

**“Uncertainty as a key decision factor: evidence from the interaction between farmers and processors in the frozen vegetable agribusiness in Argentina”**

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**Abstract**

Consumer trends in developed countries are evolving in a variety of ways and one of the fastest growing sectors is that of the frozen vegetables. The objective of this paper is to analyze the interactions between farmers and processors that operate in the frozen vegetable agribusiness in Argentina, so as to identify the reasons for the various institutional arrangements that appear. As it usually happens in an incipient business, several scales of production and governance structures tend to exist and a decisive factor towards understanding the companies' choices of institutional arrangements to govern the farmer-processor transaction is the perception of uncertainty.

**Key words: institutional arrangements, decision factors, transaction attributes.**

**1. Introduction**

The increase and sophistication in food demand driven by an increasing population with increasing income and the questions raised about the ability to supply that demand have become a central theme of discussion over the past decade.

Consumer trends in developed countries are evolving in a variety of ways, although if these trends were to be grouped, the major drivers would be: a) economy; b) convenience; c) health and nutrition and d) food security. Responding to these trends, one of the fastest growing sectors is that of the frozen vegetables, with European and North American countries being the largest per capita consumers of these products in the world. In Europe, for the first time in history, the consumption of frozen vegetables, at 3.6 million tons, has surpassed that of canned vegetables (Pierce, 2011). Meanwhile, the US and Canada consume together about 2.6 million tons of frozen vegetables.

Although the European and North American markets are growing at rates of about 8% yearly, this growth rate is achieving maturity, with some countries already at about 19 kg/capita. Latin America, along with South and Southeast Asia are two areas where frozen food consumption in general is expected to grow fast over the next years (FAO), so the overall outlook for these products shows an increasing demand which not only responds to sophistication, but also to the need for convenience and health and nutrition (if correctly processed, frozen vegetables contain higher concentrations of nutrients than fresh vegetables).

Per Capita frozen vegetable consumption in Argentina is still very far from European and North American standards at about 350 grams per year. This is comparable to Brazil's consumption at 180 grams per year, although Chile consumes over 4 kg of frozen vegetables yearly, more than 10 times Argentina's consumption. Another important aspect of argentine consumption of

frozen vegetables is the uneven distribution of the products consumed: spinach takes up 33% of the share, while vegetable mixes take 18%, peas 13%, corn 11%, green beans 9%, broccoli 6%, chard 5% and all the other vegetables make up for the remaining 5%. The top four products make up for 75% of total frozen vegetable production. Imports (from the United States, the Netherlands and Spain) accounted for about 130 tons during 2010. Exports during the same period amounted to 160 tons for a FOB value of about 200,000 US dollars (with peas and sweet corn being the most important products).

Argentina is in a unique position to produce food and other agricultural and stock products because of its comparative and competitive advantages, but frozen vegetable production is still an incipient business, with a current production of approximately 16,000 tons per year and no more than five companies operating and still some produce being imported. This has been an increasingly difficult task as Argentina's indices in trade balance have shown signs of decreasing. Responding to that, import legislation was changed and trade controls in Argentina have been lately on the rise since. It currently takes a lot of time and bureaucracy to be allowed by the government to import certain items, and food products are a clear example.

The availability of raw material (vegetables) for processing appears to be limitless for the current scale of the business. So why is it that the companies that operate in it have such diverse institutional arrangements when it comes to procuring vegetables? A reason could be that they have very different backgrounds, ranging from food product multinationals, which have a portfolio of products, to small and medium family-owned enterprises that have freezing products as their sole business. Despite an apparently abundant supply of raw material, the procurement strategy for each company appears to vary, not only because of their scale and core businesses, but also due to each company's background, path dependence and perception of uncertainty.

## **2. Objective of the study**

Given the fact that the raw materials needed are, in fact, specialties, and that the procurement of that raw material is a key element, understanding how companies govern that transaction is the heart of this paper. Therefore, the objective of this paper is to analyze the various interactions between farmers and processors that operate in the frozen vegetable agribusiness in Argentina, so as to identify the reasons for the various institutional arrangements that appear.

## **3. Theoretical framework**

The theoretical frameworks applied in this study will be those of the Theory of Dynamic Capabilities and New Institutional Economics. These frameworks are useful when analyzing the mechanisms of choice and the characterization of governance structures and business designs. The framework developed by Williamson (1985) makes it possible to analyze the choice of a governance structure based on the degree of transaction cost associated with a particular transaction. It is proposed that firms establish the best governance structure and the limits to the firm itself in order to economize on transaction costs, considering uncertainty, asset specificity and transaction frequency.

Institutional arrangements (IA) as proposed by Menard (1996) are a detailed approach to the governance structures. Menard's proposition follows Williamson's efficiency idea based on the alignment of transaction attributes, taking into account two proposed limitations to the interaction of the agents: bounded rationality and opportunism. Bounded rationality is of key importance because it assumes the impossibility to draw up complete contracts. This concept proposed by Simon (1957) brings the idea that in decision-making, the rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make a decision. It was proposed as an alternative basis for the mathematical modelling of decision making, as used in economics and related disciplines; it complements rationality as optimization, which views decision-making as a fully rational process of finding an optimal choice given the information available. Added to this, human opportunism causes differences to be harder to renegotiate and contractual breach could be an incentive to capture an advantage over the counterpart. But, once opportunism does happen, ex-post renegotiation becomes of key importance. This creates an environment in which contracts have an impossibility of being complete because the agents that draw them up have these insurmountable behavioural limitations.

The choice of an Institutional Arrangement must consider incentive and control levels needed to organize production. Market arrangements appear to be simpler and faster. However, the discipline to perform the deal depends on the existence of potential substitutes. As the specificity of the asset and uncertainty increase, market is unable to offer many potential substitutes and hence, a different type of arrangement is needed. As necessity of control increases, firms choose contractual arrangements because enforcement is possible by litigation threat. If this mechanism is not efficient or very expensive, firms may internalize the activities to apply Fiat power to organize production. In this case, firms choose hierarchy arrangements motivated by better control, at cost of lower incentive than market arrangements. When transaction frequency is high, firms have incentives to internalize sequential contracts, then, hierarchy arrangements may take place.

This paper will also take into account the recent literature on complex organizations. The idea is to bring to light the relevance of relational contracts, and from that concept to explore the application of the concept of the "firm as a contract of society" as introduced by Grandori (2009) into this analysis. This concept also connects to the approach of measurement costs as proposed by Barzel (1997).

To analyze Dynamic Capabilities, the framework applied will be the one proposed by Teece et al. (1997), which is based on processes and routines, positioning and path dependence. Regarding processes, it is considered that firms develop competitive advantages by management and organization, for instance, by non replicable work culture. Regarding positioning, firms can create advantages by special business know-how, reputation and relationship development. Path dependence analysis consists on recovering the origin of the firm to identify capabilities that were developed through years, it is important because they cannot be bought in the market. Capabilities are created inside firms, based on their past and personal relationship and developed through time.

A summary of the theoretical framework, concepts and authors utilized in this paper follow in Table 1.

**Table 1. Summary of the theoretical framework, concepts and authors used.**

Theoretical Framework	Concepts	Authors
<b>New Institutional Economics</b>	<ul style="list-style-type: none"> <li>- Transaction cost</li> <li>- Transaction attributes</li> <li>- Bounded rationality</li> <li>- Opportunism</li> <li>- Governance structure</li> <li>- Institutional arrangement</li> </ul>	<ul style="list-style-type: none"> <li>- Ménard</li> <li>- Ordóñez</li> <li>- Simon</li> <li>- Williamson</li> <li>- Zylbersztajn</li> </ul>
<b>Theory of Dynamic Capabilities</b>	<ul style="list-style-type: none"> <li>- Competitive advantages</li> <li>- Processes and routines</li> <li>- Path dependence</li> </ul>	<ul style="list-style-type: none"> <li>- Teece et al.</li> </ul>

**Source: own production.**

#### **4. Methodology**

The research that will be undertaken has all the characteristics that would justify the application of a case study method. The investigation problem needs to be contextualized and detailed to make possible inferences and to identify answers to the addressed research questions. This study also presents other requisite indicated by Yin (1994), which is the existence of previous literature to orientate the investigation process.

Three cases will be studied, with all three companies being important players in the frozen vegetable market in Argentina, but with different backgrounds and different core businesses which generate different strategies. Case selection was based on both qualitative and quantitative parameters. Companies were not randomly identified; the selection process was based on choosing three companies that operate in Argentina and which have different business strategies in terms of branding and target market, but also have different strategies in the origination process (how they obtain their feedstock/raw material). Several criteria were taken into account such as production scale, owner profile, geographical position and path dependence since those companies entered the business. Three companies were selected: (1) Company A is one of the largest food product companies in Argentina, owner of several important brands; (2) Company B is another large food product company which has been bought by a Brazilian company and is currently re-structuring its business strategies; (3) Company C is a traditionally commodity-producing company which is diversifying its production and has recently entered the frozen vegetable market.

Data collection will be made by personal interviews with companies' managers, owners and/or directors. During these interviews the objective will be to obtain the information necessary to identify the governance structures and business models used by each company, as well as the reasons for choosing said models.

Data will then be analyzed taking into account the nature of the transaction and how each company governs it. The contractual arrangements used by each company to govern that transaction will be studied within the framework of New Institutional Economics and the

Theory of Dynamic Capabilities in order to attempt to understand why each contractual arrangement is chosen.

## **5. Multiple case study: procurement strategies in three companies**

Researched cases were organized in sequential parts. A brief historical description of each company, contributes to understand decision logic particularities. The institutional arrangements are identified and characterized to identify which of them survived and the ones that were extinguished through time, according to Dynamic Capabilities. Characteristics of transaction attributes follow Transaction Cost framework. Final part of each case study presents the IA choice criteria and the reasons that lead to the establishment of multiple IA.

### **a. Company A**

Company A is one of the largest food product companies in Argentina, owner of several important brands. It was founded at the beginning of the 20th century as a milling company and purchased by its current owners at the end of the same century as a full-fledged food company with facilities all over the country. After this change in ownership, the company's portfolio was restructured and the company currently has several products and brands, ranging along the whole food system. It is important to state that despite having their own agricultural division, in which they produce major commodities such as soy, wheat or maize, the company has a long-standing tradition of developing contractual relations with farmers in order to obtain their raw material.

The company started producing frozen vegetables as part of its frozen foods division (their primary production consisted of chicken nuggets and other breaded meat and vegetable products). Today they produce frozen chard, peas, broccoli, chopped onion, green beans, corn, spinach, and two vegetable mixes. They have the number one brand in Argentina for these products capturing around 50% of the retail market share. Most of the vegetables are frozen at their own facilities (with some imports covering the remainder) and the packing is done near the largest market, Buenos Aires Metropolitan Area (where roughly 12 million people live).

Vegetables for freezing are obtained through formal contracts with local farmers in which quality parameters and agricultural practices are standardized to supply a homogeneous product. Due to the fact that the specificity of the product is very high and so is the frequency, reducing the uncertainty becomes a key element in order to reduce transaction costs. As Williamson states, the market would appear not to be a suitable option to govern this transaction and so, either contracts or vertical integration become the possible alternatives. Another key element to assess is the volume of produce needed (about 4,500 tons just for retail): the costs of either purchasing or renting the land required, plus the management causes capital immobilization to be high. Thus, it becomes critical to generate a bond of confidence with farmers in order to guarantee a constant flow of the required products with the required quality in order to reduce uncertainty at a lower capital cost than vertically integrating production. Contract farming is thus a key element for the procurement process of

this company and so, building a relation of reciprocal trust between farmers and processor is unavoidable to sustain the business relationship in the long run.

#### **b. Company B**

Company B is a food product company, bought by a Brazilian meat packing group 4 years ago. They used to specialize in beef products, particularly on hamburgers, but have recently acquired the frozen vegetables division from another traditional Argentine food company, which was restructuring its portfolio of products and regarded this division as surplus, as it was not ready to make the investments needed to modernize the plant.

In this way, and thanks to the purchase of said division, this company was able to enter the market immediately, with a completed learning curve and with established brands, producing chard, peas, broccoli, green beans, corn, spinach, and garden vegetable mix under two brands. Despite this, the facilities they purchased are already quite a few years old, and thus the technology employed is not the most advanced, in fact, benchmarking it against the other leading companies' technologies, it could be considered obsolete.

Company B had its own frozen vegetable division prior to this purchase but relied on importing and contract processing (or à façon processing, where a company owning the freezing facilities would produce this company's products). Currently, having their own freezing facility, they do not require contract processing, but they still do import some products in particular, similarly to what happens with company A.

Since the company was not acquiring raw material for freezing before the acquisition of the company, they do not have a trajectory in that particular field. Nevertheless, with the purchase of the plant, they decided to carry on with the model that the previous owners had for procuring vegetables, i. e. contracts with local farmers near the freezing plant located in the centre of the country, near the most important commercial port. Hence, the company's current institutional arrangements are similar to those of company A's but the way in which they got to that point differs. Another difference is that contracts between farmers and Company B are not as quality-oriented as those between farmers and Company A. The cause for this is probably determined by the fact that Company A's brands are regarded as top quality and Company B's brands are more oriented to delivering low prices. Of course this will generate differences between the particularities of a contract (institutional arrangement) that two similar farmers may have with each company, as one has strong incentives and penalties for quality while the other is more lax. Company B is currently one of the followers in terms of domestic market share.

#### **c. Company C**

Company C started its overall activities in 1992. Primarily an agricultural production company, they have always sought to add value to their production through further processing their main products (agricultural goods). Early in its history, they have focused on the production of corn and sunflower hybrid seeds for third parties whose markets are in the northern hemisphere. It is a major producer of counter-season corn seeds. Nowadays, and as a result of mergers of international companies, most of the production aims to the internal market,

subsequently exported by local representatives. After some years, vegetable oil production (soy and sunflower crushing) and egg production were incorporated as main activities vertically integrating all operations. In 2009 and continuing with a vertical integration process, the company has built a vegetable oil refinery.

The company currently operates on roughly 20 thousand hectares (about 50 thousand acres), in the provinces of Buenos Aires, Chaco, Santa Fe and Santiago del Estero. Out of this area, 3,000 hectares (7,500 acres) are under irrigation with central pivot systems in the province of Buenos Aires.

The company finished their freezing facilities located approximately 50 km (about 30 miles) north of the city of Buenos Aires in 2007. This company started out procuring vegetables under various governance structures that varied from hierarchy to market. After two unsuccessful years, where own production underachieved due to agronomical maladjustments and several contracts were broken due to the opportunism of farmers based on spiking food prices, the firm chose to abandon most of its contract farming. Already in 2010, just three years after its entrance into the business, the procurement strategy had varied considerably: in 2007 own production amounted to about 40% of total vegetable processed, while in 2010 this figure grew to 75%, mostly capturing what contracts used to provide (down from 40% in 2007 to 15% in 2010). Market purchases also went down from 20% to 10% during the same time frame. Currently, the firm produces all of the pea, sweet corn, green beans and broccoli and most of the spinach and chard. Carrots, pumpkins and cauliflowers are procured via contracts with farmers located within a 30 km (20 miles) radius as well as some of the spinach and chard. Market purchases are made up of mostly peppers and onions and some opportunity items (mostly due to seasonality), such as berries.

An important fact about this company is its marketing strategy: it does not market its goods in the domestic market under an own brand. Rather, it produces frozen vegetables for other companies which do not produce themselves (mostly supermarkets which seek to have their own brand, but also other companies in the market such as company B) and it focuses strongly on the export and food service markets.

## **6. Results**

As expected, the companies show different governance structures and institutional arrangements depending on the product, but also on the path dependence and consequential dynamic capabilities of each company.

Company A shows a very high use of contractual arrangements. It has several brands, which make up almost 50% of retail sales of these products. Naturally, it requires a product standard to maintain that share and to that effect, it draws up contracts with producers in which there are incentives, penalties and controls over the raw material that is delivered. The history of the company, since its beginnings as a milling company (frequent interaction with farmers) and the possibility to reduce capital and land immobilization without increasing uncertainty explains the reluctance of this company to integrate itself towards farming and so, depends heavily on contracts with farmers to procure their raw material. This has not changed since the frozen

vegetable division was created, which is a sign that they have been able to establish a relation of trust with their suppliers, which appears to be durable.

Company B's situation used to be that of a heavy reliance on market in comparison to company A. This was logical taking into account that its products are usually regarded as second quality brands. Product specificity is not as high as in company A and thus, in certain products, it appeared to be "cheaper" to go to the market than to establish a formal contract. Currently, the acquisition of a freezing facility would appear to rebuff the previous statements. Nevertheless, the logic here is that Company B has decided to boost its participation in the frozen vegetable market and hence, has decided to change its strategy. In order to gain market share in the local market it needs to compete in costs with the leader (Company A) and it cannot do that by outsourcing freezing (à façon production) or by relying heavily on imports, and so, they had to start doing their own processing. An advantage to this is that they have cold storage capacity due to their meat packing facilities and this is one of the main bottlenecks and a source for escalating production costs. Company B altered its governance structure because it altered its whole strategy.

Company C developed a somewhat rare procurement strategy. First off, its core business is different than the other companies: its target markets are the export and food service markets and it also produces for other brands which do not have own production. Another key factor is that the company was originally focused on farming and then, adding value to that production. As a highly integrated company, it produces much of its own feedstock. Contracts are also present but to a lesser degree than in the other companies. Company C changed its procurement strategy from being diversified to mostly integrated. The impact of contracts in procuring has decreased due to many breaches in contracts during 2008 but also due to the company's dynamic capabilities and path dependence: they have been farmers since the beginning, and when the opportunism of the supplying farmers appeared, they decided to go back and do it themselves. It could definitely be considered as a reduction in transaction costs with the downside of having to increase capital and land immobilization to do so.

## **7. Conclusions**

As it usually happens in an incipient business, several scales of production and governance structures tend to exist. This is the case of the frozen vegetable sector in Argentina: the three analyzed companies use different institutional arrangements not only because they have different core businesses, but also because the companies' capabilities and histories are very different and path dependence is expected to matter when designing business models.

It is highly likely that companies will also show multiple-coordination as a strategy in order to take advantage of the better of each arrangement. As it happens, all of the companies do "a little bit of everything" when it comes to procuring vegetables for freezing.

Nevertheless, a decisive factor towards understanding the companies' choices of institutional arrangements to govern the farmer-processor transaction has to be the perception of uncertainty as experienced by the decision makers in each case. At similar levels of asset specificity and frequency, uncertainty has to be a commanding factor in the explanation of the variability.

In order to achieve a quality end product, one which complies with quality and nutritional standards, two elements are indispensable: raw material that complies with the required standards and adequate processing of said raw material. The latter is easily standardized, but that is not the case of the former.

When discussing vegetables for freezing, it must be taken into account that we are dealing with a highly specialized product in terms of easily and cheaply measurable attributes, such as nutrients and ethylene levels, colour, shape, density and others. What becomes not easily measurable is whether that product will arrive at the time, in the quantity and at the price that was established in the planning of a certain procurement strategy.

This is where uncertainty and its perception by the agents participating in a business come into play. It has been established along the paper that, when considering the farmer-processor transaction, all three companies faced similar a scenario. One in which the attributes of the transaction in question show that there is a highly specific asset in play and were frequency is also high (a single farmer may deliver several different products at different times of the year). Observing that the procurement strategies varied between firms, when asset specificity and frequency are similar, then the cause for differentiation must certainly be uncertainty. Moreover, as uncertainty depends on information and as we know, no one agent in any economic system holds the ability to obtain all information (which is asymmetric and incomplete) and process it due to its bounded rationality, then uncertainty as such is reduced to a perception, that is, how one agent perceives the degree and nature of uncertainty.

The path dependence and dynamic capabilities of each company and the people who make the decisions within them shape the decisions to come. The perception of uncertainty is based on those attributes and all three companies went down different roads, making different decisions acting on their perceived nature and degree of uncertainty. This is the reason why companies A and B rely more on contracts to procure vegetables, while company C has chosen to further its vertical integration. Both are effective ways of reducing uncertainty and thus, transaction costs, although the fixed and variable costs associated with those choices can differ significantly.

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