MECHANISMS OF GOVERNANCE IN SWINE SECTOR: THE CASE OF SOUTH REGION OF BRAZIL

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Abstract

Since the mid-80s, when the classic book of Oliver Williamson, Markets and Hierarchies, was published, the discussion of vertical integration reached the agenda of scholars in the fields of economics, managerial sciences, and sociology, among others. With the development of studies, in addition to these governance structures, extremely opposite, empirical evidence had shown that there were structures, called hybrid that combined features present in the open market and pure vertical integration. Furthermore, the evolution of studies in this area also allowed observing that many companies had adopted more than one governance structure to the same transaction. Despite the clear existence of this combination of mechanisms for various sectors as in automotive industry, agribusiness, among others, the reasons of this choice still generate questions. By observing the agribusiness system of pigs in South region of Brazil, were precisely these questions that led us to undertake the present work: why this region Brazilian processors adopt different governance mechanisms to ensure the supply of pigs for slaughter on your plants?

Key words: *swine supply chain; vertical integration; governance structure*

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1. Introduction

Brazil is the world's fourth largest producer of pork at 3.3 million metric tons (MMT) on a carcass weight basis in 2012, according to the Foreign Agricultural Service of USDA. In the past fifty years, the production of pork increased 2.9 million tons. According to Coser (2010), Brazilian production has potential to increase even more due to its large feed grains production capacity, favourable weather, water availability and the large territory for use of effluent. Taken into account that pork is the most consumed meat around the world and considering its demand tends to increase more and more, Brazilian pig production has attracted interest of foreign countries.

The growth of Brazilian hog production, in agreement with Coser (2010), was founded on technological innovation in health, genetics, nutrition and management areas. Furthermore, there was a significant change in the organization of the activity, in which production coordination through extra-market transactions (contracts and hierarchical structures) has been increased.

In Brazil, Bortolotti (2008) pointed out that transactions were governed by price mechanism (supply and demand law) until 1980s. Since then, more intense degree of governance was required due to the inflationary problems of instability and uncontrolled increase production. This intensification was sharper in 1990s, thanks to economic and social problems as the crisis in the sector, deregulation of markets, food security and the formation of economic blocs.

According to Garcia (2010), Concórdia Sadia S/A was the pioneer in implementing vertical integration system for hog supply in Brazil, which was subsequently adopted by other companies as Perdigao S/A, Seara and Ceval.

In a study conducted in 2003 by the Center for Advanced Studies in Applied Economics (Cepea / Esalq-USP) for the Food and Agriculture Organization (FAO), it was estimated that in the states of Rio Grande do Sul and Santa Catarina, 60% to 80% of the production became from integrated farms – this estimative was based on data from Swine Breeders Association of Rio Grande do Sul (ACSURS) in Rio Grande do Sul and from Center for Agricultural Planning and Socio-Economics (CEPA) in Santa Catarina. Regarding to Paraná state, the integration represented between 60% and 70% of the production – information based on Parana State Agricultural Federation (FAEP) data.

In the literature, studies have been conducted regarding governance structure in swine supply chain (Borges e Souza, 2012; Miele, 2012; Souza e Bánkuti, 2012; Bortolotti, 2008; Coser, 2010). Most of them use Transaction Cost Economics (TCE) framework as theoretical approach.

Considering the processor point of view, several reasons for integrating production are raised; however the question that still needs to be more explored is why firms still choose more than one mechanism of governance to drive the same transaction.

In this paper, we aim to identify why firms, more specifically processors, adopt plural forms of organization to supply their industrial plants with animals ready for slaughter. We intend to analyse on the industry point of view. To do this, some specific objectives were established: 1) Identify what governance structures are present in the swine supply chain of South region of Brazil; and 2) Identify what determines the choice of one governance structure rather than another, or the option to use more than one.

This paper is designed as follows. We begin with a brief background about Transaction Cost Economics and, further, a summary about plural forms theory is provided. Next, we present the principal characteristics of swine supply chain in Brazil and some particular characteristics of the supply chain in the South region of the country are given. The third section presents the methodology and the results of empirical case is presented and discussed on the fourth section. Final remarks is then provided.

2. Theoretical framework

2.1. Background: Transaction Cost Economics

Among many years, Industrial Organization was the mainstream of economic thought. According to Hayek (1933), economists from this orthodox line looked at economic system as being coordinated by price mechanism. In his paper, Hayek supported Mises (an Austrian economist) idea that the society was viewed as an organism by neoclassical economists – not an organization – in which every part performs a necessary function for the continuance of the whole, without any human mind having devised it.

In agreement with Farina, Azevedo and Saes (1997), the first institutionalism contributions emerged around 1930s. According to the authors, Commons' praiseworthy was the suggestion of taken the transaction as the unit of analysis. Knight was highlighted mainly to distinguish risk of uncertainty. And, regarding to Bernard and Hayek, though in different ways and with different objectives, introduced into the discussion the adaptation issue when economic system face changes in the economic environment.

In this period, the mainly contribution was given by Coase (1937). In his famous paper *"The Nature of the Firm"*, the author identified the firm as alternative form of organization instead of the open market. Furthermore, Coase sketched what would be the mainly assumption in Transaction Cost Economics: there is a cost of using the price mechanism.

> *"The main reason why it is profitable to establish a firm would seem to be that there is a cost of using the price mechanism"* (Coase, 1937).

The watershed between neoclassical theory and the Transaction Cost Economics approach was Oliver Williamson´s work, which was developed based on Coase´s insight about transaction costs. According to Williamson (1985), transaction costs would be distinguished as *ex ante* and *ex post* type: *ex ante* are the costs of drafting, negotiating, and safeguarding an agreement and, regarding to *ex post* costs, they can include the maladaptation costs, the haggling costs, the setup and running costs associated with the governance structures and the bonding costs of effecting secure commitments.

In agreement with Williamson (1985), Transaction Cost Economics was built upon two behavioral assumptions: bounded rationality and opportunism. According to Zylbersztajn (1995), Williamson identified three dimensions of transactions that affect the costs: 1) Frequency: is a measure of the recurrence that a transaction is effected and is important to determine the possibility of internalizing a particular stage of production without losing efficiency related to the scale; 2) Uncertainty: implies the addition of costs to transactions that occur through the market, encouraging the structuring of alternative forms of governance; and 3) Asset specificity: according to Azevedo (2000), the assets are specific if the return associated with them depends on the continuity of a specific transaction. According to the author, the higher the asset specificity, the greater the loss associated with an opportunistic action by another agent and, consequently, the higher the transaction costs.

These dimensions determine the governance structure adopted. According to Vinholis et al. (2012), Williamson identified three basic forms of coordinating transactions: 1) Spot market – where there is no effort made to repeat the relationship; 2) Hybrid forms – relationships based on trust, since the agents are inclined to establish and comply with their clauses, and defined according to asset specificity and the recurring nature of the transactions; and 3) Vertical integration or hierarchy – coordination necessary for regular transactions and in the presence of highly specific assets.

According to Ménard (2012), efforts for capturing the specificity of these arrangements within a coherent analytical framework remain underdeveloped. However, as pointed out by Parmigiani (2007), transaction cost economics views the governance choice as placed upon a continuum, with market and hierarchy as the anchors.

2.2. Plural Forms of Organization

In agreement with Bradach and Eccles (1989), discussions about the dichotomy of markets and hierarchies had been resting on the premise that they are mutually exclusive means to govern transactions when emerged the first contributions to plural forms of organization. According to Ménard (2012), it is only in the 1990s that empirical investigations as well as theoretical insights on non standard arrangements took off, and considerations on plural forms developed only at the margin of this literature.

Beyond plural forms, terms as concurrent sourcing (Parmigiani, 2007; Mols, 2009), permeable vertical architectures (Jacobides and Billinger, 2006) and plural governance (Heide, 2003), are also used to characterise when an organization selects simultaneously different ways to organize similar transactions.

There are numerous situations in which an integrated firm may choose a complex arrangement in which, beside its integrated activities, it develops activities transferred outside its perimeter (Ménard, 2012).

For some authors, plural forms is a transitory situation and the most efficient arrangement will be adopted by agents gradually. According to Ménard (2009), Williamson

(1975) considered hybrid forms as transitory, with a limited time span when operating in a competitive environment, a view he was to abandon later on.

On the other hand, some authors seem plural form as an effective solution when a synergy between two or more mechanisms of governance is necessary. According to Lewin e Solomons (1999), each form has its own reason to be used and both are required to the firm success.

According to Ménard (2012), plural forms can be applied upward or downward, in distribution. Most of studies in the literature analyse dual system in franchising. In production, the pioneering econometric study was about integration in the car making industry by Monteverde and Teece (1982a; 1982b).

3. Method

In this study it was adopted the exploratory investigation. According to Martins Junior (2011), this type of research aims to increase familiarity with the research problem and normally is the first step in a broader investigation. About the case study method, according to Yin (2010), is used in many situations – in exploratory, descriptive or explanatory research – given contributions to the knowledge about individual, group, organizational, social or political phenomenon.

Considering that this investigation aimed to understand why one processor choose use different governance forms to supply their plants with animals, people interviewed was the employees of this firms.

To get information, it was conducted a semi-structured questionnaire, applied to 12 enterprises – all of them under inspection of Federal Service (SIF) – in South region of Brazil in the beginning of second semester of 2013. Some of these processor have more than one industrial plants which, in turn, can be located in south region of Brazil or not.

South region of Brazil is the focus of analysis because its importance and tradition in hog production in the country. Regarding the quantity, in 2012, the Brazilian Institute of Geography and Statistics (IBGE) data shown that almost 50% of national herd (39,3 million heads) of pigs are were located in the South. Considering only the industrial production, this concentration is even more significant. Furthermore, pig production in Brazil has its origins in the South, culture brought by immigrants in colonization period.

4. Empirical evidence

Agents, Product and the Transaction

This part aims to characterize the swine supply chain in South region of Brazil, as a result of interviews. Just to clarify, we are analysing the transaction that takes place between hog producers and processors in swine supply chain. In agreement with Zylbersztajn (1995), a standard agribusiness system consists of typical transactions, which can be seen in Figure 1. Considering this model, in this paper, we focus on “T2”, which means the transaction between agriculture and livestock segment and food and fiber industry segment.

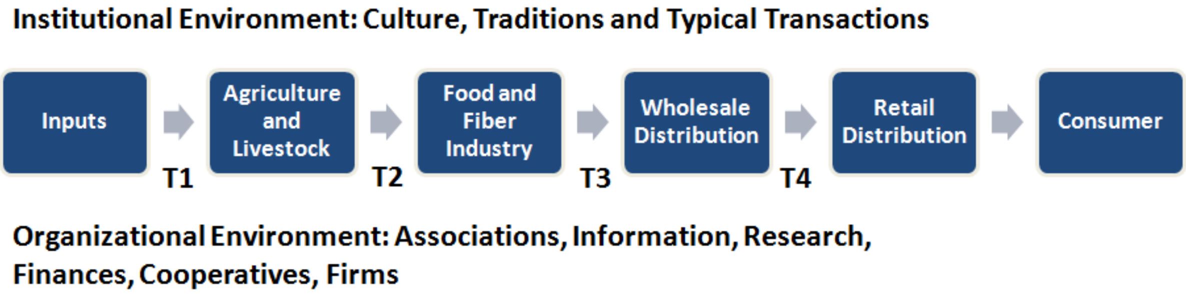

Figure 1 – Agribusiness System and Typical Transactions
Source: Adapted from Zylbersztajn (1995)

Before focusing on transaction *per se*, it is important to clarify some aspects about the production and the profile of the agents involved in this transaction.

Inside the farm gate, hog production can be divided basically in three parts: 1) breeding (from farrow to weaning piglets), rearing (from weaning piglets to rearing piglets) and fattening (until the ideal slaughter weight). There are specialised weaning piglet producers, specialised rearing piglet producers, producers who have weaning piglet production with piglet rearing and specialised fattening producers. Likewise, there are producers who breed the piglet throughout the whole cycle.

Particularly in South region of Brazil, large proportion of producers is specialised especially producers under what agents of the sector called integration – after, a better discussion about terms used by agents will be provided.

According to the information gathered during the investigation, is common to find producers who have weaning piglet production with piglet rearing and specialised fattening producers. However, the tendency is to divide the producers into specialised weaning piglet producers and specialised rearing piglet producers.

Although the objective of this paper is to analyse the transaction between processors and their hog ready to slaughter suppliers, it is important to highlight that industries or cooperatives can also trade with piglet suppliers – for example, in case of specialised fattening producers under integration, the integrator is responsible buy or produce piglets to provide for them.

For a while, we are focus on producers who supply the processors with animals ready for slaughter to standardize the unit of analysis. This restriction was adopted because, in agreement with Ménard (2012), when the discussion is about plural forms of organization, the analysis involves *"different organizations using different mechanisms regulating basically the same type of transaction"*. As result of the interviews, the schema in Figure 2 shows possible relationships between agents involved in the analysed transaction.

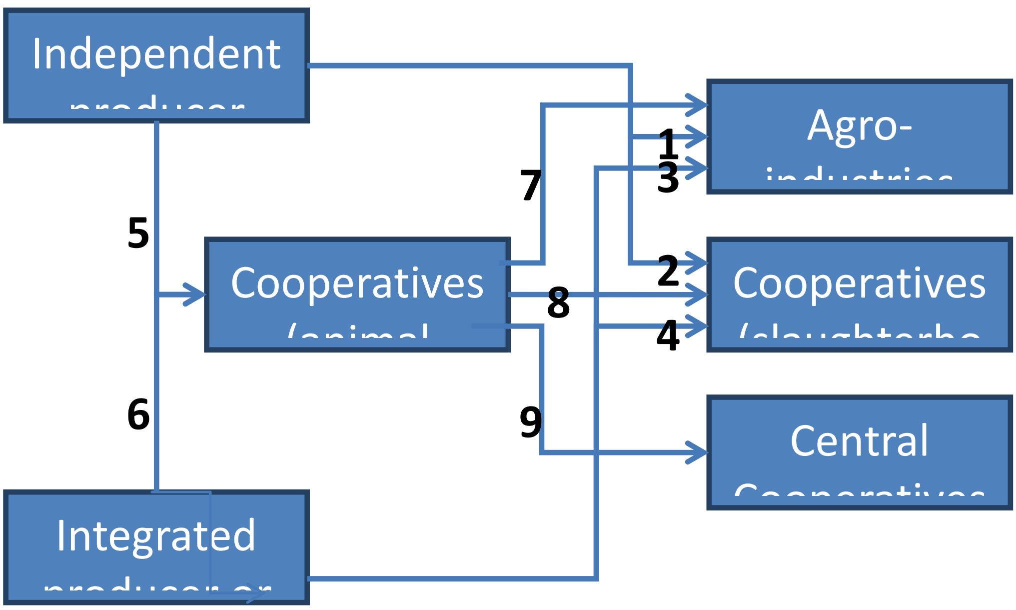

Figure 2. Agents involved on hog´s transaction in South swine supply chain.
Source: Elaborated by authors

Looking in a slaughterhouse perspective, they can supply their plant in different ways. Some companies has their own production, which characterizes the pure vertical integration. But, the most important governance structure in the South is a long-term contract in which the companies provides piglets, ration, veterinary products and technical assistance to the producer, as well as the transportation of animals. In this case, the producer is responsible basically for the farm structure and labor. This kind of transaction allows the industry controls almost every aspect of the quality of production, as well as quantity of animals that will be delivered.

Another way to guarantee the quantity of animals is establish a partnership with independent producers, in which the producer undertakes to deliver an amount of hogs to processor. Normally the quantity is defined per month, but the deliver can be weekly. This agreement between producer and processor can be established in a contract or just be verbal (informal). In this case, the industry can even guarantee part of your supply, mainly when the agreement is under contract, however, in this case, the uncertainty about the quality increases.

To guarantee some aspects of the product, especially regarding sanitary rules, the producer needs to provide a certificate to the industry called "Boletim Sanitário de Acompanhamento de Lotes de Suínos", signed by the veterinarian responsible for the production and the producer. However, according to interviewees, the certain is not the same as when the industry provide the nutrition and healthy inputs to the production and also monitors the production at the farm.

Last but not least, abattoirs can buy hogs on the open market, when the price is driven supply and demand foundations. Also in this case, the producer needs to provide a certificate that guarantees the sanitary quality of the herd.

Instead of transacting directly with the industry, it is also possible establish the same kind of transactions described earlier with cooperatives of production. The cooperative can have their own production, establish a contract, a partnership or depending on the market conditions, even buy hog from independent producers.

Then, this cooperative of production supplies their slaughterhouse individually. Or, in some cases, there is a central cooperative which is supplied by three or more cooperatives of production. To summarise the options of governance structure and the role of each agent in the transaction, Table 1 is provided.

Table 1 – Role of animal producers and agro-industries/cooperatives from South region of Brazil in which kind of relationships between them.

	Producer´s role	Agro-industry/Cooperative role
Spot Market	Producer is responsible for all aspects involving the production. There is no guarantee of sell animals.	Agro-industry/cooperative buys animals when necessary. There is no guarantee of supply. The price is established according to supply and demand conditions.
Informal Partnership (without contract)	As in the spot market, producer is responsible for all aspects of production. However, producer guarantees their sell through a verbal (informal) agreement with industry.	Agro-industry/cooperative is not involved in the animal production. Supply of a certain number of animals is guaranteed through a verbal (informal) agreement with producer.
Formal Partnership (with contract)	Producer is responsible for all aspects of production. Producer guarantees their sell through a contract (formal) with industry.	Agro-industry/cooperative is not involved in the animal production. Supply of a certain number of animals is guaranteed through a contract (formal) with producer.
Long-term Contracts	Producer has a contract of supply with the industry. Producer receives piglets, ration, veterinary products and technical assistance from the integrator. Entire production is destined to the industry (guarantee of sell)	Agro-industry/cooperative provides piglets, ration, veterinary products and technical assistance to the producer, as well as the transportation of animals. Guarantee of supply and control of production.
Vertical Integration	The farm is owned by the industry and receives all that are necessary to the animal production. Entire production is destined to the industry.	Agro-industry/cooperative provides everything required to the animal production. Guarantee of supply and control of production.

Source: Elaborated by authors

In case of cooperatives, long-term contracts seem to be more common in this transaction (hogs ready to slaughter). In analysing transactions of agro-industries, long-term contracts are also very used, but participation of other types of transactions is higher. Vertical integration is not common in case of fattening phase. According to interviewees, this form of governance is used more in the piglet production, in which the investment is higher and the production needs more careful.

Variables that influences the choice of governance structure

In case of pure vertical integration, as said earlier, the reason of adoption is related especially to investments and technical aspects. The asset specificity is higher and, to achieve superior level of efficiency and effectiveness, more production control is required.

Contracts in which the agro-industry or cooperative provide the inputs of production and the producer is responsible for farm structure and labour, is more common in that region. As already shown, specialization of pig production in the South of Brazil has increased and, in this case, hog to slaughter supplier only fattening animals, activity that require low investments by the animals are not so susceptible to technical problems as in the farrowing and nursery phases. Then, a closed control as in pure vertical integration is not required, this form of governance is sufficient to guarantee the quality, quantity and traceability.

Traceability was the mainly issue highlighted by interviewees. Contract establishment allows not only the control of production, but also the information about this. This point is very important taken into account the huge impact of international sales in domestic market. Although exports do not account for a major share of production (Almost 20% of pork produced in the country), they have a great effect on the domestic market. If shipments decrease, prices in the Brazilian market normally drop because internal market does not absorb very large increases in supply.

One of the obstacles in Brazilian swine supply chain is the low level of consumption of national population. Still pork is the world's most consumed meat, in Brazil, pork consumption comes after broiler and beef. The *per capita* consumption is still far below the

European and Asian levels. In 2012, according to Abipecs (Brazilian Pork Industry and Exporter Association), the *per capita* consumption in Brazil reached 14.9 kilos.

Choose partnerships as the governance structure normally aims to guarantee the hog supply in terms of quantity. This allows having economies of scale. According to the interviewees, meat originated from these animals normally is designed to domestic market and, in a smaller proportion, to international market. This is because broader buyers, especially those who buy more national meat, are normally very demanding and establish a set of rules to import Brazilian pork. Noteworthy that this does not mean that Brazilian consumer are not demanding.

There are also reasons to buy animals on the spot market; however it is not common in the South region of Brazil. A point raised by one interviewee is that, in face of market prices instability, is very difficult to independent producer from this region survive without any agreement or contract with the industry that guarantee the sell. Indeed, when the demand for meat is not satisfactory, the buyer just slaughter their animals or the production under contract while the independent producer has to deal with very low prices.

We described what motivates the adoption of each governance form. Although one or another predominates, the fact is that the same company normally adopts different governance structures to govern their transactions. Regarding the reasons to use plural forms of organization, interviewees pointed out the uncertainty of demand and different levels of specificity.

About the demand, exports are influenced mainly by the exchange rate and non-tariff barriers. For example, in 2011, Russia – who was the destiny of 50% of Brazilian pork exported – prohibited imports from Brazil and the meat had to be relocated domestically, jeopardizing the sales prices in the country (in a industry point of view).

Regarding domestic demand, the preference of Brazilian people is still for beef and broiler, considering *per capita* consumption. This scenario influences pork market, depending on the conditions of income and price that the consumer is faced. Furthermore, to fresh meat, seasonality of demand throughout the year is high, which makes the alignment with the supply even more difficult.

The level of specificity reflects the level of buyer's requirement, broadly speaking. Integrated production is preferably designed to most demanding buyers, but also serves those who do not have very high level of requirements. However, when the meat origins were not controlled by the industry, final product is not designed to the most demanding costumers.

5. FINAL REMARKS

This paper was a description of how transactions between hog producer and slaughterhouses occur in the South region of Brazil. But this is the first step to a broader study about swine supply chain in the country.

Regarding results presented, it became clear that, given the conditions in the industry, vertical integration or adoption of hybrid governance mechanisms is essential for the sector. However, the uncertainty of demand limits the supply chain coordination.

The question that emerged is if this scenario (adoption of various forms of governance by the firm) is just a moment of transition and companies tend to adopt only vertical integration or long-term contracts as in Brazilian poultry supply chain. Or, this scenario represents the best strategy to industries in swine sector?

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