AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

International Food and Agribusiness Management Review
Volume 15, Issue 2, 2012

An Empirical Study on Governance Structure Choices in China´s Pork Supply Chain

Chen Ji[a], Isabel de Felipe[Φb], Julian Briz[c] and Jacques H. Trienekens[d]

[a]*Ph.D., Polytechnic University of Madrid, Agricultural Economics and Social Sciences ETSI Agronomos, Avenida Complutense 3, Madrid, Spain*

[b]*Professor, Polytechnic University of Madrid, Agricultural Economics and Social Sciences ETSI Agronomos, Avenida Complutense 3, Madrid, Spain*

[c]*Professor, Polytechnic University of Madrid, Agricultural Economics and Social Sciences ETSI Agronomos, Avenida Complutense 3, Madrid, Spain*

[d]*Professor, Management Studies, Wageningen University, 1 Hollandseweg , Wageningen 6706 KN, Netherlands*

Abstract

China´s pork chain is changing in several ways. Specialized and commercial productions are gaining importance although small scale (backyard) pig production still dominates production. Similarly, small slaughterhouses continue transactions with pig producers in spot market relationships, while big pork slaughtering and processing companies are actively exploring and advancing different forms of integration. This study explains the governance structure choices in China´s pork chain from both transaction cost economics and transaction value analysis perspectives using Structural Equation Modeling (SEM). It is revealed that governance choices in China´s pork chain are the joint effect of transaction cost and collaborative advantages.

Keywords: China's Pork Supply Chain; Governance Structure; Structural Equation Modeling

[Φ]Corresponding author: Tel: + 34. 91.336.5791
Email: isabel.defelipe@upm.es
C. Ji joemimi49@gmail.com
J. Briz: julian.briz@upm.es
J.H. Trienekens: Jacques.Trienekens@wur.nl

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved

Introduction

China is a large, developing country with a fast-growing economy and an industrial structure which is undergoing great transformation. The pork sector is the most important livestock sector in China, and Chinese people consume more than 50% of the pork produced in the world.

China´s pork chain is changing in several aspects. Although the small scale (backyard) pig production still dominates the production mode in China, specialized and commercial productions are gaining importance. A similar situation takes place in slaughtering and processing industry. Slaughtering and processing industries are core companies in China´s pork chain, and they conduct various governance structure forms to integrate with their downstream chain agents. Small slaughterhouses continue the transactions with pig producers in spot market relationships, while big pork slaughtering and processing companies (called dragon-head companies) are actively exploring and advancing different forms of integration. They collaborate with pig producers using mechanisms such as long-term contract, "company-cooperatives-pig farmers" and vertical integration.

Furthermore, slaughtering and processing industries are greatly encouraged to integrate with pig producers, as advanced in the *Formulation of Development Plan on National Slaughtering and Processing Industry (2010-2015)*, issued by the Ministry of Commerce in China. The issues of establishing good brands as well as ensuring pork safety and quality are also addressed. Therefore, this study aims to answer the following questions:

1. Why do different governance structure forms co-exist in China's pork supply chain, and why are the big slaughtering and processing industries driving integrations in the chain?
2. What should the pig producers, slaughterhouses, processors and policy makers do to advance integrations in China's pork supply chain?

Transaction Cost Economics (TCE) has been at the forefront of the development of governance-related issues. It offers a set of normative rules for choosing among alternative governance arrangements (Masten 1993), which lies in that organizing transactions involves costs (Ménard 2001) and governance structure affects transaction cost economizing result (Williamson 1998). Its "discriminating way" permits hypotheses about organizational forms to be formulated and tested (Masten 1993, 119).

However, several strands of viewpoints have criticized TCE from different perspectives, mainly concentrating on theories, methodologies and empirical studies. Among them, the Transaction Value Analysis (TVA) provides the logical insight from a marketing strategy perspective, pointing out that a single-party cost minimization without analyzing the interdependence between exchange partners in the pursuit of joint value is not sufficient in governance choice studies (Zajac and Olsen 1993). It has been found that transaction value refers to "collaboration advantages" that achieved by exchange partners; thus, this study uses "collaboration advantages" to express transaction value in the empirical part.

This study deduces the relationship among transaction cost, "collaboration advantages" and level of integration, using structural Equation Modelling (SEM) and data from 350 slaughtering (pro-

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

cessing) companies. The factors that influence transaction cost and "collaboration advantages" are also explored. It is discovered that "collaboration advantages" positively influences core companies' choices in integration with their downstream partners in Chinese pork supply chain. It is also revealed that willingness and capability to collaborate are the factors that influence "collaborative advantages".

Based on the findings, this study is expected to explore some managerial implications and provide suggestions to the chain actors and chain administrators. It suggests that big slaughtering and processing companies make full use of their resources in capital, technology, and public reputation to integrate with pig producers in various modes. Administrators in the pork chain, on one hand, should make sure that policies maintain the stability of the pork market to reduce the environmental uncertainty. On the other hand, they have to support big processing industries in policy, finance, technology, logistics, information and innovation to enhance their growth and to encourage the integration they are promoting.

Theoretical Background and Research Hypotheses

Transaction Cost Economics Theory (TCE)

The concept of transaction cost originates in Coase´s famous 1937 paper "The Nature of the Firm" and it was used to explain the nature and limits of firms. Transaction cost theory was reintroduced and developed by Williamson (1975, 1985), who pointed out that "all cost differences between internal and market procurement ultimately rest on transaction cost considerations" (Williamson 1996, 68). He also puts forward the term "New Institutional Economics (NIE)" in 1975. Relevant NIE studies are concentrated in modes of governance, enforcement mechanism, hierarchical structures, and bargaining strength.

New Institutional Economics introduced the concept of governance structure. Network governance is defined as the institutional matrix that encapsulates the configuration of multi-stage business arrangements within a given strategic network (Sauvée 2002). Hesterley et al. (1990, 403) defined that these governance mechanisms include any institutional arrangement that serves to influence the exchange process. Hendrikse (2003), also stated that a governance structure consists of a collection of rules / institutions /constraints structuring the transactions between the various stakeholders.

Transaction Cost Economics is an important school within the New Institutional Economics, which has the potential to offer valuable insights to agricultural economists who work in a variety of fields in the food and agricultural industries in both developed and developing economies (Dorward 1999). According to transaction cost economics, in a world without transaction costs, all activities would be carried out as exchanges between units, and it is due to the failure of markets, or arenas of exchange, to allow for many exchanges without prohibitively high governance costs that organizations come to exist (Williamson 1985, 1991). In other words, hierarchical organization is considered a response to market failure. Transaction cost economics is not only concerned with the emergence of organizations to manage transaction costs, but also with how the choice of organizational form may vary according to the specific types of exchange activities involved.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

The two important assumptions of TCE, which are bounded rationality (Cyert and March 1963; March and Simon 1958; Nelson and Winter 1982) and opportunism, suggest that it is costly to identify untrustworthy individuals *ex ante* (Williamson 1996) and further indicate that all exchanges are costly. The theories put forth by Williamson (1975) and Klein et al. (1978) point out that transactions are seen to differ in terms of market contracting inefficiencies which originate from small numbers bargaining situations, while small numbers bargaining situations may exist *ex ante*. Therefore, TCE provides the insights that the governance of exchange agreements between economic actors is costly and governance forms vary in their ability to facilitate exchange depending on the attributes in the transactional environment (Leiblein 2003).

Transaction Cost Economics has been the dominant paradigm for analyzing issues in inter-firm relationships, channel structure, foreign market entry and so on. The central philosophy is that governance structure aims at mitigating all forms of contractual hazards found between the partners in a transaction-cost economizing way (Williamson 1996). In the framework established by Coase and Williamson, the organizational criterion is minimization of production and transaction costs (Williamson 1979). The choice of organizational governance form is seen as a central means through which management affects the costs of monitoring and administration or, more specifically, the costs of negotiating and writing contracts and monitoring and enforcing contractual performance (Williamson 1975).

The vast majority of empirical literature in TCE has examined the factors which influence the choice of governance form. Coles and Hesterly (1998) pointed out that transaction cost – whether they stem from asset specificity, uncertainty or measurement difficulties – are central to understanding vertical integration, but the impact of these factors should not be examined in isolation.

Important empirical evidence provided by Shelanski and Klein (1995) supports the relationship between vertical integration and transaction cost, which involve the explanations of asset specificity and uncertainty. The empirical studies in U.S. food industries from Frank and Henderson (1992) also supported the notion that transaction costs form a primary motivation for vertical coordination via nonmarket arrangements. The most influential transaction cost factors are related to uncertainty, input supplier concentration, asset specificity, and scale economics. Klein et al. (1990), Leblebici and Gerald (1981) suggested that environmental uncertainty undermines an organization's ability to predict future outcomes. Partners may act opportunistically when circumstances change, which may cause organizations to incur costs related to communication, negotiation, and coordination (Klein et al. 1990; Rindfleisch and Heide 1997; Williamson 1975, 1991). To economize on such transaction costs, organizations use an internal governance structure when environmental uncertainty is high (Klein et al. 1990; Williamson 1985).

Transaction Value Analysis (TVA)

Although TCE has become the dominant paradigm for analyzing issues in several areas such as inter-firm relationships, channel structure and so on (Ghosh and John 1999), several strands of viewpoints criticized TCE in different aspects, which are reviewed as follows:

- The first criticism comes from strategy-oriented literature and Transaction Values Analy-

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

sis (TVA). In this school, representative standpoints from Zajac and Olsen (1993) and Ghosh and John (1999) argue that TCE has made little headway into market strategy literature, emphasizing a single-party cost minimization without analyzing the interdependence between exchange partners in the pursuit of joint value.

- Another point comments that studies from TCE are still static and structural, neglecting the fact that governance form choice is actually a dynamic and process issue (Zajac and Olsen, 1993).
- Finally, mainstream economists criticize the lack of mathematical models to support the reasoning and contribute to testable predictions, an implausible critique in light of the remarkable set of empirical tests and analysis already available in New Institutional Economics (Ménard, 2001). And it is pointed out that there are two major weaknesses in the existing NIE theory, specifically: 1) how we relate the analysis of transaction costs to the dynamic innovation; 2) interaction between institutional environments and governance structures.

Transaction Value Analysis contends that TCE´s single-minded focus on cost minimization provides little insight into strategic marketing choices that are undertaken by exchange partners who create and claim value. TVA also pointed out that "while some might argue that transaction cost analysis does not neglect the issue of joint value inter-organizational strategies, but simply 'holds it constant', we suggest that even this interpretation maybe problematic" (Zajac and Olsen 1993, 132). They propose that it may be more appropriate to hold transaction costs rather than transaction value constant if a factor must be held constant to focus on more critical factors. Based on this point, TVA proposes another focus in analyzing the inter-organizational strategies which is claiming the maximized joint value of the two (or multi) exchange partners.

Zajac and Olsen (1993, 138) also emphasize the co-effect of transaction cost and transaction value on governance structure choice, putting forward that "when the pursuit of transactional value necessitates higher transaction costs, and expected joint gains outweigh transaction cost considerations, inter-organizational strategies having a greater joint value will typically require the use of less efficient (from a transaction cost perspective) governance structures." This sentence could be explained from three aspects:

First, it strengthens the point that both transaction cost and transaction value are changeable variables; neither transaction cost nor transaction value is a constant. Second, it pinpoints the importance of transaction value´s effect on governance structure choice. The structure is not only decided by cost, but also by the joint value expected to be achieved. Third, it underlies the co-effect of transaction cost and transaction value, compared with a matrix of low transaction and low joint value, exchanging partners may choose the structure matrix of high transaction and high joint value because the expected high joint value overwhelms the high transaction cost. While this structure is not efficient according to transaction cost economics due to its high transaction cost, it´s chosen due to its overwhelming joint transaction value.

However, the existing definition of transaction value in theories is neither clear nor concrete for an empirical study. Through the overview of transaction value analysis, it is found that transaction value refers to joint improvements achieved by exchange partners. To make this concept

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

clear and understandable, this study translates and explains transaction value as collaboration advantages:

Collaboration advantages refer to the joint advantages achieved through transaction (mutual activities) of agents in supply chains. These advantages form the mutual improvements in logistics systems, cash response, information exchange, technology and innovation and quality management.

It is noted that, as transaction cost differs from production cost, collaboration advantages in this study do not include the firm profits drawn by the exchange partners jointly.

Hypotheses

From the theoretical overviews stated previously, several hypotheses are generated, and they are explained as follows.

Based on the theoretical review of Transaction Cost Economics, it is concluded that in selecting a governance mode, organizations attempt to minimize transaction costs. A market governance mode is preferred when transaction costs are low. Because of economies of scale and scope, TCE assumes that the market will always be the lowest-cost producer of certain goods or service. Alternatively, an internal governance mode is preferred when transaction costs are high. It should be noted here that transaction cost itself is a negative value. The value of transaction cost refers to its absolute value. When the absolute value of transaction cost is expected high, the exchange partners tend to apply a more intense and stable governance structure to reduce the transaction cost.

The production cost advantage of the market is overwhelmed by the high transaction cost incurred. Then, it is assumed that a higher transaction cost would encourage the chain actors to increase the level of integration, and the first hypothesis of this research is:

Hypothesis 1: Transaction cost has a positive relationship with level of integration

Transaction costs are directly related to all the three independent constructs, asset specificity and uncertainty — both behavioral as well as environmental (Grover and Malhotra 2003). Uncertainty refers to the unanticipated changes in circumstances around a transaction. This uncertainty could preclude both the formulation of a contract *ex-ante* and/or the ability to verify compliance *ex-post*. The former (environmental uncertainty) can be reflected in constructs such as unpredictability of the environment, technology, and demand volume and variety. The latter (behavioral uncertainty) includes performance evaluation and information asymmetry problems. As discussed earlier, the effects of the bounded rationality constraint are accentuated by conditions of uncertainty (Grover and Malhotra 2003).

The concept of uncertainty has long been a central component of a number of theories of organization and strategy. March and Simon (1958) identified uncertainty as a key variable in explaining organizational behavior. Thompson (1967) suggested that an organization's primary task is coping with the uncertain contingencies of the environment, especially those of the task envi-

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

ronment. Pfeffer and Salancik's (1978) resource dependency theory suggests that organizations structure their external relationships in response to the uncertainty resulted from dependence on elements of the environment.

Behavioral uncertainty creates problems for performance evaluation. Exchange partners can use their own guile to create hidden costs by performing inefficiently and ineffectively (Rindfleisch and Heide 1997; Williamson 1985). Monitoring and enforcement costs must be increased (Williamson 1975). Organizations attempting to minimize transaction costs that arise as a result of behavioral uncertainty are likely to choose an internal governance structure (Anderson 1985; Gatignon and Anderson 1988; John and Weitz 1988; Williamson 1985).

Environmental uncertainty undermines an organization's ability to predict future outcomes (Klein et al. 1990; Leblebici and Gerald 1981). Thus, organizations have more difficulty in writing market contracts in changeable circumstances. As a result, partners may act opportunistically when circumstances change, causing organizations to incur costs related to communication, negotiation, and coordination (Klein et al. 1990; Rindfleisch and Heide 1997; Williamson 1975, 1991). To economize on such transaction costs, organizations use an internal governance structure when environmental uncertainty is high (Klein et al. 1990; Williamson 1985).

Therefore, behavioral uncertainty and environmental uncertainty are introduced into the measurement of the variable of uncertainty in this study, and we conclude the second hypothesis:

Hypothesis 2: Uncertainty has a positive relationship with transaction cost; i.e. higher uncertainty exerts high transaction cost

Asset specificity refers to the transferability of assets that support a given transaction. A 'specific' asset is significantly more valuable in a particular exchange than in an alternative exchange and leads to a 'lock-in' effect that causes hold-up problems (Barney 1999; Williamson 1975). Highly asset-specific investments (also called relationship-specific investments) represent costs that have little or no value outside the exchange relationship. Transactions not supported by high-specificity assets are not prone to hold-up problems. Hence, organizations opt for the least-costly governance mode available in the market (Barney 1999; Williamson 1975, 1979, 1985, 1994). And organizations attempt to protect against hold-up problems by using an internal governance structure (Rindfleisch and Heide 1997; Walker and Weber 1984; Williamson 1975, 1979, 1994).

These costs are mainly in the form of human specificity (e.g. training of salespeople, specifically for a certain partner) or physical specificity (e.g. investment by a supplier in equipment, tools, jigs, and fixtures to cater to idiosyncratic needs of a manufacturer). Investments in information systems that primarily serve the needs of one unique customer and cannot be leveraged across other external parties would also be another form of asset-specific investment. Therefore, we generate the third hypothesis:

Hypothesis 3: The relationship between asset specificity and transaction cost is positive

Based on the strategic management and transaction value analysis theories, it is proposed that when the expected "collaboration advantages" is high, exchanging partners tend to apply more

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

intense and stable governance structure to maintain or to increase "collaboration advantages". Thus, the fourth hypothesis is:

Hypothesis 4: Collaboration advantages and the level of integration have a positive relationship

As for how to measure collaboration advantages, it will be explained in the following parts.
The creation and claim of joint advantages depends on two factors as it is extracted from the transaction value and resource based view which are willingness to collaborate and capability to collaborate. Zajac and Olsen (1993) put the weight on both exchange partners´ concern for maximizing transaction value. This concern is explained as (1) knowing the partner´s preference and concern as a basis for exchange and mutual gain and (2) discovering ways in which similarities or shared interests can be exploited to maximize co-operative joint value that accrue to both parties. Therefore, we define this concern to know each other and cooperate with each other as willingness to collaborate, and it is one of the factors that affect the claim of "collaboration advantages", the greater the willingness they have, the greater the collaboration advantages are expected. Therefore, hypothesis 5 is generated as follows:

Hypothesis 5: Willingness to collaborate has a positive relationship with collaboration advantages

Barney (1991) asserts that firms achieve and sustain competitive advantages by developing valuable resources and capabilities. Firms internalize and maintain internally those activities in which their superior capabilities enable efficient production (Poppo and Zenger 1998).

Research of Hsiao et al. (2009) gives insight into the concept of capability in this study. It is stated in their points on logistical resources, where they include tangible assets (such as trucks or warehouses) and intangible assets (such as knowledge or skills, i.e. 'capability'). Olavarrieta and Ellinger (1997) defined capability as a complex bundle of individual skills and accumulated knowledge exercised through an organizational process that enables firms to co-ordinate activities and make use of their resources. They proposed that a logistic activity is executed or translated by an employee's capabilities and the most important is that the available capabilities also influence the make-or-buy decision. For instance, Argyres (1996) proposed that firms were vertically integrated into those activities in which they have greater production experience and/or organizational skills (capabilities) than the potential suppliers, and they outsource activities in which they have inferior capabilities. They assert that firms internalize a certain logistics activity in which they have superior capabilities to obtain joint advantages for themselves.

Therefore, the capability to collaborate of the chain partners in this study is defined as the skills and knowledge that enable chain agents to collaborate and make use of resources. The capability of collaboration not only includes logistics, but also technology, capital and intangible capabilities such as reputation, and public appeal. It is the capability or power of exchange partners to create and claim joint advantages. Each chain agent has its unique capability to collaborate and this capability influences the joint advantages and thus it influences make-or-buy decision. As a

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

result, exchange partners who have a great "capability" will help the two parts to achieve more joint competitive advantages. Therefore, the sixth hypothesis is generated as follows:

Hypothesis 6: Capability to collaborate has a positive relationship with collaboration advantages

Finally, it is proposed that the uncertainty of environment will affect the collaboration advantages gained from both exchange parts, and the last hypothesis is stated as:

Hypothesis 7: Uncertainty has a negative effect on collaboration advantages

With seven hypotheses generated, the conceptual model is presented as follows.

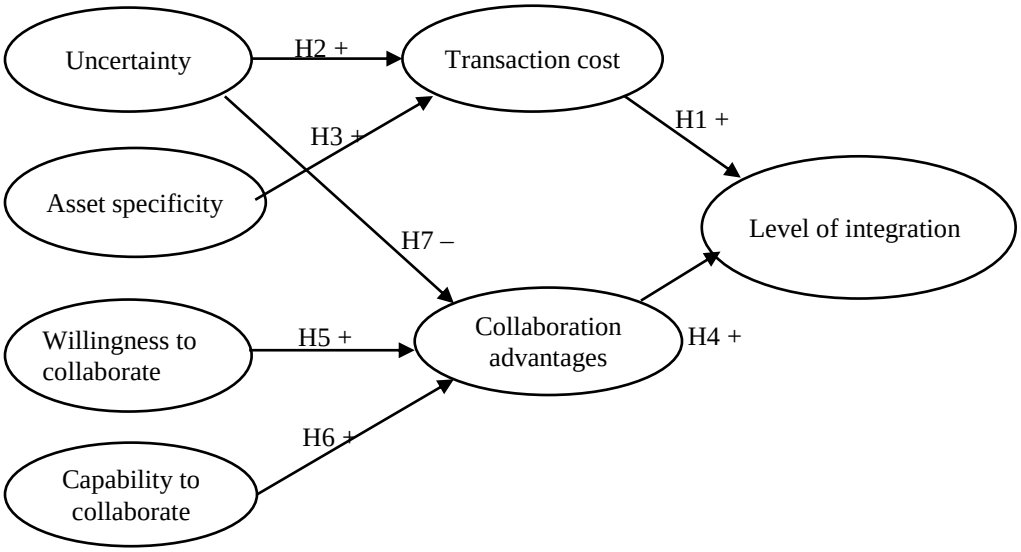

Figure 1. Conceptual Model

Methodology

Explanation and Measurement of Variables

To test the hypotheses and to reach the conclusions, a proper methodology is deduced by measurement of the variables and description of SEM model.

(1) Transaction cost

Transaction costs are both difficult to define and, once defined, difficult to observe and quantify (Dorward 1999). Coase (1960) describes in his well-known article "The Problem of Social Cost" the transaction costs he is concerned with: In order to carry out a market transaction it is neces-

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

sary to discover who it is that one wishes to deal with, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on. More succinctly, transaction costs are: search and information costs, bargaining and decision costs and policing and enforcement costs. This is the original scope of transaction cost and it is used in this research as the base to measure transaction cost.

Empirical work on direct measurement of transaction costs has been more nascent and limited, and has mostly been treated at the conceptual rather than the measurement level. Pilling et al. (1994) categorized transaction costs as associated with ex-ante costs of developing and setting up an exchange relationship, and ex-post costs of monitoring performance, and dealing with opportunistic behavior (Rindfleisch and Heide 1997).

Grover and Malhotra (2003) measured transaction costs by measuring the difficulty to associate with the supplier, difficulty to monitor the performance of the supplier, difficulty in addressing problems that might arise in the relationship with the supplier and the possibility of likelihood of the supplier taking advantage of its relationship with the firm being interviewed. Dierderen (2004) listed the costs of market transaction, hierarchy and social network. Market transaction includes searching costs, bargaining costs, enforcing costs; hierarchy includes of monitoring costs, incentive alignment costs, bonding costs and dead-weight losses; costs for social network includes networking costs, cooperating and retaliating costs.

All these indicate that the measurement of transaction costs could be derived from its original concept, which means that, transaction costs are able to be measured by the possible costs occurred in the transaction process between two exchange partners. Therefore, transaction costs in this study are reflected by five aspects, that is, searching cost, information cost, bargaining (negotiating) cost, contract making cost (decision cost) and monitoring cost. And these are the five indicators used in this study to measure transaction cost.

(2) Level of integration

As stated in section 3, an internal governance mode is preferred when transaction costs are high. Cooper and Ellram (1993) describe governance structures in different typologies, from spot market, short-term contract, long-term contract, joint venture to strategic alliance and vertical integration. Williamson (1975) characterizes two extremes of governance modes — perfectly competitive markets and vertically integrated hierarchies. Spot market could be considered as one extreme of internal governance mode, which carries zero level of integration. Zigger and Trienekens (1999) point out that when the structure of organization tends to be more intense and stable, the organization works more efficiently. Particularly, when chain agents encounter emergency, an intense organization structure shows a better response. Williamson (1987, 2000) considers that when companies invest more asset specificity and exchange more frequently, the opportunism will be reduced, and the structure is more intense. Therefore, the study will use the degree of intensity and stability to measure the level of integration.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

(3) Uncertainty

Uncertainty comes in two forms: behavioral uncertainty and environmental uncertainty (Rindfleisch and Heide1997; Simon 1957; Slater and Spencer 2000; Williamson 1985). Uncertainty refers to the unanticipated changes in circumstances around a transaction. This uncertainty could preclude both the formulation of a contract ex-ante and/or the ability to verify compliance ex-post. The environmental uncertainty can be reflected in constructs such as unpredictability of the environment, technology, and demand volume and variety. The behavioral uncertainty includes performance evaluation and information asymmetry problems. Therefore, uncertainty is measured by two indicators: environmental uncertainty and behavioral uncertainty.

(4) Asset specificity

Williamson (1985) identified site, physical, human and dedicated asset specificity as distinct types of transaction-specific investments. It has, by and large, been measured as a latent construct in the context of human asset specificity. Scales for other types of asset specificity such as physical asset specificity or brand name capital are less readily available due to the difficulty associated with their measurement and operationalization. Buvik (2002) operates asset specificity as: the magnitude of the investments and/or adaptations made by the buyer in physical assets, production facilities, tools and knowledge tailored to the relationships. The measuring of asset specificity is that this study draws lessons from studies of Anderson (1985), Heide and John (1990), Klein et al. (1989), and Sriram et al. (1992) among others. And it is measured by physical asset specificity and relationship asset specificity.

(5) Collaboration advantages

The concept of collaboration advantages in this study originates from the transaction value research by Zajac and Olsen (1993). As we stated before, transaction value is not well defined in the existing theories. It is generated as the expected joint value that exchanging partners will gain during the process of their transaction. The mutual benefits that the chain agents will obtain from their exchange processes could be recognized and realized over time through enhanced information acquisition and exchange, along with the emergence of shared interests. It is also stated in the anterior part that “collaboration advantages” is used in this study in the place of transaction value as it is better for an empirical study.

Simatupang et al. (2002) found that the joint interests will be created through coordination between chain agents through operational linkages and organizational linkages, and the mutual improvements lie in logistics synchronization, information sharing, incentive alignment and collective learning, in which collective learning implies collaborated technological benefits, innovative benefits, etc., which are in line with the propositions mentioned in this section. It is addressed that the key of collaboration advantages is “joint”. Therefore, it comes from advantages created through all the mutual activities that happened between chain agents such as logistics, cash response, information exchange, technological coordination, innovation cooperation and joint quality and safety improvement system establishment. It includes interests that achieved jointly/mutually by exchange partners. “Collaboration advantages” is a collective concept just like transaction costs.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Empirical work on direct measurement of collaboration advantages has been more nascent and limited, and collaboration advantages are going to be measured in this study according to the definition given by six dimensions: logistics system, cash response, information exchange, technological exchange, innovative system and quality and safety management system.

(6) Willingness to collaborate

Willingness to collaborate is proposed as one of the factors that influence collaboration advantages, and it originates from the transaction value theories framework. Zajac and Olsen (1993) believe that the exchange partners´ willingness to know each other and their willingness to make the joint effort have effect on transaction value. Thus, these two dimensions will be applied to measuring willingness to collaborate.

(7) Capability to collaborate

On one hand, it is proposed that the exchange partners should have the willingness to collaborate; on the other hand, the chain agents need the capability to collaborate in order to create collaboration advantages.

The variable capability to collaborate comes from RBV theories. Researchers and practitioners interested in the RBV have used a variety of different terms to talk about a firm's resources, including competencies (Prahalad and Hamel 1990), skills (Grant 1991), strategic assets (Amit and Schoemaker 1993) and stocks (Capron and Hulland 1999). Wade and Hulland (2004) define resources as assets and capabilities that are available and useful in detecting and responding to market opportunities or threats (Sanchez et al. 1996; Christensen and Overdorf 2000). Capabilities are defined as repeatable patterns of actions in the use of assets to create, produce, and/or offer products to a market (Sanchez et al. 1996). Capabilities transform inputs into outputs of greater worth (Amit and Schoemaker 1993; Capron and Hulland 1999; Sanchez et al. 1996; Schoemaker and Amit 1994). Capabilities can include skills, such as technical or managerial ability, or processes, such as systems development or integration.

As stated above, capability to collaborate of the chain partners in this study is defined as the skills and knowledge that enable chain agents to collaborate and make use of resources. It is considered as competitively tangible and intangible resources (capability) of the firm that could be utilized to achieve the collaboration between chain agents aiming to maximize the collaboration advantages. Tangible capability refers to the ability to offer goods and services such as capital, technology, logistics systems; intangible capability refers to the ability to transform inputs into outputs of greater worth such as business reputation, public appeal, and managerial skills. Thus, the capability to collaborate is measured by tangible and intangible capability to collaborate.
All the measurable variables of each latent variable are listed in Table 1. The measurement of measurable variables is stated in the questionnaires found in Appendix 1.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Table 1. Latent Variables and Measurable Variables

Latent variables	Measurable variables
Transaction Cost	1. Searching Cost (SRC) 2. Information Cost (INC) 3. Bargaining Cost (BAC) 4. Decision Making Cost (DEC) 5. Monitoring Cost (MOC)
Level of Integration	1. Level of Stability of the Governance (SGG) 2. Level of Intensity of the Governance (IGG)
Uncertainty	1. Environmental Uncertainty (ENU) 2. Behavioral Uncertainty (BHU)
Asset Specificity	1. Physical Asset Specificity (PAS) 2. Relationship Asset Specificity (RAS)
Collaboration Advantages	1. Logistics Advantages (LGA) 2. Cash Response Advantages (CRA) 3. Information Use and Exchange Advantages (IEA) 4. Technology Advantages (TEA) 5. Innovation Advantages (INA) 6. Quality Management Advantages (QMA)
Willingness to Collaborate	1. Willingness to Know the Partner (WTK) 2. Willingness to Make Joint Effort (WTE)
Capability to Collaborate	1. Tangible Capability to Collaborate (TCC) 2. Intangible Capability to Collaborate (ITCC)

Description of SEM

Supply Chain Management research very often involves an analysis of relationships among abstract concepts. For this type of analysis, Structural Equation Modeling (SEM) is a very powerful technique because it combines measurement models (confirmatory factor analysis) and structural models (regression analysis). The usefulness of SEM lies in its ability to test hypotheses that are difficult if not impossible to evaluate with other analytical methods into a simultaneous statistical test (Gimenez et al. 2005). Thus, SEM is the proper methods for this study to test the hypotheses and explore the influencing factors. The software SPSS 17.0 and Amos 17.0 were adopted to analyze the data and test the results of the models.

The study uses measurable variables to measure the seven latent variables in two conceptual models. Likert-type scale method is used to measure these items, and it is widely used in psychology and management, etc. research areas. Likert-type scale usually uses 4 to 6-point scale as measurement levels, in which 5-point scale has a better internal consistency. Then, a five-point Likert-type scale anchored from “strongly disagree” to “strongly agree” is adopted in the measurement.

Empirical Evidence

With the methodology, the study utilizes the data from China´s pork chain case to test the hypotheses.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Data Collection

In China´s pork chains, the slaughtering (slaughtering-processing) companies are core agents of the chain as they are the main organizations who drive the chains´ governance structure development. Therefore, this paper chooses the governance structure between slaughtering (slaughtering-processing) companies and their upstream chain agents which are pig farmers, as the research domain.

Before conducting the formal investigation, trial interviews were initiated in September, 2010 and final questionnaires were revised according to the result of the trial interviews. Formal investigation was carried out during 3 months from October to December, 2010. A sample of 350 slaughtering (slaughtering-processing) companies in three biggest pig production and pork processing provinces in China, –*Jiangsu* Province, *Henan* Province and *Shandong* Province (see figure 2), were chosen. These three provinces all have large population: 76 million, 93 million and 99.2 million respectively by the end of 2008.

Figure 2. Geographic location of *Jiangsu*, *Henan* and *Shandong* Provinces in China

Jiangsu Province is in *Yangzi* River Triangle Economic Area, which is one of the three most important economic areas in China. These areas have abundant natural resources, human resources and high technology, open economic policies and fairly established foreign investments. *Shandong* province develops particularly in the fast in past ten years, mainly thanks to the great development in the livestock sector and harbor-related business. The Chinese government is investing heavily in establishing a new economic area in the downstream of Yellow River, and it incorporates *Shandong* province. *Henan* province is one of the important economic parts in middle-east China, and one of its most important economic supporters is the pig industry.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

With regard to the pork sector, all the three provinces are big pig producers and processers. According to the statistics provided by China´s meat organization, 19 companies in *Shandong*, 9 companies in *Henan* and 4 companies in *Jiangsu* are listed the 50 most competitive meat producing companies in China in 2005, which in all account for 64% of the 50 most competitive meat producing companies. And among the 44 companies that slaughter more than 200,000 heads of pigs in 2005, 17 of them are companies in *Jiangsu*, *Shandong* and *Henan*. The biggest three companies *ShuangHui*, *JinLuo* and *YuRun* come from *Henan*, *Shandong* and *Jiangsu* respectively. There are 434 pork slaughtering and processing companies in *Shandong* in 2008, and 98 of them slaughter 200000 heads of pigs per annum. It is reported that pork producing companies are concentrated in these areas, which is proper for the survey as the questionnaire object is pork slaughtering (processing) industries.

In total, 350 questionnaires were conducted in these three provinces in the form of personal investigation, personally delivery and electronic delivery. The total returned ratio is 93.1% with 6.9% of the questionnaires being not valid (see Table 2).

Table 2. Questionnaire Information

Provinces	Total	Face-face	Delivered personally or by e-mail	Effectively returned	Returned ratio
Jiangsu	100	60	40	92	92%
Shandong	150	50	100	139	92.7%
Henan	100	40	60	95	95%
Total	350	150	200	326	93.1%

Finally, 326 questionnaires were effectively collected. According to the Ministry of Commerce in China, a company who slaughters more than 200,000 heads of pigs per annum qualifies as a large scale one in the pork industry. We can see from Table 3 that large scale companies still account for a smaller percentage of the pork industry in China. The 326 slaughtering (slaughtering-processing) companies are differentiated from their scales, core businesses and governance structures, shown in the following Table 4 and Table 5.

Table 3. Scales of 326 Companies

Scale	Number	Ratio
Large scale	60	18.4%
Middle and small scale	266	81.6%
Total	326	100%

Table 4. Core Businesses of 326 Companies

Core business	Number	Ratio
Slaughtering only	262	80.4%
Slaughtering and processing	64	19.6%
Total	326	100%

Among the 326 companies, 80.98% still conduct spot market transactions with their upstream pig farmers, while the other 19.02% are using governance structures such as contracts, cooperatives and integrations. “Company – production base – pig farmers” is a governances structure of

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

long-term contract production, and "company – cooperatives – pig farmers" is the more integrated alliance governances structure (see Table 5).

Table 5. Governance Structures of 326 Companies

Governance Structure	Number	Ratio
Spot market	264	80.98%
Company – production base – pig farmers	27	8.29%
Company – cooperatives – pig farmers	24	7.36%
Integration	11	3.37%
Total	326	100%

The data used in this study comes from surveys in the measurement of the seven variables in the empirical model. The designing of the questionnaire has taken into consideration the related studies and the need of this research. It is designed according to the explanations of the measurement items.

The reliabilities of the data are tested first, and the results indicate that all the Cronbach's α value of the data are more than 0.70 (see appendix 2), which means all the data are reliable for further analysis.

Model Results and Explanations

According to structural equation analysis procedures, goodness of model fit should first be tested to determine whether the model is well built. Bagozzi and Yi (1988) pointed out that the goodness of structural equation fit should be evaluated from three perspectives, which are preliminary fit criteria, fit of internal structure of model and overall model fit.

This study uses overall model fit goodness to evaluate the fit between model and observed data. The overall model has three types, namely the absolute fit measures, incremental fit measure and parsimonious fit measures. Absolute fit measures are used to determine how the overall model can predict the covariance matrix or correlation matrix. Major indicators include value of chi-square statistics, goodness of fit index (GFI), square root of the average residual (RMSR), mean square root of approximate error (RMSEA) etc., in which when GFI value is greater than 0.8 and RMSR and RMSEA values are less than 0.1 means the model has good fit. Incremental fit measures include indicators such as adjusted goodness of fit index (AGFI), normed fit index (NFI), comparative fit index (CFI) etc., when AGFI and NFI values are greater than 0.9 it means that the model is well fit. Indexes for parsimonious fit consist of a parsimonious normed fit index (PNFI), parsimonious goodness of fit index (PGFI), etc., usually PNFI, PGFI value higher than 0.9 is ideal. However, Doll et al (1994) suggest that the criterion that GFI and NFI should be greater than 0.9 is too conservative, and the model is quite well fitted when GFI and NFI are greater than 0.8.

Based on these indexes, statistical software Amos 17.0 and SPSS 17.0 are applied to the SEM model test, and the results of the model fit are shown in Table 6.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Table 6. Model Fit Indicators

Model fit indicators	Value	Ideal value	Explanation
CMIN/DF	2.24	---	---
GFI	0.911	>0.9	Ideal
RMR	0.035	<0.05	Ideal
RMSEA	0.081	<0.05	Accepted
NFI	0.965	>0.9	Ideal
TLI	0.946	>0.9	Ideal

From Table 6, we can see that the observed data is well fit the model, which means the collected data and model could well reflect the real situation. The path parameters between variables are shown in Figure 3 and the test results of parameter are shown in Table 7.

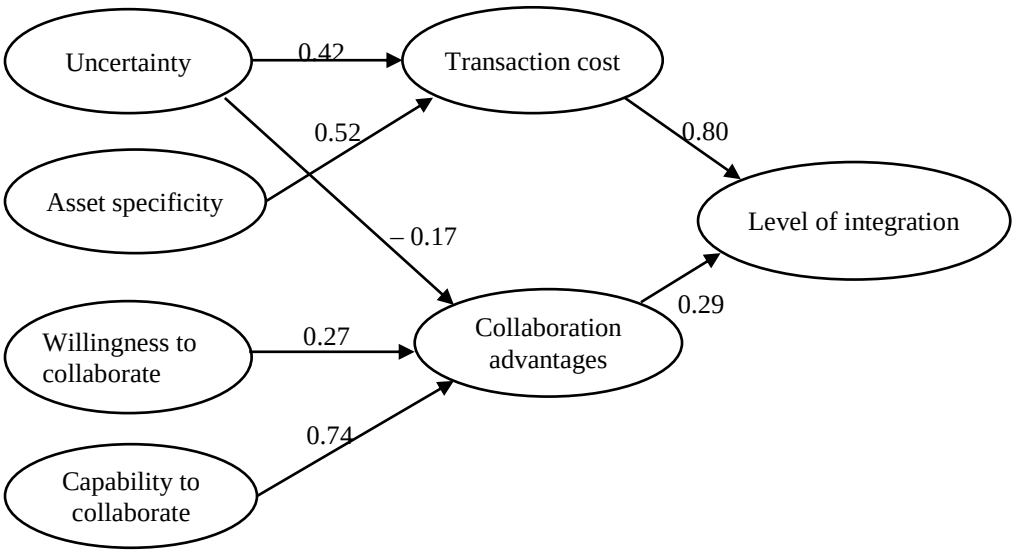

Figure 3. Paths and parameters of SEM Model

The parameters and their regression weights are listed in Table 7.

It can be seen that all the hypotheses given by the research are proven by the model in the case of China´s pork chain. Both transaction cost and "collaboration advantages" have influence on the level of integration. Transaction cost theory is confirmed as one of the most important theory references in the studying of governance of supply chain. In China´s pork chain case, transaction cost is the most important factor that influences the choice of core pork chain agents in governance structure. In the process of chain governance structure change and evolution, transaction cost has been a key reason.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Table 7. Regression Weights (Group number 1-Default Model)

Paths	Estimate	S.E.
Transaction Cost ← Uncertainty	0.422	0.014 ***
Transaction Cost ← Asset Specificity	0.522	0.022 ***
Collaboration Advantages ←Capability to Collaborate	0.741	0.026 ***
Collaboration Advantages ←Willingness to Collaborate	0.269	0.015 ***
Collaboration Adtantages ←Uncertainty	-0.171	0.014 ***
Level of integration ← Transaction Cost	0.805	0.033 ***
Level of integration ← Collaboration Advantages	0.292	0.016 ***

Note: the parameters are estimated unstandardized values.
S.E.: Standard error of regression weight
***: significant on the level of significance for regression weight at 0.1% level.
From the results we can see that all the paths passed the regression test. Combined with the hypotheses raised in this research, the final hypotheses test result is shown in Table 8.

Table 8. Tests of Hypotheses According to the Model

Hypothesis Code	Hypothesis Content	Result of Model
H1	Transaction cost has positive relationship with the level of integration	Approved
H2	Uncertainty has positive relationship with transaction cost	Approved
H3	The relationship between asset specificity and transaction cost is positive	Approved
H4	Collaboration advantages and the level of integration have positive relationship	Approved
H5	Willingness to collaborate has positive relationship with collaboration advantages	Approved
H6	Capability to collaborate has positive relationship with collaboration advantages	Approved
H7	Uncertainty has negative effect on collaboration advantages	Approved

However, although the influence of transaction cost is stronger than "collaboration advantages" on the level of integration, "collaboration advantages" functions in the slaughtering and processing companies' choice in integrations. When facing higher transaction cost and good "collaboration advantages", cooperative partners tend to choose more intense and stable governance structures to minimize the transaction cost and maximize the "collaboration advantages". It also means that cooperative partners´ purpose of choosing more intense and stable governance structure is not only to lower transaction cost, but also to increase "collaboration advantages".
The relationship between transaction cost and the level of integration is in line with Williamson´s point on the relationship between transaction cost and vertical integration. "Collaboration advantages" is proven to be another factor that influences governance structure choice.

The influences of uncertainty and asset specificity on transaction cost are confirmed on the transaction cost theories base. Great uncertainty of the environment and behavioural uncertainty between exchange partners increase the transaction cost. A company with high specificity also exerts high transaction cost. These conclusions in transaction cost theories also find their proofs in China´s pork chain.

It is also revealed that companies´ capability to collaborate has greater influence on collaboration advantages than that of willingness to collaborate on "collaboration advantages", which means

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

strengthening companies´ capability helps improve the "collaboration advantages" that is jointly claimed. On the other hand, the willingness to collaborate is also important as it also has a positive relationship with "collaboration advantages".

Finally, uncertainty shows a slight negative relationship with "collaboration advantages". It means that uncertainty is a factor that influences both transaction cost and "collaboration advantages". The more uncertain the environment and the behaviour between exchange partners is, the less collaboration advantages that the collaboration partners will obtain.

Conclusions and Discussion

Based on the whole analysis, the study arrives at several conclusions, and it proposes some questions for future discussions.

In China´s pork chain, transaction cost is not the only factor that influences the slaughtering and processing industries´ decision in governance mode, and "collaboration advantages" plays a role in choosing a governance structure. To conclude and also to answer the first question raised in the introduction, different levels of integration modes co-exist in China's pork chain because the slaughtering and processing industry is undergoing a transformation in which different companies choose to apply different integration modes considering both transaction cost and "collaboration advantages".

Large-scale slaughtering and processing industries choose to transact with small-scale pig producers in more intense and stable relationships in order to reduce the transaction cost that is exerted by the hold-up behaviours of small pig producers. They also aim to improve the mutual advantages through collaboration. These advantages include improvements in logistics, cash response, quality management and technological renovation, among which quality management and logistics are mostly focused on. This answers the question why big slaughtering and processing companies are driving integration with pig producers.

Spot market relationship dominates the governance structure among the numerous backyard pig farmers and small family slaughterhouses because they are connected by acquaintance relationships and the transaction cost in turn is low. Their relationship is reliable as they know each other in the neighbourhood. Therefore, a spot market relationship is suitable for their exchange.

The research contributes to empirical and theoretical knowledge mainly in two aspects.
First, for chain actors and policy makers, it is noted that, in order to drive the integrations in China´s pork chain, the advancement of "collaborative advantages" among chain members should be promoted. For big slaughtering and processing companies, the mutual advantages achieved through collaboration in logistics systems, information exchange, technology and quality management are motivations that force them to integrate. On one hand, they should strengthen their willingness to collaborate with pig producers; on the other hand, they should make full use of their capabilities to collaborate.

For policy makers, they should greatly encourage commercialized pig production and big-scale slaughtering and processing. At the same time, policy makers should give sufficient financial,

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

technical and professional support to advanced slaughtering and processing industries, improving their capability to accelerate integrations of China´s pork chain. These answer the second question given in the beginning of this study.

Second, the study provides empirical evidence for the application of TVA theories in governance structure studies in supply chain. Empirical results from China's pork chain indicate that TVA is a complementary theory to TCE in governance structure studies. TVA and TCE are not contradictory, and they together provide a more completed view to the existing studies in governance structure.

However, there are some points that the study would propose for discussions in future studies.
First, compared with the traditional studies in governance structure choices in supply chain management, using transaction cost economics theories, this study applies both transaction cost economics theories and transaction value analysis theories. In addition, it obtains its empirical evidence from China's pork chain case. But, this framework needs to be consolidated by more evidences from other empirical cases in the agricultural sector and in other developing or developed countries. Will the same evidence be achieved from other cases?

Second, the governance structure choice process in this study is deduced statically. In fact, the choice of governance modes is a dynamic process that requires long-term adjustment. Chain actors initialize governance modes choice, then they create norms, encounter managing conflicts, and develop trust in their relationships, and they will assess the governance performance gap and thus refine the governance structure. Later, they initialize a new round of governance mode choice. Then, how could this dynamic process be described? And what methods should be applied?

Acknowledgement

Many thanks go to the great ideas and suggestions given by the two anonymous reviewers. Financial support for the survey in China provided by Professor Wang Kai from Nanjing Agricultural University and research support from his research group and its National Natural Science Foundation Project *"Research on Influence of Implementing Supply Chain Management on Ensuring the Supply of Safe Pork (No. 70973053/G0305)"* are greatly appreciated. The authors also gratefully acknowledge the European Community's financial support under the Sixth Framework Programme for Research, Technological Development and Demonstration Activities, in the Integrated Project Q-PORKCHAINS FOOD-CT-2007- 036245.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

References

Amit, R. and P.J.H. Schoemaker. 1993. Strategic Assets and Organizational Rent. *Strategic Management Journal* 14: 33-46.

Anderson, E. 1985. The salesperson as outside agent or employee: a transaction cost analysis. *Marketing Science* 4 (3): 234–254.

Argyres, N. 1996. Evidence on the Role of Firm Capabilities in Vertical Integration Decisions. *Strategic Management Journal* 17 (2): 129-150.

Bagozzi, R.P. and Y. Yi. 1988. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science* 16 (1): 74-94.

Barney, J. 1991. Firm resources and sustained competitive advantage. *Journal of Management* 17 (1): 99–120.

Barney, J.B. 1999. How a firm's capabilities affect boundary decisions. *Sloan Management Review* 40 (3): 137–145.

Buvik, A. 2002. Hybrid governance and governance performance in industrial purchasing relationshipsd. *Scandinavian Journal of Management* 18: 567-587.

Capron, L. and J. Hulland. 1999. Redeployment of Brands, Sales Forces, and General Marketing Management Expertise Following Horizontal Acquisitions: A Resource-Based View. *Journal of Marketing* 63: 41-54.

Christensen, C.M. and M. Overdorf. 2000. Meeting the Challenge of Disruptive Change. *Harvard Business Review* 78 (2): 67-75.

Coase, R.H. 1937. The nature of the firm. *Economica, New Series* 4(16): 386-405.

Coase, R.H. 1960. The Problem of Social Cost. *Journal of Law and Economics* 3: 1-44.

Coles, J. and W. Hesterly. 1998. The impact of firm-specific assets and the interaction of uncertainty: an examination of make or buy decisions in public and private hospitals. *Journal of Economic Behavior and Organization* 36 (3): 383-409.

Cooper, M.C. and L.M. Ellram. 1993. Characteristics of Supply Chain Management and the Implication for Purchasing and Logistics Strategy. *The International Journal of Logistics Management* 4 (2): 13-24.

Cyert, Richad M. and James G. March. 1963. *A behavioral theory of the firm*. Prentice-Hall Inc., New Jersey, USA.

Dorward, A. 1999. A risk programming approach for analyzing contractual choice in the presence of transaction costs. *European Review of Agricultural Economics* 26(4): 479-492.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Dosi, G., D. Teece and S. Winter. 1990. Toward a theory of corporate coherence: Preliminary remarks. Working paper, University of California, Berkeley.

Frank, S.D. and D.R. Henderson. 1992. Transaction Costs as Determinants of Vertical Coordination in the U.S. Food Industries. *American Journal of Agricultural Economics* 74 (4): 941-950.

Gatignon, H. and E. Anderson. 1988. The multinational corporation's degree of control over foreign subsidiaries: an empirical test of transaction cost explanation. *Journal of Law, Economics and Organization* 4 (2): 305–336.

Ghosh M. and G. John. 1999. Governance Value Analysis and Marketing Strategy. *The Journal of Marketing* 63 (Special issue):131-145.

Gimenez, C. and E. Ventura. 2003. Logistics-Production, Logistics-Marketing and External Integration: Their Impact on Performance. *International Journal of Operations & Management* 25(1): 20-38.

Grant, R.M. 1991. The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation. *California Management Review* 33 (1): 114-135.

Grover, V. and M.K. Malhotra. 2003. Transaction cost framework in operations and supply chain management research: theory and measurement. *Journal of Operations Management* 21: 457-473.

Heide, J.B. and G. John. 1990. Alliances in industrial purchasing: the determinants of joint action in buyer–supplier relationships. *Journal of Marketing Research* 27 (1): 24–36.

Hendrikse, G.W.J. 2003. *Economics and Management of Organizations: Co-ordination, Motivation and Strategy*. Mc Graw Hill.

Hesterly, W.S., J. Liebeskind and T.R. Zenger. 1990. Organizational economics: an impending revolution in organization theory? *Academy of Management Review* 15(3): 402-420.

Hsiao, H.I., R.G.M. Kemp, J.G.A.J. van der Vorst and S.W.F. Onno Omta. 2009. Make-or-buy decisions and levels of logistics outsourcing: an empirical analysis in the food manufacturing industry. *Journal on Chain and Network Science* 9 (2): 105-118

John, G. and A.B. Weitz. 1988. Forward integration into distribution: An empirical test of transaction cost analysis. *Journal of Law, Economics and Organization* 4 (2): 121–139.

Klein, B., R.G. Crawford and A.A. Alchian. 1978. Vertical Integration, Appropriable Rents, and the Competitive Contracting Process. *Journal of Law and Economics* 21: 297–326.

Klein, S., G.L. Frazier and V. Roth. 1989. A transaction cost analysis model of channel integration in international markets. *Journal of Marketing Research* 17: 253–260.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Klein, S., G.L. Frazier, and V.J. Roth. 1990. A transaction cost analysis model of channel integration in international markets. *Journal of Marketing Research* 27 (2): 196–209.

Leblebici, H. and S. Gerald. 1981. Effects of environmental uncertainty on information and decision process in bank. *Administrative Science Quarterly* 26 (4): 578–596.

Leiblein, M.J. 2003. The choice of organizational governance form and performance: Predictions form transaction cost, resource-based and real options theories. *Journal of Management* 29 (6): 937-961.

March, J.G. and H.A. Simon. 1958. *Organizations*. John Wiley. New York.

Masten, S.E. 1993. Transaction Costs, Mistakes, and Performance: Assessing the Importance of Governance. *Managerial and Decision Economics* 14 (2): Special Issue: Transaction costs Economics: 119-129.

Ménard, C. 2001. Methodological Issues in New Institutional Economics. *Journal of Economic Methodology* 8 (1): 85-92.

Nelson, R. and S. Winter. 1982. *An Evolutionary Theory of Economic Change*. Belknap Press, Cambridge, M.A.

Olavarrieta, S. and A.E. Ellinger. 1997. Resource-based theory and strategic logistics research. *International Journal of Physical Distribution & Logistics Management* 29 (10): 559-587.

Pfeffer, J. and G.R. Salancik. 1978. *The external control of organizations: a resource dependence perspective*. New York: Harper & Row.

Pilling, B.K., L.A. Crosby and D.W. Jackson. 1994. Relational bonds in industrial exchange: an experimental test of the transaction cost economic framework. *Journal of Business Research* 30 (3): 237–251.

Poppo, L. and T. Zenger. 1998. Testing alternative theories of the firm: Transaction cost, knowledge-based, and measurement explanations for make-or-buy decisions in information services. *Strategic Management Journal* 19 (9): 853-877.

Prahalad, C.K. and G. Hamel. 1990. The Core Competence of the Corporation. *Harvard Business Review* 68 (3): 79-92.

Rindfleisch, A. and J.B. Heide. 1997. Transaction cost analysis: past, present, and future applications. *Journal of Marketing* 61 (4): 30–54.

Sanchez, R., A. Heene and H. Thomas. 1996. *Towards the Theory and Practice of Competence-Based Competition.* Pergamon Press, Oxford.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Sauvée, L.C. 2002. Efficiency, Effectiveness and the Design of Network Governance. 5th International Conference on Chain Management in Agribusiness and the Food Industry, Noordwijk an Zee, The Netherlands, June 7-8, 2002.

Schoemaker, P.J.H. and R. Amit. 1994. *Investment in Strategic Assets: Industry and Firm-Level Perspectives. Advances in Strategic Management*. P. Shrivastava, A. Huff and J. Dutton, (Eds). JAI Press.

Shelanski, H.A. and P.G. Klein. 1995. Empirical research in transaction cost economics: A review and assessment. *Journal of Law, Economics, and Organization* 11(2): 335-361.

Simatupang, T.M. and R. Sridharan. 2002. The Collaborative Supply Chain. *International Journal of Logistics Management* 13(1): 15-30.

Simon, H.A. 1957. *Models of man, social and rational: mathematical essays on rational human behavior in social settings*. John Wiley. New York.

Slater, G. and A.D. Spencer. 2000. The uncertainty foundation of transaction costs economics. *Journal of Economic Issues* 34 (1): 61–87.

Sriram, V., R. Krapfel and R.E. Spekman. 1992. Antecedents to buyer-seller collaboration: an analysis from the buyer's perspective. *Journal of Business Research* 25 (4): 303–320.

Thompson, J.D. 1967. *Organizations in action*. Mc Graw Hill.

Wade, M and J. Hulland. 2004. The Resource-Based View and Information Systems Research: Review, Extension, and Suggestions for Future Research. *MIS Quarterly* 28 (1): 107-142.

Walker, G. and D. Weber. 1987. Supplier competition, uncertainty, and make-or-buy decisions. *Academy of Management Journal* 30 (3): 589–596.

Williamson, O.E. 1987. Transaction cost economics: the comparative contracting perspective. *Journal of Economic Behavior & Organization*, 8 (4): 617-625.

Williamson, O.E. 1975. *Markets and Hierarchies, Analysis and Antitrust Implications: A Study in the Economics of Internal Organization*. Free Press. New York.

Williamson, O.E. 1979. Transaction Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics* 22: 233-62.

Williamson, O.E. 1985. *The governance of contractual relations, in the Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. Free Press. New York. 68–84.

Williamson, O.E. 1991. Comparative economic organization: the analysis of discrete structural alternatives. *Administrative Science Quarterly* 36 (2): 269–296.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Williamson, O.E. 1994. *Transaction cost economics and organization theory*. N.J. Smelser and R. Swedberg (Eds.). *The Handbook of Economic Sociology*, Princeton University Press. Princeton, N.J. 77-107.

Williamson, O.E. 1996. *The Mechanism of Governance*. Oxford University Press, New York, United States of America.

Williamson, O.E. 1998. The Institutions of Governance. *American Economic Review* 88: 75-79.

Williamson, O.E. 2000. The new institutional economics: Taking stock, looking ahead. *Journal of Economic Literature* 38 (3): 595-613.

Zajac, E.J. and C.P. Olsen. 1993. From transaction cost to transaction value analysis: implications for the study of inter-organizational strategies. *Journal of Management Studies* 30(1): 131-145.

Zigger, G.W. and J.H. Trienekens. 1999. Quality assurance in food and agribusiness supply chains: Developing successful partnerships. *International Journal of Production Economics* 60-61: 271-279.

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

Appendix 1.

Questionnaires to slaughterhouses (processing) companies in China's pork chain

Your Name: _____Your Title:_____

Contact Information：_____

Company's Name：_____Company Location:_____

Declarations：

1. The questionnaire is only for research purpose, the results to be generated will not be used for any business intention.
2. Please fulfill the questionnaire as objective as possible.
3. The score-value questions are evaluated with five-grade marking system
4. If you have any doubts about this survey, please don't hesitate to contact us

Thank you very much for taking time from your busy schedule to fulfill our questionnaire!

Department of Agricultural Economics, Polytechnic University of Madrid, Spain
Department of Economics and Management, Nanjing Agricultural University, China

[A] Basic information of your company

1. The main work you are responsible for your company is:

⑴ Sales/market ⑵ Purchasing ⑶ Logistics

⑷ Production/Operation ⑸ R&D ⑹ Others_____

2. The main business of your company is (are):

(1) Pig slaughtering (2) Pork processing (3) Both pig slaughtering and pork processing

3. The scale of pig production of your company is (annually):

⑴ 1-5 heads ⑵ 5-100 heads ⑶ 100-500 heads (4) more than 500 heads

4. The scale of pig slaughtering of your company is (annually)

(1) 1-50 heads (2) 50-1000 heads (3) 1000-5000 heads (4) 5000-10000 heads

(5)10000-50000 heads (6) 50000-100000 heads (7) 100000-200000 heads

(8) more than 200000 heads

[B]The relationship between your company and your upstream agent

1. In which way you do business with your biggest upstream supplier?

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

(1) Oral Contract (2) sign sales contract (3) sign producing and sales contract (4) upstream agent participate my company (5) I participate my upstream supplier (6) others _____

2. When you have to choose the upstream chain supplier, the main factors that you consider are: (please give an order to the following factors according to their importance, from high to low, in your opinion)

⑴ Quality ⑵ Production scale ⑶ Credit

(4) Producing experience

(5) Stable supply from the supplier ⑹ Low cost of the supplier

Order: _____

[C] Questions for scoring

- **Instructions for the score：**

Please give a score "*1 to 5*" to the following items according scales from "strongly disagree" to "strongly agree":

"1" means that you **strongly disagree** with the description that the item gives.

"2" means that you **disagree** with the description that the item gives.

"3" means that you **agree** with the description that the item gives **to some extent**.

"4" means that you **agree** with description that the item gives.

"5" means that you **strongly agree** with the description that the item gives.

- **Example:**

1. Regulations of the industry changes frequently

If you are strongly agree with the item "Regulations of the industry changes frequently" please choose "5"; agree, choose "4", agree to some extent, choose "3", disagree, choose "2", strongly disagree, choose "1".

All items go after this example.

- **Notes:**

"Cooperative partner" means your upstream chain agents which have any form of cooperative relationship (acquaintance, oral contract, formal contract, formal/informal cooperatives, joint venture, joint ownership, merger/acquisition etc.) with you.

If you don't have any cooperative relationship with any upstream agents, then it refers to up-stream chain agents that do business with you. "Both parts" means you and your cooperative partner

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

- **Transaction Cost**

1. It is very difficult to get information about the pig industry	1	2	3	4	5
2. It is very difficult find proper business partner (pig supplier)	1	2	3	4	5
3. It is very difficult to know the information about your cooperative partner	1	2	3	4	5
4. It is very difficult to exchange information with your cooperative partner	1	2	3	4	5
5. It is very difficult to get on an agreement with your cooperative partner	1	2	3	4	5
6. It is very difficult to agree on the conditions of the contract between you and your partner	1	2	3	4	5
7. It is very difficult for you to decide to sign the contract with your partner	1	2	3	4	5
8. It costs you a lot effort (time, fund, labour, etc.) to finally sign the contract	1	2	3	4	5
9. It is very difficult for you to monitor your partner	1	2	3	4	5
10. If your partner betrays the contract, you suffer great loss	1	2	3	4	5

- **Level of Integration**

1. Frequency of transactions between you and your cooperative partner is higher than that between you and a common upstream chain agent	1	2	3	4	5
2. Your most important business of your firm only happens with your cooperative partner	1	2	3	4	5
3. Both you and your cooperative partner rarely betray the contract	1	2	3	4	5
4. You and your cooperative partner have a long time of cooperation	1	2	3	4	5
5. Either you or your cooperative partner gives up your cooperative relationship easily	1	2	3	4	5

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

- **Uncertainty**

1. Regulations of the industry change frequently	1	2	3	4	5
2. Demand of the clients is uncertain	1	2	3	4	5
3. Competition among the counterparts is fierce	1	2	3	4	5
4. Technology of the whole industry changes fiercely	1	2	3	4	5
6. Your cooperative partner and you do not exchange business information well	1	2	3	4	5
7. Your cooperative partner is not reliable	1	2	3	4	5
8. Trust between you and your partner is not established for a long time	1	2	3	4	5

- **Asset Specificity**

1. If you switch to other products, you will lose a lot of investments in facilities and tools	1	2	3	4	5
2. If you switch to other products, you will lose a lot of investments in human resources	1	2	3	4	5
3. If you switch to new suppliers, you will lose a lot of investments in time and efforts in establishing relationship with your former key supplier	1	2	3	4	5
4. You invest a lot of time and effort in maintaining collaborating relationship with your most important suppliers	1	2	3	4	5

- **Collaboration Advantages**

1. Logistics between you and your cooperative partner will be ensure the products supply	1	2	3	4	5
2. When emergency happens, the logistics system will not be broken easily	1	2	3	4	5
3. Payment between you and your cooperative partner could be realized quickly	1	2	3	4	5
4. Cost of cash flow between you and your partner is lower than that between you and other partners	1	2	3	4	5
5. You and your partner can share information about cost, price, product safety, quality and quantity etc.	1	2	3	4	5

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

6. You and you partner could use the fastest and most convenient way to communicate	1	2	3	4	5
7. You and your partner can adopt the new technology of the industry quickly	1	2	3	4	5
8. You know how to change and improve technology adjusting the demand from your cooperative partner	1	2	3	4	5
9. You and your partner can collaborate to co-innovation	1	2	3	4	5
10. You and your cooperative partner can benefit from the co-innovation	1	2	3	4	5
11. You and your cooperative partner collaborate to adopt good quality management practices in the industry quickly	1	2	3	4	5
12. You and your cooperative partner jointly to establish good practices to ensure food safety	1	2	3	4	5
● **Willingness to Collaborate**					
1. You have great willingness to know your cooperative partner' s preference	1	2	3	4	5
2. You consider the mutual knowing as the basis of cooperation	1	2	3	4	5
3. You have great willingness to discover similarities and common interests between you and your cooperative partner	1	2	3	4	5
4. You have great willingness to make great effort to maximize the joint value between you and your cooperative partner	1	2	3	4	5
● **Capability to Collaborate**					
1. Between you and your cooperative partner, at least one has capital to enhance your collaboration	1	2	3	4	5
2. Between you and your partner, at least one holds key technology of the industry	1	2	3	4	5

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

3. Between you and your partner, at least one has strategic logistics systems	1	2	3	4	5
4. Between you and your cooperative partner, at least one has good business reputation	1	2	3	4	5
5. Between you and your cooperative partner, at least one has public appeal in the industry	1	2	3	4	5
6. Between you and your cooperative partner, at least one has good relationship and managerial skills	1	2	3	4	5

Appendix 2.

Reliability Analysis

1. Cronbach's α analysis for reliability of transaction cost

Code of item	Cronbach's α
SRC 1 SRC 2	0.703
INC 1 INC 2	0.786
BAC 1 BAC 2	0.793
DEC 1 DEC 2	0.744
MOC 1 MOC 2	0.846

2. Cronbach's α analysis for reliability of l level of integration

Code of item	Cronbach's α
IGS 1 IGS 2	0.776
SGS 1 SGS 2 SGS 3	0.915

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.

3. Cronbach's α analysis for reliability of uncertainty

Code of item	Cronbach's α
ENU 1 ENU 2 ENU 3 ENU 4	0.907
BHU 1 BHU 2 BHU 3	0.842

4.Cronbach's α analysis for reliability of asset specificity

Code of item	Cronbach's α
PAS 1 PAS 2	0.851
RAS 1 RAS 2	0.965

5. Cronbach's α analysis for reliability of collaboration advantages

Code of item	Cronbach's α
LGA 1 LGA 2	0.764
CRA 1 CRA 2	0.859
IEA 1 IEA 2	0.860
TEA 1 TEA 2	0.860
INA 1 INA 2	0.785
QMA 1 QMA 2	0.843

6. Cronbach's α analysis for reliability of willingness to collaborate

Code of item	Cronbach's α
WTK 1 WTK 2	0.884
WTE 1 WTE 2	0.792

7. Cronbach's α analysis for reliability of capability to collaborate

Code of item	Cronbach's α
TCC 1 TCC 2 TCC 3	0.902
ITCC 1 ITCC 1 ITCC 1	0.890

© 2012 International Food and Agribusiness Management Association (IFAMA). All rights reserved.