the mixed and highly idiosyncratic kinds take place. Relational contracting is relevant to transaction-specific governance, where two types of structures can be distinguished: bilateral governance (obligational contracting) and unified governance (internal organization).

Market governance with classical contracting for non-specific transactions often happens in the spot market where demand and supply are determined by prices. Contractual transaction (neo-classical contracting) is defined as the occasional transactions conducted under written agreement between buyers and sellers with mixed or idiosyncratic specific investments. Relational transaction (bilateral and/or unified governance) is defined as recurrent transactions that are completed based on long-term relationships between two parties with mixed or idiosyncratic specific investments.

		Investment Characteristics		
		Nonspecific	Mixed	Idiosyncratic
Frequency	Occasional	Market Governance (classical contracting)	Trilateral Governance (Neoclassical Contracting)	
	Recurrent		Bilateral Governance (Relational Contracting)	Unified Governance

**Figure 3.**  
Matching governance structures with commercial transactions

Source: Williamson (1996, p. 253)

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Therefore, contractual and relational governance are two major business relationship governance forms.

In Macneil's relational contracting theory, the concept of contract is expanded to refer to relationships between people who share norms and values. Trust is a key feature in this relational governance. Relational governance mechanisms (such as trust) are regarded as a means to enhance TSI associated with less monitoring and bargaining (Barney and Hansem, 1994).

### *Trust*

Most studies define trust as "the extent to which a firm believes that its exchange partners is honest and or benevolent" (Anderson and Narus, 1990). Honest refers to a channel member's belief that one's partner is "reliable, stands by its word, fulfils promised role obligations and is sincere". Benevolence is defined as the belief that one's partner is "genuinely interested in one's interests or welfare and is motivated to seek joint gains" (Geyskens *et al.*, 1998).

Based on the degree of trust, Barney and Hansem (1994) identified three types of trust in economic exchanges: weak form trust, semi-strong form trust, and strong form trust. Williamson (1993a, b) distinguished another three types of trust according to the objects: calculative trust, personal trust, and institutional (or hyphenated) trust.

A series of research has identified several antecedents and consequences of trusts. Anderson and Narus (1990) identified and tested three antecedents (cooperation, communication and economic outcomes given comparison levels) and two consequences (conflict and satisfaction) for trusts. Fritz and Fischer (2007) observed that trust is positively affected by quality communication and positive collaboration experience in the past. Lu *et al.* (2007a) developed a conceptual model on small holders' personal relationships and their market behaviour. They observed that trusted buyer-seller relationship enhanced farmers' participation in modern market outlet (export and supermarket) as well as increased the contracts application.

In their meta-analysis, Geyskens *et al.* (1998) examined 24 studies on trusts and the antecedents and consequences of trust in marketing channels. Based on over 60 constructs as antecedents and consequences of trust from the articles reviewed, they developed and tested a causal model in which trust played a mediating role between its five antecedents (environmental uncertainty, own dependence, partner's coercive power use, communication, economic outcomes) and two consequences (satisfaction, long-term orientation). They also identified that the top three constructs mostly related to trust were sentiments (goal compatibility, fairness); actions (communication, opportunistic behaviour and support), and performance (economic outcome).

Although benevolence and honest are conceptually distinct, most trust studies included one or both aspects of trust in a single, one-dimensional measurement (Jap, 2001; Claro *et al.*, 2003; Lu *et al.*, 2007b). Only limited studies (Ganesan, 1994; Kumar *et al.*, 1995; Kemp and Ghauri, 2001) successfully developed a multidimensional construct for trust and measured it for its two facets: credibility and benevolence. The question whether researchers need to measure the two facets of trust remains unanswered.

### *Two dimensional approaches*

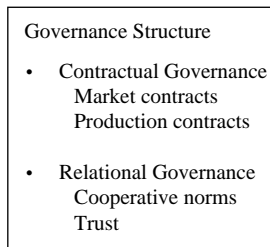
Governance structure, by its very nature, is difficult to measure and requires the constructs of proxy variables, or scale development. Based on the above literature review,

we propose to study the supply chain governance from two dimensions: contractual governance and relational governance (Figure 4). We define that contractual governance refers to any agreements (both written and oral) reached by parties to reduce risk and uncertainty in exchange relationships. Considering the reality in China, we specify two types of contracts, that are marketing contracts and production contracts. Marketing contracts define buying and selling conditions for the products while production contracts describe more details for the production process. Relational governance refers to parties' informal embedded relationships and social norms. We approach the relational governance from two facets: trust and cooperative norms. Empirical research shows that relational governance is associated with trust (Gulati, 1995; Zaheer and Venkatraman, 1995; Dyer and Singh, 1998). Cooperative norms are the shared belief and expectation of two parties that they must work together to achieve mutual goals (Baker *et al.*, 1999; Cannon and Perreault, 1999). Cai and Yang (2008) identified key factors which have impacts on cooperative norms, as well as the influences of these norms on business performance in a Chinese context. Contractual governance stands for the hard, explicit and formal sides of their relationships, while relational governance suggests the other side of soft, tacit and informal.

**Hypothesis**

*Contractual governance vs relational governance*

Researchers have been studying the relationships between contractual and relational governance (Yu *et al.*, 2006). Ferguson *et al.* (2005) observed that relational governance was the predominant governance mechanism associated with exchange performance. Contractual governance was also positively associated, but to a much lesser extent. There are compelling arguments for a substitutive relationship between these two governance mechanisms (Dyer and Singh, 1998; Gulati, 1995). Gulati (1995) even claimed that "Cautious contracting gives way to looser practices as partner firms build confidence in each other." Yu *et al.* (2006) found that both formal governance (contractual agreements and financial commitments) and relational governance (trust) mechanisms affects suppliers' tendencies to make specialized investments. They argued that, as firms built up more calculative trust, their partners reduced the dependence on formal governance mechanisms. However, the empirical study from Poppo and Zenger (2002) supported the proposition that formal contracts and relational governance function as complements. These two may coexist and interact with each other. In their China chain study, Lu *et al.* (2007a, b) confirmed that a positive relationship exist between trust and contractual governance. We believe that relational governance becomes a necessary complement to contracts when change and conflict arise (Macneil, 1978). In particular, in the Asian culture, social norms and values are



**Figure 4.**  
2D approach to  
governance structure in  
agri-food supply chain

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sometime functioning as tacit agreement and binding people's behaviour. In the eyes of certain group of Chinese, contracts are a piece of paper and do not have any use if partners do not trust each other. Thus, we hypothesize in the content of Asian culture:

- H1.* There is a positive relationship between contractual governance and relational governance.

*Environmental factors vs governance structure*

We limit our environmental factors to the market environment, composed of direct and potential competitors, market regulating agencies, and so on. By definition, we treat the macro environment, such as social and political impact, as a given context. External environmental factors play a significant role in decision-making uncertainty in marketing channel relationships (Achrol and Stern, 1988). In a highly instable environment, buyers and sellers may seek to establish certain governance structure in order to manage this turbulent situation better. Geyskens *et al.* (1998) grouped environmental uncertainty as environmental diversity (the degree of heterogeneous and complex of environmental elements), environmental volatility (referring to the rapid changes of market and demand), and environmental munificence (the rich availability of resources. Based on reviewing the work of Claro *et al.*, 2003; Cannon and Perreault, 1999; Ganesan, 1994; Klein *et al.*, 1990), as well as the actual situation in the agribusiness in China, we formulated two dimensions to study environmental uncertainty: diversity and volatility.

Achrol *et al.* (1983) argued that cooperation and coordination will increase in a highly uncertain input/output or competitive sector as marketing channel dyads tend to protect themselves by being better organized. In a high degree of market uncertainty, buyers and sellers are trying to work together during the difficulty times, such as using contracts to safeguard their business and minimize the impacts of the turbulence from the markets. Thus, we hypothesize a positive relationship between the environmental uncertainty and contractual governance.

Geyskens *et al.* (1998) and Kumar *et al.* (1995) observed that environmental uncertainty is inversely related to relationship quality and trust. Ganesan (1994) argued that in a severe uncertain environment, channel partners tend to remain flexible and develop temporary relationships and thus exhibits lower trust. However, these studies were based on large companies in western culture, where business relationships were more rooted in the formal, explicit aspects. In the Chinese content, we expect that our target groups, small scale farmers, embrace much more to personal relationship in the uncertainty environments in order to secure their markets. Thus, following our *H1* in which a positive relationship between contractual and relational governance is proposed, we also expect a positive impact of environmental uncertain on relational governance as well. Thus, we can formulate following hypotheses:

- H2a.* The greater the perceived environmental uncertainty, the greater the use of contractual governance.
- H2b.* The greater the perceived environmental uncertainty, the greater the use of relational governance.
- H2c.* The greater the perceived environmental uncertainty, the greater the use of both contractual and relational governance.

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*Transaction specific investment vs governance structure*

TSI is one of the critical elements in the buyer-seller relationship and refers to the seller's perception of the extent to which an investment was made specifically for the transaction with the selected buyer (Claro, 2004; Lu, 2007a, b). TSI focuses on the accumulation of assets that are difficult and costly to shift from one transitional partner to another, thus asset specificity arises. Asset specificity refers to durable investments that are undertaken in support of particular transactions, the opportunistic cost of which investments is much lower in best alternative uses (Williamson, 1985). Highly asset-specific investments represent costs that have little or no value outside the exchange relationship. Williamson (1985) has distinguished five types of asset specificity: site specificity, physical asset specificity, human asset specificity, dedicated assets and brand name capital. Site specificity is held in situation when, for instance, supplier and customer are located close to each other in order to economize on transport and inventory costs. The other type of asset specificity is physical asset specificity. These are investments by a supplier in capital goods that are done specifically for the transaction (e.g. investments in equipment, tools). Human asset specificity refers to investments in particular knowledge that has been developed to use in specific transactions (e.g. training of sales – people specifically for a certain partner). Dedicated assets are investments in generic assets that exceed the level of investments the firms would do if it did not engage in the specific transaction-relationship. The last type of asset specificity is a brand name capital. Investments in a brand name capital become obsolete if the product, which the brand name is tied to, is no longer available.

According to Claro *et al.* (2003), physical asset specificity can stimulate relational governance. Bearing in mind variations in degrees of TSI, suppliers select governance that minimizes transaction costs. In case assets are not specific, then market governance may be sufficient to minimize the transaction costs. If the assets are to some extent specific, relational forms of governance are appropriate. In agri-food supply chain production process requires investments, which are mostly sunk costs, because assets cannot be easily converted or used for other purposes, therefore they are specific (Bijman, 2002). Therefore, in this study the choice of the governance structure is based on one hand on the argument that the relational form of governance mechanism is more appropriate for asset specific investments, and on the other hand it is agreed upon the fact that Chinese farmers are small scale farmers. This means that these farmers lack finance, and therefore investments and may be inclined first to chose a suitable governance structure, accumulate sufficient capital and then to make investments.

Initially, the high level of TSI was considered as having a negative impact on buyer-seller relationship, because it would foster dependence and opportunism (Williamson, 1985). However, later on research has found also positive impact of TSI on buyer-seller relationship, such as enhanced coordination and cooperation between partners (Dyer, 1996). Depending on investments a seller may experience more constant sales volume, more repeat business, a decrease in sales expenses and improving in planning and forecasting (Lohtia and Krapfel, 1994).

The purpose of governance mechanism is to provide, at minimum costs, the coordination, control, and “trust” that are necessary for chain actors to believe that engaging in the exchange will make them better off (Williamson, 1985). From the TCE

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perspective when asset specificity is low, contractual governance is considered to be a (relatively) more efficient means of governance. When asset specificity and/or uncertainty are high, hierarchical governance is (relatively) more efficient. When, asset specificity is “semi-specific” and uncertainty is low, hybrid governance (through neoclassical contracts) is viewed as (relatively) more efficient (Dyer, 1996). Contractual arrangements provide the possibility to reduce the effects of opportunism and uncertainty. Williamson (1985) argued that in transactions with TSI, the exchange partners need more formal management due to increased dependency of the investing partners. When the transaction involves a high level of TSI, detailed transaction conditions should be negotiated to reduce risk and uncertainty for transaction partners. Consequently, formal contracts are applied. Therefore, we expect the positive relationship between contractual governance and TSI. Based on theory above and related it to our model the following hypothesis is proposed:

*H3a.* The higher the level of contractual government the higher the level of TSI.

In addition to neoclassical contracts, alternative means of safeguarding hybrid transactions have been offered such as: trust, reputation, financial hostage (Dyer, 1996; Sako, 1991; Klein, 1980). Based on aforementioned arguments asset specificity increases transaction costs because of fear of opportunism. Zaheer and Venkatraman (1995) argued that trust can be viewed as the obverse of opportunism since it reflects one party’s belief that its requirements will be fulfilled through future actions undertaken by the other party. Such a view is in line with the theoretical reasoning in the negotiations literature (Pruitt, 1981) as well as the transaction cost perspective in which trust is an important determinant of long-term hierarchy-like relationships (Williamson, 1985; Aoki, 1990; Bromiley and Cummings, 1995). Thus, one can propose that the more transaction partners trust each other, the more these partners are likely to invest in TSI. In the model proposed in this study, one of the major items of relational governance is trust. Relational governance mechanisms such as trust are regarded as means to enhance TSI associated with less monitoring and bargaining (Yu *et al.*, 2006). Therefore, the following hypothesis is proposed:

*H3b.* With the increase of trust (the level of relational governance) the level of TSI increases.

#### *Chain performance vs governance structure*

Research on performance of supply chain has proven to be difficult task. Although various studies have been devoted to performance, the topic remains controversial. A large number of various performance indicators has been used to characterize supply chains, ranging from highly qualitative indicators like customer or employee satisfaction to quantitative indicators like return on investments. This large number of different performance indicators, and the lack of consensus on what determines performance of supply chains, complicates the selection of performance measures (Aramyan *et al.*, 2006). The debate rises from the fact that performance can be defined and evaluated in several ways, and few definitions and indicators of performance are widely accepted (Claro, 2004). Furthermore, combining these indicators into one measurement system proves to be difficult.

Performance indicators are of vital importance for continuity of chains and networks. Insufficient scores on these performance measures might lead to continuity

problems in the short or long-term. To ensure continuity it is imperative to work efficiently and minimise costs chain-wide. In the long-term production and consumption chains will have to approach the efficiency frontier in order to survive. Evaluation of an organisation's performance is complicated in the presence of multiple inputs and outputs in the system, including negative externalities. These difficulties require a shift in the focus of performance evaluation and benchmarking from characterising performance in terms of single measures to evaluating performance in a multidimensional systems perspective (Zhu, 2003). Furthermore, chain performance is not just an aggregation of individual performance. The production function for a supply chain faces additional costs compared with firms. Beside costs associated with production, a supply chain is faced with information costs (i.e. the costs associated with information exchange between SC members), inventory carrying costs (i.e. the costs associated with carrying a quantity of stored inventory; capital costs, inventory service costs, storage space costs and inventory risk costs), physical flow costs (i.e. the costs of distribution), and transaction costs (i.e. the costs associated with transactions between SC members) (LaLonde and Pohlen, 1996). These costs have both fixed and variable characteristics and should be taken into account in measuring performance.

There is less agreement, on the matter of what performance measurement system should look like. According to Bunte *et al.* (1998) performance indicators should relate to both effectiveness (to what extent is output standards met) and efficiency of the supply chain and its actors (input-output ratio compared to a target). Van der Vorst (2000) makes a slightly different distinction: utilisation (actual input/norm input), productivity (actual output/actual input), and effectiveness (actual output/norm output). Beamon (1999) suggests a system of three dimensions: resources (i.e. efficiency of operations), output (i.e. high level of customer service) and flexibility (i.e. ability to respond to a changing environment).

Available literature identifies a number of performance measures as important in the evaluation of supply chain performance. The most commonly used measures can be grouped as following: efficiency, flexibility and responsiveness. Aramyan *et al.* (2007) summarised performance indicators used in literature and proposed the following categories of performance indicators applicable for agri-food supply chains: efficiency, flexibility, responsiveness and food quality. Efficiency measures how well the resources are utilized and includes several measures such as production costs, profit/profitability, return on investment and inventory. Flexibility indicates the degree to which the supply chain can respond to a changing environment and extraordinary customer service requests. It may include customer satisfaction, volume flexibility, delivery flexibility, reduction in the number of backorders and lost sales. Responsiveness aims at providing the requested products with a short lead time. It may include fill rate, product lateness, customer response time, lead time, shipping errors, and customer complaints. The specific characteristics of agri-food supply chains are captured in the measurement framework in the category food quality.

Lu (2007a, b) has proposed a model to analyse governance mechanisms that support market performance in Chinese vegetable supply chains. In his model, Lu used three performance indicators, which are efficiency, quality/price satisfaction, and profitability. Han *et al.* (2006) conducted a study which explored the links between vertical integration, quality management and firm performance within the framework

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of transaction cost analysis using data from Chinese pork industry. As performance indicators authors used growth rate, market share, profitability and productivity.

Claro *et al.* (2003) built an integrated framework for Dutch potted plants and flower production that aimed at the combination of constructs on the transaction, dyadic and business environment level for testing their impact on relational governance and performance. As performance indicators the sales growth rate, profitability and the perceived satisfaction have been used. The impact of flexibility on two financial performance indicators has been assessed.

Combining the aforementioned works and taking into account that our case is supply chain in agri-food in China, the following set of performance indicators are proposed:

- *Efficiency*. Final product price, profitability (value added), sales growth.
- *Flexibility*. Volume flexibility, delivery flexibility.
- *Quality*. Customer satisfaction with product quality.

Formal contracts are mechanisms that attempt to mitigate risk and uncertainty in exchange relationships (Lusch and Brown, 1996). However, strict adherence to the written contract may disturb the necessary flexibility in transactional exchange Ferguson *et al.* (2005). Exchange performance can suffer when detailed contracts are used without a well developed social relationship (Cannon *et al.*, 2000), and may create opposing conflicts that could eventually harm channel member flexibility, thus performance (Lusch and Brown, 1996). When social relationship are well developed and partners trust each other, a higher level of flexibility and tolerance is found than in relationship with lower trust (Morgan and Hunt, 1994). Consequently, the buyers that trust their partners will be more willing to react flexible to changing environment or demands of the partner (Claro, 2004). Based on this we hypothesize:

*H4a*. The higher the level of trust between small scale farmers and their buyers, the higher the level of flexibility.

According to Macneil (1981) formal contracts represent promises and obligations to perform particular action in the future. Contracts may specify the quality obligations of the products as well (e.g. compliance with certain standards, monitoring, penalties). Therefore, with contractual governance, transaction partners could be highly motivated to comply with the quality arrangements specified in the contracts, since in case of not complying with these arrangements may result in terminating the contract and losing a transaction partner.

According to Ganesan (1994) trusting partners have strong desire to continue the relationship. However, the duration of the relationship is related to the fulfilments of mutual requirements regarding quality arrangements (Lu, 2007a, b). Not compliance with the requirements will harm trust and future relationship. Based on above mentioned driving forces, the following hypothesis is proposed:

*H4b*. The higher the level of contractual governance the higher the level of product quality due to high compliance with quality requirements.

*H4c*. The higher the level of trust the higher the level product quality.

Trust can reduce negotiation costs. Negotiations are less costly under conditions of high inter-organizational trust, because agreements are reached more quickly and

easily as trust mitigates the information asymmetries by allowing more open and honest sharing of information (Zaheer and Venkatraman, 1995), therefore the higher the trust the lower the negotiation costs. Zaheer and Venkatraman (1995), proposed that exchange performance (i.e. suppliers' fulfilment of buyer's requirements in terms of price, delivery time, quality and flexibility) is lowered when negotiation costs are high due to the time and energy spent for negotiations. Consequently, when there is trust between partners and negotiation costs are low, performance will tend to increase. According to Rotter (1967):

[...] One of the most salient factors in the effectiveness of our present complex social organization is the willingness of one or more individuals in a social unit to trust others. The efficiency, adjustment, and even survival of any social group depend upon the presence or absence of such trust.

Morgan and Hunt (1994) listed arguments why trust enhances efficiency, productivity, and effectiveness. These arguments are:

- transaction partners work at preserve relationship by cooperating with transaction partners;
- resist attractive short-term alternatives in favour of expected long-term benefits of staying with current partners; and
- view potentially high-risk actions as being prudent, because of the belief that their partners will not act opportunistically.

Besides, according to Sako (1992) trust contributes towards enhancing efficiency, because:

- it stimulates the flow of truthful information which might otherwise be distorted by opportunistic behaviour, which in its turn may improve efficiency;
- monitoring costs are low because trust enables abolishing the quality inspection on delivery, so costs of enforcement ensures that promises are fulfilled without actual use of external sanctions; and
- costs of quantity and price negotiations are low because of mutual open disclosure of information concerning future business plans and costs.

Based on aforementioned literature review the following hypothesis is proposed:

*H4d.* The higher the level of trust the higher the level of efficiency.

### **Conclusion**

When reviewing the relevant literature on agri-food supply chain in developing countries, one central policy question is how to integrate small scale farmers in the supply chain. The majority of the articles addressing this topic focus on CF while limited research touches upon the issues of trust and relations. However, a combination of both contracting and relationships are seldom addressed.

Based on the TCE theory and relational theory, we developed a conceptual framework for the choice of governance mechanism in the Chinese agribusiness context where small scale farmers are prevailing. The governance mechanism is conceptualized from both contractual as well as relational aspects. A series of hypotheses is developed for the quality of relationships between chain governance

and its antecedents, environmental uncertainty, as well as its consequences, chain performance.

Future research is needed to empirically verify this model. Both qualitative and quantitative approaches could be applied. Based on available literature, a set of measurements could be developed for each concept in order to test the proposed hypothesis. Because these concepts are based on the combination of managerial constructs, we consider the application of structural equation modelling and path analysis to be useful methods.

## References

- Achrol, R.S. and Stern, L.W. (1988), "Environmental determinants of decision-making uncertainty in marketing channels", *Journal of Marketing Research*, Vol. 25 No. 1, pp. 36-50.
- Achrol, R.S., Reve, T. and Stern, L.W. (1983), "The environment of marketing channel dyads: a framework for comparative analysis", *Journal of Marketing*, Vol. 47 No. 4, pp. 55-67.
- Anderson, J.C. and Narus, J.A. (1990), "A model of distributor firm and manufacturer firm working partnerships", *Journal of Marketing*, Vol. 54 No. 1, pp. 42-58.
- Aoki, M. (1990), "The participatory generation of information rents and the theory of the firm", in Aoki, M., Gustafsson, B. and Williamson, O.E. (Eds), *The Firm as a Nexus of Treaties*, Sage, London, pp. 26-52.
- Aramyan, L.H., Ondersteijn, C., van Kooten, O. and Oude Lansink, A. (2006), "Performance indicators in agri-food production chains", in Ondersteijn, C.J., Wijnands, J.H., Huirne, R.B. and van Kooten, O. (Eds), *Quantifying the Agri-food Supply Chain*, Springer, Dordrecht.
- Aramyan, L.H., Oude Lansink, A., van der Vorst, J. and van Kooten, O. (2007), "Performance measurement in agri-food supply chains: an case study", *Supply Chain Management: An International Journal*, Vol. 12 No. 4, pp. 304-15.
- Baker, T.L., Simpson, P.M. and Siguaw, J.A. (1999), "The impact of suppliers' perceptions of reseller market orientation on key relationship constructs", *Academy of Market Science Journal*, Nos 27/1, pp. 50-7.
- Barney, J.B. and Hansem, M.H. (1994), "Trustworthiness as a source of competitive advantage", *Strategic Management Journal*, Vol. 15, pp. 175-90, Special Issue: Competitive Organizational Behavior.
- Beamon, B.M. (1999), "Measuring supply chain performance", *International Journal of Operations & Production Management*, Vol. 19 No. 3, pp. 275-92.
- Bijman, J. (2002), "Essays on agricultural co-operatives. Governance structure in fruit and vegetable chains", PhD thesis, Erasmus University, Rotterdam.
- Bromiley, P. and Cummings, L. (1995), "Transaction costs in organizations with trust", in Bies, R., Sheppard, B. and Lewicki, R. (Eds), *Research 012 Negotiation in Organizations*, JAI Press, Greenwich, CT.
- Bunte, F., Mulder, M., van Tongeren, F. and de Vlieger, K. (1998), *Meting van de 'performance' van agrarische productiekolommen*, LEI-onderzoeksverslag (research report by the Dutch Agricultural Economics Institute), The Hague.
- Cai, S.H. and Yang, Z.L. (2008), "Development of cooperative norms in the buyer-supplier relationship: the Chinese experience", *Journal of Supply Chain Management*, Vol. 44 No. 1, pp. 55-70.
- Cannon, J.P. and Perreault, W.D. Jr (1999), "Buyer-seller relationships in business markets", *Journal of Marketing Research*, Vol. 36 No. 4, pp. 439-60.

- Cannon, J.P., Achrol, R.S. and Gundlach, G.T. (2000), "Contracts, norms, plural form governance", *Journal of the Academy of Marketing Science*, Vol. 28 No. 2, pp. 180-94.
- Claro, D.P. (2004), "Managing business networks and buyers-suppliers relationship", PhD thesis, Wageningen University, Wageningen.
- Claro, D.P., Hagelaar, G. and Omta, O. (2003), "The determinants of relational governance and performance: how to manage business relationships?", *Industrial Marketing Management*, Vol. 32, pp. 703-16.
- Demsetz, H. (1988), "The theory of the firm revisited", *Journal of Law, Economics, and Organization*, Vol. 4 No. 1, pp. 141-61.
- Dyer, J.H. (1996), "Specialized supplier networks as a source of competitive advantage: evidence from the auto industry", *Strategic Management Journal*, Vol. 17, pp. 271-91.
- Dyer, J.H. and Singh, H. (1998), "The relational view: cooperative strategy and sources of interorganizational competitive advantage", *The Academy of Management Review*, Vol. 23 No. 4, pp. 660-79.
- Ferguson, R.J., Paulin, M. and Bergeron, J. (2005), "Contractual governance, relational governance, and the performance of interfirm service exchanges: the influence of boundary-spanner closeness", *Journal of the Academy of Marketing Science*, Vol. 33 No. 2, pp. 217-34.
- Frank, S. and Henderson, D. (1992), "Transaction costs as determinants of vertical coordination in the U.S. food industries", *American Journal of Agricultural Economics*, Vol. 74 No. 4, pp. 941-50.
- Fritz, M. and Fischer, C. (2007), "The role of trust in European food chains – theory and empirical findings", paper presented at the 17th Annual World Food and Agribusiness Forum and Symposium, Parma, 23-26 June.
- Ganesan, S. (1994), "Determinants of long-term orientation in buyer-seller relationships", *Journal of Marketing*, Vol. 58 No. 2, pp. 1-19.
- Geyskens, I., Steenkamp, J.B.E.M. and Kumar, N. (1998), "Generalizations about trust in marketing channel relationships using meta-analysis", *International Journal of Research in Marketing*, Vol. 15, pp. 223-48.
- Glover, D.J. (1987), "Increasing the benefits to smallholders from contract farming: problems for farmers' organization and policy makers", *World Development*, Vol. 15 No. 4, pp. 441-8.
- Gulati, R. (1995), "Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances", *The Academy of Management Journal*, Vol. 38 No. 1, pp. 85-112.
- Han, J., Trienekens, J.H., Tan, T., Omta, S.W.F. and Wang, K. (2006), "Vertical coordination, quality management and firm performance of the pork processing industry in China", in Bijman, J., Omta, S.W.F., Trienekens, J.H., Wijnands, J.H.M. and Wubben, E.F.M. (Eds), *International Agri-food Chains and Networks: Management and Organization*, Wageningen Academic Publishers, Wageningen.
- Hanf, J. and Dautzenberg, K. (2006), "A theoretical framework of chain management", *Journal on Chain and Network Science*, Vol. 6 No. 2, pp. 79-94.
- Henderson, D.R. (1994), "Measuring and assessing vertical ties in the agro-food system", *Canadian Journal of Agricultural Economics*, Vol. 42 No. 4, pp. 549-60.
- Hernández, R., Reardon, T. and Berdegúe, J. (2007), "Supermarkets, wholesalers, and tomato growers in Guatemala", *Agricultural Economics*, Vol. 36, pp. 281-90.
- Hobbs, J.E. (1996), "A transaction cost approach to supply chain management", *Supply Chain Management*, Vol. 1 No. 2, pp. 15-27.

- 
- Hobbs, J.E. and Young, Y.M. (2000), "Closer vertical co-ordination in agri-food supply chains: a conceptual framework and some preliminary evidence", *Supply Chain Management*, Vol. 5 No. 3, pp. 131-42.
- Huang, J.K., Wu, Y.H. and Rozelle, S. (2007a), *Marketing China's Fruit: Are Small, Poor Farmers Being Excluded from the Supply Chain?*, Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Huang, J.K., Huang, Z.R., Zhi, H.Y., Wu, Y.H., Niu, X.F. and Rozelle, S. (2007b), "Production, marketing and impacts of market chain changes on farmers in China: case study of cucumber and tomato in Shandong province", Micro study report of Component 1 (China), Regoverning Market Program. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing.
- Hu, D.H., Reardon, T., Rozelle, S., Timmer, P. and Wang, H.L. (2004), "The emergence of supermarkets with Chinese characteristics: challenges and opportunities for China's agricultural development", *Development Policy Review*, Vol. 22 No. 5, pp. 557-86.
- Jap, S.D. (2001), "Perspectives on joint competitive advantages in buyer-supplier relationships", *International Journal of Research in Marketing*, Vol. 18, pp. 19-35.
- Jap, S.D. and Ganesan, S. (2000), "Control mechanisms and the relationship life cycle: implications for safeguarding specific investment and development commitment", *Journal of Marketing Research*, Vol. 37 No. 2, pp. 227-45.
- Johnson, S.A. and Houston, M.B. (2000), "Buyer-supplier contracts versus joint ventures determinants and consequences of transaction structure", *Journal of marketing research*, Vol. 37 No. 1, pp. 1-15.
- Kemp, R.G.M. and Ghauri, O.N. (2001), "Interdependency in joint ventures: the relationship between dependence asymmetry and performance", *Journal on Chain and Network Science*, Vol. 1 No. 2, pp. 101-10.
- Key, N. and Runsten, D. (1999), "Contract farming, smallholders, and rural development in Latin America: the organization of agroprocessing firms and the scale of outgrower production", *World Development*, Vol. 27 No. 2, pp. 381-401.
- Klein, B. (1980), "Transaction cost determinants of unfair contractual arrangements", *American Economic Review*, Vol. 70 No. 2, pp. 56-62.
- Klein, S., Frazier, G.L. and Roth, V.J. (1990), "A transaction cost analysis model of channel integration in international markets", *Journal of Marketing Research*, Vol. 27 No. 2, pp. 196-208.
- Kumar, N., Scheer, L.K. and Steenkamp, J.B.E.M. (1995), "The effects of supplier fairness on vulnerable resellers", *Journal of Marketing Research*, Vol. 32 No. 1, pp. 54-65.
- LaLonde, B.J. and Pohlen, T.L. (1996), "Issues in supply chain costing", *International Journal of Logistics Management*, Vol. 7 No. 1, pp. 1-12.
- Lohtia, R. and Krapfel, R. (1994), "The impact of transaction specific investments on buyer-seller relationships", *Journal of Business & Industrial Marketing*, Vol. 9 No. 1, pp. 6-16.
- Lu, H. (2007a), *The Role of Guanxi in Buyer-seller Relationships in China: A Survey of Vegetable Supply Chains in Jiangsu Province*, International Chains and Networks Series, Vol. 1, Wageningen Academic Publishers, Wageningen.
- Lu, H. (2007b), "The role of guanxi in buyer-seller relationships in China. A survey of vegetable supply chains in Jiangsu Province", PhD thesis, Wageningen University, Wageningen.
- Lu, H., Trienekens, J. and Omta, O. (2007a), "Does traditional *Guanxi* matter for smallholders in modern markets? A structural equation modeling", paper presented at the 17th Annual World Food and Agribusiness Forum and Symposium, Parma, 23-36 June.

- 
- Lu, H., Trienekens, J., Omta, O. and Feng, S. (2007b), "The role of Guanxi networks and contracts in Chinese", *Journal on Chain and Network Science*, Vol. 7 No. 2, pp. 121-31.
- Lusch, R.F. and Brown, J.R. (1996), "Interdependency, contracting, and relational behavior in marketing channels", *Journal of Marketing*, Vol. 60, pp. 19-38.
- Macneil, I.R. (1978), "Contracts: adjustment of long-term economic relations under classical, neoclassical, and relational contract law", *Northwestern University Law Review*, Vol. 72 No. 6, pp. 854-905.
- Macneil, I.R. (1981), "Economic analysis of contractual relations: its shortfalls and need for rich classificatory apparatus", *Northwestern University Law Review*, Vol. 75 No. 1, pp. 1018-63.
- Macneil, I.R. (2000), "Relational contract theory: challenges and queries", *Northwestern University Law Review*, Vol. 94 No. 3, pp. 877-907.
- Morgan, R.M. and Hunt, S.D. (1994), "The commitment-trust theory of relationship marketing", *Journal of Marketing*, Vol. 58, pp. 20-38.
- Peterson, H.C., Wysocki, A. and Harsh, S.B. (2001), "Strategic choice along the vertical coordination continuum", *International Food and Agribusiness Management Review*, Vol. 4, pp. 149-66.
- Poppo, L. and Zenger, T. (2002), "Do formal contracts and relational governance function as substitutes or complements?", *Strategic Management Journal*, Vol. 23, pp. 707-25.
- Porter, G. and Phillips-Howard, K. (1997), "Comparing contracts: an evaluation of contract farming schemes in Africa", *World Development*, Vol. 25 No. 2, pp. 227-38.
- Pruitt, D.G. (1981), *Negotiation Behavior*, Academic Press, New York, NY.
- Reardon, T. and Barrett, C.B. (2000), "Agroindustrialization, globalization, and international development: an overview of issues, patterns, and determinants", special issue, *Agricultural Economics*, Vol. 23, pp. 195-205.
- Ring, P. and van den Ven, A. (1992), "Structuring cooperative relationships between organizations", *Strategic Management Journal*, Vol. 13, pp. 483-98.
- Ring, P. and van den Ven, A. (1994), "Developmental processes of cooperative interorganizational relationships", *Academy of Management Journal*, Vol. 19 No. 1, pp. 90-118.
- Rotter, J.B. (1967), "A new scale for the measurement of interpersonal trust", *Journal of Personality*, Vol. 35 No. 4, pp. 651-65.
- Sako, M. (1991), "The role of trust in Japanese buyer-supplier relationships", *Ricerche Economiche*, Vol. XLV, pp. 449-74.
- Sako, M. (1992), *Prices, Quality, and Trust: Inter-firm Relations in Britain and Japan*, Cambridge University Press, Cambridge.
- Schulze, B., Spiller, A. and Theuvsen, L. (2007), "A broader view on vertical coordination: lessons from German pork production", *Journal on Chain and Network Science*, Vol. 7 No. 1, pp. 35-53.
- Sporleder, T.L. (1992), "Managerial economics of vertically coordinated agricultural firms", *American Journal of Agricultural Economics*, Vol. 74 No. 5, pp. 1226-31.
- van der Vorst, J.G.A.J. (2000), "Effective food supply chains. Generating, modelling and evaluation supply chain scenarios", PhD thesis, Wageningen University, Wageningen.
- Warning, M. and Key, N. (2002), "The social performance and distributional consequences of contract farming: an equilibrium analysis of the ABP program in Senegal", *World Development*, Vol. 30 No. 2, pp. 255-63.

- 
- Weatherspoon, D.D. and Reardon, T. (2003), "The rise of supermarkets in Africa: implications for agrifood systems and the rural poor", *Development Policy Review*, Vol. 21 No. 3, pp. 333-55.
- Williams, S. and Karen, R. (1985), *Agribusiness and the Small-scale Farmer: A Dynamic Partnership for Development*, Westview Press, Boulder, CO.
- Williamson, O.E. (1975), *Markets and Hierarchies*, The Free Press, New York, NY.
- Williamson, O.E. (1985), *The Economic Institutions of Capitalism*, The Free Press, New York, NY.
- Williamson, O.E. (1991), "Comparative economic organization: the analysis of discrete structural alternatives", *Administrative Science Quarterly*, Vol. 36 No. 2, pp. 269-96.
- Williamson, O.E. (1993a), "Transaction cost economics and organization theory", *Industrial and Corporate Change*, Vol. 2 No. 2, pp. 107-56.
- Williamson, O.E. (1993b), "Calculativeness, trust, and economic organization", *Journal of Law & Economics*, Vol. 36, pp. 487-500.
- Williamson, O.E. (1996), "Transaction-cost economics: the governance of contractual relations", *The Journal of Law & Economics*, Vol. 22 No. 2, pp. 233-61.
- Williamson, O.E. (1998), "Transaction cost economics: how it works; here it is headed", *De Economist, Quarterly Review of the Royal Netherlands Economic Association*, Vol. 146 No. 1, pp. 23-59.
- Yu, C.M.J., Liao, T.J. and Lin, Z.D. (2006), "Formal governance mechanisms, relational governance mechanism, and transaction-specific investments in supplier-manufacturer relationships", *Industrial Marketing Management*, Vol. 35, pp. 128-39.
- Zaheer, A. and Venkatraman, N. (1995), "Relational governance as an interorganizational strategy: an empirical test of the role of trust in economic exchange", *Strategic Management Journal*, Vol. 16 No. 5, pp. 373-92.
- Zhu, J. (2003), *Quantitative Models for Performance Evaluation and Benchmarking*, Kluwer Academic Publishers, Dordrecht.
- Zuniga-Arias, G. and Ruben, R. (2007), "Determinants of market outlet choice for mango producers in Costa Rica", in Ruben, R., van Boeker, T., van Tilburg, A. and Trienekens, J. (Eds), *Tropical Food Chains: Governance Regimes for Quality Management*, Wageningen Academic Publishers, Wageningen, pp. 49-67.

### Further reading

- Allen, D. and Lueck, D. (1992), "Contract choice in modern agriculture: cash rent versus cropshare", *Journal of Law & Economics*, Vol. 35 No. 2, pp. 397-426.
- Gibbs, J.P. (1981), *Norms, Deviance, and Social Control: Conceptual Matters*, Elsevier, New York, NY.
- Han, J., Omta, S.W.F. and Trienekens, J.H. (2007), *The Joint Impact of Supply Chain Integration and Quality Management on the Performance of Pork Processing Firms in China*, IAMA or IFAMA, Carefree, AZ.
- Masakure, O. and Henson, S. (2005), "Why do small-scale producers choose to produce under contract? Lessons from nontraditional vegetable exports from Zimbabwe", *World Development*, Vol. 33 No. 10, pp. 1721-33.
- North, D.C. (1990), *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge.

- Perry, M.K. (1989), "Vertical integration: determinants and effects", in Schmalensee, R. and Willig, R.D. (Eds), *The Handbook of Industrial Organisation*, Vol. 1, North-Holland, Amsterdam.
- Sartorius, K. and Kirsten, J. (2007), "A framework to facilitate institutional arrangements for smallholder supply in developing countries: an agribusiness perspective", *Food Policy*, Vol. 32, pp. 640-55.
- Saxton, T. (1997), "The effects of partner and relationship characteristics on alliance outcomes", *Academy of Management Journal*, Vol. 40, pp. 443-61.
- Schulze, B., Wocken, C. and Spiller, A. (2006), "Relationship quality in agri-food chain: supplier management in the German pork and dairy sector", *Journal on Chain and Network Science*, Vol. 6 No. 1, pp. 55-68.

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