

# Networks in Argentine agriculture: a multiple-case study approach

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## RESUMO

### Redes na agricultura argentina: um estudo de caso múltiplo

A Argentina está entre os quatro maiores produtores de soja, girassol, milho e trigo, entre outros produtos agrícolas. As mudanças institucionais e políticas na década de 1990 incentivaram o desenvolvimento da agricultura na Argentina e na introdução de inovações de produtos e tecnologias (plantio direto, aumento do uso de agrotóxicos, transgênicos, GPS) e novos investimentos em plantas de *crushing* em soja e girassol. Além de mudanças tecnológicas, uma **revolução silenciosa** ocorreu na produção agrícola: de uma agricultura de autoprodução ou propriedade para uma agricultura com base no contrato. O objetivo neste trabalho é explorar e descrever o surgimento de redes no setor de produção agrícola na Argentina. São apresentados e descritos quatro casos que, atualmente, constituem cerca de 50% do plantio total de grãos na Argentina: forma híbrida informal, *trust*, estrutura orientada para o investidor, e rede de redes. Em todos os casos, abordam-se as formas híbridas envolvendo um grupo de atores unidos por objetivos comuns, principalmente para aumentar a produção em escala, compartilhar recursos e melhorar a rentabilidade. Essas formas de organização são altamente flexíveis e mostram grande capacidade de adaptação aos desafios, além de serem competitivas, porque têm incentivos alinhados, flexibilidade e adaptabilidade.

**Palavras-chave:** contratos, formas híbridas, rede de redes, colaboração interfirma, relações.

## 1. INTRODUCTION

Due to natural resource endowments and continuous productivity gains, Argentina is in a unique position to produce food, agricultural, and livestock

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products. Perhaps not surprisingly Argentina is one of the leading producers and exporters of agrifood products. Argentina is among the four largest producers of soybeans, sunflower seeds, corn, and wheat; is also the world's 5<sup>th</sup> largest exporter of wheat, the 2<sup>nd</sup> largest exporter of corn, the 3<sup>rd</sup> largest exporter of sunflower seed and soybean, and the number one exporter of sunflower and soybean oils and pellets. For the past 20 years, the agrifood sector has been a fundamental engine of economic growth as the main generator of export and tax revenues in Argentina.

Traditionally, farming took place in small and medium sized family farms, using mostly their own land, labour, credits, and agricultural machinery (CHADDAD *et al.*, 2009). Producers owned enough equipment to cope with all required activities of the production season. In some specific cases, services were contracted for machinery with a higher specificity level in relation to the area worked by the producer, such as harvesting services. The scale of production was limited to land property, and so were productivity and revenues.

In the 1990s the Argentine economy was open to globalization, free market rules were adopted, and state-owned companies were privatized. Hyperinflation was finally kept under control with the implementation of the currency board that linked the local peso to the US dollar. As a result of these policy changes, the 1990s were a decade of economic stability and growth based on the convertibility rule (one peso-one dollar). These institutional and policy changes fostered the development of Argentine agriculture and the introduction of innovative process and product technologies, including no-till cropping systems, fertilizers, agrochemicals, genetically modified soybean seeds, precision agriculture systems (with the use of GPS), and new investments in modern, large-scale sunflower and soybean processing plants (ORDÓÑEZ and NICHOLS, 2003).

In addition to these technological changes, a **quiet revolution** occurred in the way agricultural production was carried out and organized: from self-production (or ownership) agriculture (using own lands) to an agriculture based on contracts and organizational relationships. These **institutional arrangements** were service contracts, land rental contracts, harvesting contracts, future markets contracts, and insurance contracts, among others. The agricultural production sector increasingly shifted to a large-scale business model, and farming expanded by using third-party lands in order to increase production while using the same capacity (fixed costs).

As production areas expanded, it became impractical for farmers to move their own machinery around. Agents then arose for local suppliers of sowing services, crop-spraying, harvesting, and pest control at the new production sites. In other words, producers started to outsource to service providers activities that were previously **vertically integrated**. A new business model emerged to develop large-scale, high technology agriculture through contractual arrangements among

different actors participating in agricultural production and commercialization.

Producers developed complex organizational arrangements and business relationships involving contractors, producers, suppliers, processors, exporters, banks, and individual investors (some with no previous experience in the farming sector). These **hybrid** arrangements – that are neither markets nor hierarchies – provided the institutional framework necessary to reduce transaction costs and build trust among agents, such that contracts and exchange could continue to occur in a highly uncertain institutional and international environment. Nowadays unofficial sources estimate that about 50% of total agricultural production in Argentina is carried out by these hybrid organizational forms.

The objective of this paper is to explore and describe the emergence of new organizational forms in the Argentine crop production sector. Specific objectives are: to explain why these organizational forms emerged, and to describe their evolution and governance structure.

The paper is organized as follows. Chapter 2 describes the theoretical framework and the methodology used. Chapter 3 identifies the main institutional changes and the impact they had on the organization of farming and agribusiness in general. Chapter 4 describes the organizational forms using the netchain approach (LAZZARINI, CHADDAD, and COOK, 2001). Finally, conclusions and possible trends in the Argentine agricultural organizational environment are described.

## 2. THEORETICAL FRAMEWORK AND PROCEDURES

### 2.1. Theoretical framework

In order to describe hybrid arrangements in the Argentine agricultural sector the paper introduces Transaction Cost Economics (COASE, 1937; KLEIN, CRAWFORD, and ALCHIAN, 1978; WILLIAMSON, 1979 and 1985) and organizational interdependence (THOMPSON, 1967; LAZZARINI, CHADDAD, and COOK, 2001; MÉNARD, 2004) theoretical frameworks.

The Transaction Cost theory introduced by Coase (1937) has become a standard framework for the study of organizations. Coase (1937) introduced the notion that firms and markets are alternative “institutional arrangements” to govern transactions. In particular, he posited that the firm supersedes the market when the transaction costs of internal organization are relatively lower than in the market. In this sense, firm boundaries depend not only on technology, but also on organizational considerations; that is, on the costs and benefits of various organizational alternatives. Building on Coase's original insight, the Transaction Cost approach emphasizes that vertical coordination can be an efficient means of protecting relationship-specific investments or mitigating other potential

conflicts under incomplete contracting (KLEIN, CRAWFORD, and ALCHIAN, 1978; WILLIAMSON, 1979). Williamson (1991, p.271) suggests that:

“each viable form of governance – market, hybrid, and hierarchy – is defined by a **syndrome of attributes** that bear a supporting relation to one another”.

Williamson (1991) concedes that Transaction Cost Economics has focused on the study of polar forms (markets and hierarchies) at the expense of hybrids. Additionally, the relative costs and competencies of alternative modes of governance have received less attention than the attributes of the transaction – frequency, uncertainty, and specific assets. He posits that each generic form of governance is supported by a different form of contract law; and that there are crucial differences between markets, hybrids, and hierarchies in how they adapt to changing circumstances and in the use of incentive and administrative control instruments. Transaction Cost Economics argues that hybrid arrangements emerge as a result of characteristics of the transaction, named “attributes of transactions” (WILLIAMSON, 1991).

In the Transaction Cost perspective, markets and hierarchies are considered polar modes of governance, while:

“the hybrid mode displays intermediate values in all four features”. In particular, the hybrid form is characterized by “semi-strong incentives, an intermediate degree of administrative apparatus, displays semi-strong adaptations of both kinds and works out of semi-legalistic contract law regime” (WILLIAMSON, 1991, p.281).

Building on this view, Ménard (2004) distils a large and amorphous literature on hybrid arrangements including networks, supply chains, franchise agreements, partnerships, and cooperatives. He identifies three common features or “regularities” of such “strange forms”: pooling, contracting, and competing. Ménard’s (2004) central proposition is that hybrid organizations form a “specific class” of governance structures, combining contractual agreements and administrative entities or “authorities” with the purpose of coordinating partners’ efforts to generate rents from mutual dependence while controlling for the risks of opportunism. The role of contracts in hybrid arrangements is crucial in coordinating partners, avoiding uncertainties, respecting property rights, and sharing quasi rents.

Contracts achieve these purposes by selecting partners; determining the duration of the relationship; specifying quantity and quality requirements; laying out procedures for regulating renegotiations when ex post adaptation is required; and specifying rules for distributing the expected gains from joint actions. Because contracts are unavoidably incomplete, the stability and continuity of hybrid arrangements require “specific mechanisms

designed for coordinating activities, organizing transactions, and solving disputes”. According to Ménard (2004, p.366), a core element in the architecture of hybrid organizations is the presence of private governments (or authorities) that “pair the autonomy of partners with the transfer of subclasses of decisions to a distinct entity in charge of coordinating their action”. These authorities vary in degree of formalization and centralization of decision making, ranging from trust to formal government.

The netchain approach, in turn, provides a complementary framework to analyzing inter-firm collaboration in hybrid forms (LAZZARINI, CHADDAD, and COOK, 2001). The netchain approach integrates supply chain analysis (SCA) and network analysis (NA) by recognizing that complex inter-organizational settings embody several types of interdependencies, which are associated with distinct **sources of value** – that is, strategic variables yielding economic rents – and **coordination mechanisms** involved in inter-organizational collaboration. Three core sources of value in SCA are identified: optimization of production and operations, reduction of transaction costs, and appropriation of property rights. On the other hand, three core sources of value are emphasized in NA: social structure, learning, and network externalities.

SCA has focused on sequential interdependencies, whereas NA has primarily dealt with either pooled or reciprocal interdependencies (see Figure 1). Thompson (1967) suggests that each type of interdependence should be handled with particular coordination modes. These coordination modes include standardization, plan, and mutual adjustment. SCA focuses on coordination mechanisms involving some sort of plan or discretionary managerial action, which according to Thompson (1967) corresponds to sequential interdependence. NA, in turn, emphasizes either standardization or mutual adjustments, which are appropriate coordination mechanisms to deal with pooled and reciprocal interdependencies respectively. The netchain analysis integrates SCA and NA by considering **simultaneously** all types of interdependencies that occur in a given inter-organizational setting. In the present research, both theoretical approaches – Transaction Cost Economics and netchain analysis – will inform the analysis of hybrid arrangements in the Argentine crop production sector.

## 2.2. Procedures: the case study approach

The description of hybrid arrangements in Argentine agriculture is based on a multiple case study methodology (YIN, 1994; STERNS, SCHWEIKHARDT, and PETERSON, 1998). Four different hybrid arrangements in the Argentine grain production sector were identified during the period 1990-2010: informal hybrid forms; an agricultural trust fund (known as *fideicomiso*) which has both producers and outside investors as partners; an investor-oriented corporate structure; and a large network of networks (many private nodes in relation with other private nodes including landowners, agronomists,

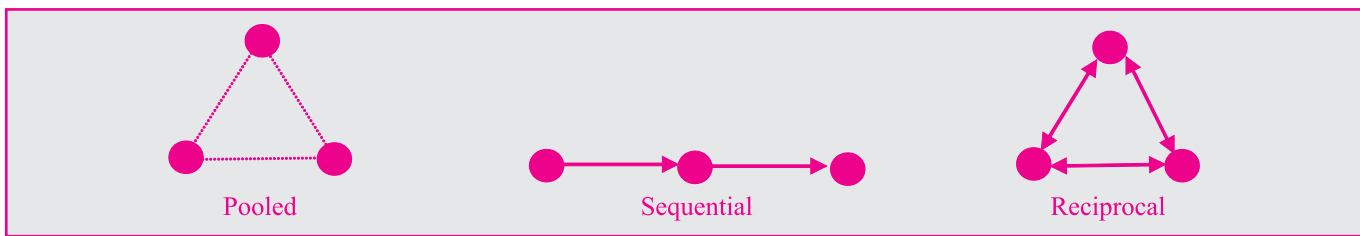


Figure 1: Representation of Types of Interdependence

Source: Lazzarini, Chaddad, and Cook (2001).

branch managers, contractors, and service providers). Each case is analyzed identifying the social structure, evolution, average productive area, share of information, financial sources, frequency of transaction, level of organizational uncertainty, level of trust/reputation, formality, incentives and control, and specific assets involved (see Figure 2).

The information needed to describe the organizational architecture of the four hybrid forms was obtained by means of personal e-mail interviews (conducted in March 2010), using a standardized questionnaire with closed-ended questions. A total of 8 experts and CEOs representing the four identified hybrid forms were interviewed. The data collection instrument included general information questions regarding the develop-

ment of new organizational forms in Argentina and specific questions regarding coordination and control mechanisms used in each hybrid structure. The identities of the organizations and the respondents shall be kept confidential.

### 3. AGRICULTURE IN ARGENTINA

Over the past 20 years, important transformations have taken place in Argentine agriculture at the institutional, organizational, and technological levels. As explained in the introduction, during the 1990s the country adopted a neo-liberal system, reducing trade barriers and privatizing state-owned companies. Convertibility (one peso = one dollar) provided a

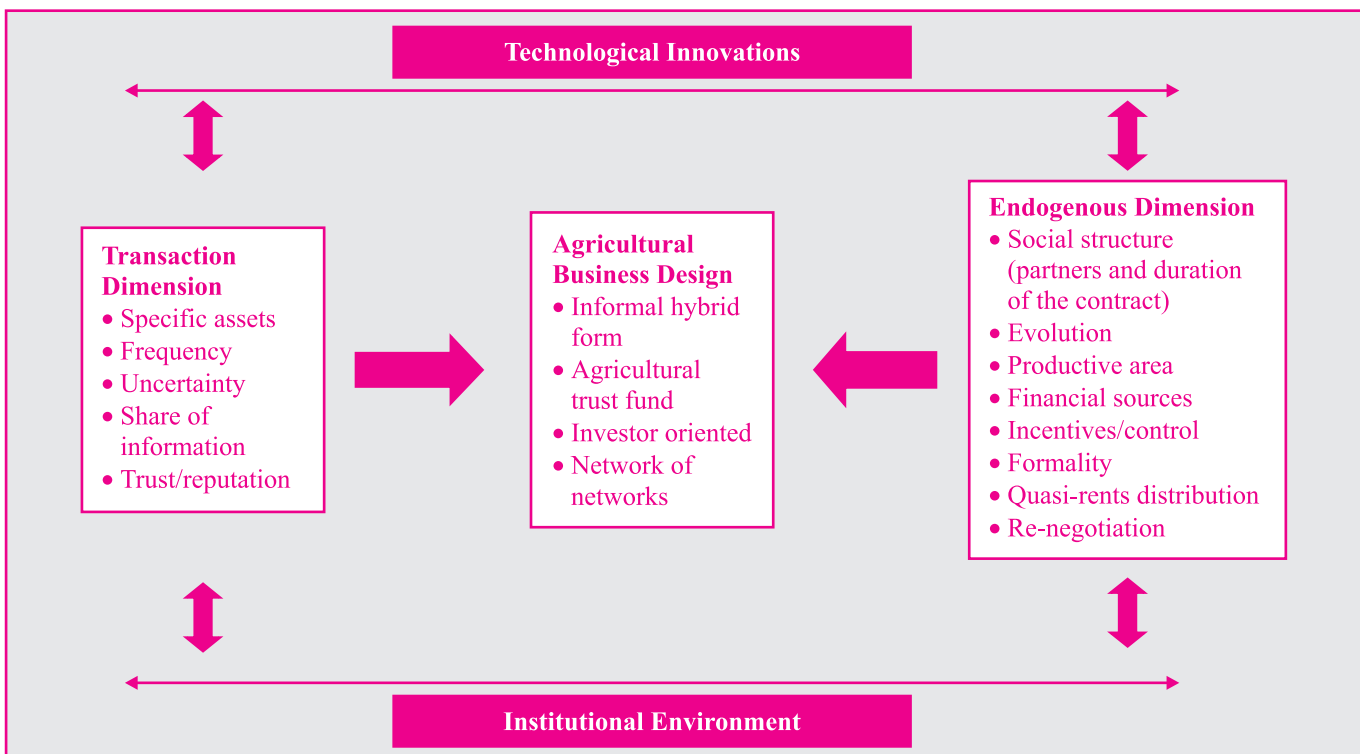


Figure 2: Procedures Scheme

higher level of security to investments, especially in agribusiness. Moreover, privatization of ports, railways, oil companies, energy facilities, communication systems, highways and road systems, along with increased private investments, reduced costs of doing business. Export taxes and import tariffs on agrifood products were significantly reduced or eliminated. As a result, distortions between domestic and international prices were significantly reduced.

As a result of these institutional innovations, Argentine farmers introduced new technologies (machinery, seeds, agrochemicals, etc.) and better administration and management of their business, resulting in a more competitive way of farming, which led to:

- a 57% growth in planted area of the 4 major commodities – soybean, sunflower, wheat, and corn – from 14.5 million hectares in 1992 to 22.7 million hectares in 2000;
- a 64% increase in production of these 4 major crops, from 35.5 million tons in 1992 to 58.3 million tons in 2000.

The competitiveness of the Argentine agrifood sector, however, was seriously jeopardized by a series of macroeconomic crises and institutional shocks starting in December 2001. Negative collective action, rent-seeking behaviour, and contractual hold-ups became the norm, with continuous confrontations among different interest groups trying to become winners in **zero-sum** games. Neither planted area nor crop production increased significantly until 2004.

Because economic agents did not trust the currency or the banking system, they were **forced** to develop new organizational and financial structures to decrease transaction costs, enforce property rights, and thereby encourage the normal economic activities of buying, selling, saving, and investing that are necessary to generate growth and jobs. This was precisely the case in the Argentine agricultural sector: producers developed more complex organizational arrangements and business relationships involving contractors, producers, suppliers, processors, exporters, and individual investors (some with no previous experience in the sector). These “institutional arrangements” provided the institutional framework necessary to expand agriculture to other regions (in Argentina and Latin America), reduce transaction costs, and build trust

among agents. In addition, they were fundamental in allowing outside investors to provide capital to agricultural production and processing ventures, which in turn were facing binding financial constraints.

In this context of great institutional uncertainty and high transaction costs, and with growing demand for agricultural and food products on a global level, hybrid governance structures enabled Argentina to maintain and grow its leading position in the global agrifood system. The results are:

- a 32% increase in the planted area of the 4 major crops – soybean, sunflower, wheat, and corn – from 22.7 million hectares in 2000 to 30 million hectares in 2010;
- and a 65% growth in production of the 4 major products from 58.3 million tons in 2000 to 96 million tons in 2010.

In summary, planted area increased 106.8% while crop production grew 170.4% in the 1992-2010 period (see Table 1).

#### 4. HYBRID FORMS IN AGRICULTURE

##### 4.1. Introduction

Traditionally, farming took place on small and medium sized family farms, using mostly their own land, labour, and agricultural machinery. Producers owned enough equipment to cope with all farming activities during the season; this type of operation was known as “administration agriculture” (*agricultura por administración*). In some specific cases, services were contracted for machinery with a higher specificity level in relation to the area worked by the producer, such as harvesting services. A **sequential type of interdependence** describes this type of coordination mechanism.

By the 1990s, however, with the introduction of new technologies and increased agricultural productivity, the agricultural commodity sector increasingly shifted to a large-scale business model. As a result, farming expanded to third-party lands in different regions of the country. As the productive areas expanded a result of regional and crop diversification, it became impractical to move machinery around. Agents needed local suppliers of sowing services, crop-spraying, harvesting, and pest control at the new production sites.

Table 1

#### Planted Area and Production of Four Major Crops in Argentina (1992-2010)

	1992	2000	2010	% Growth (1992-2010)
Planted area (in million hectares)	14.5	22.7	30.0	106.8%
Production (in million metric tons)	35.5	58.3	96.0	170.4%

Source: Ministry of Agriculture Data.

“Outsourcing became a solution for some and an opportunity for others. Production started to structure around a group of service companies organized through more or less formal contracts” (TRUCCO, 2008).

The new business model consisted of developing large-scale and high-technology agriculture through arrangements (contracts) among different actors that participate in agricultural production and commercialization. The experts surveyed state that this has been an emergent process, based on the technological innovations mentioned before. There were no leaders to promote these organizational forms, although many professionals sought to link knowledge to service and capital. Perhaps the most primitive form of hybrid agricultural organization was an informal hybrid arrangement. However, starting with the 2002 economic crisis, other actors were incorporated into more formal hybrid arrangements, including external investors, both through banks and individually. The most highly evolved hybrid form is the network of networks, in which different actors come together, based on formal and informal contracts, but showing strong bilateral dependency and shared objectives.

#### 4.2. Informal hybrid forms

Informal hybrid forms were the first organizational innovation to arise, at the end of the 1980s. They basically consist of contractual relations, mainly informal (verbal), in which the producers participate in a number of contracts for services related to grain and oilseed production (land leases, production

inputs, sowing services, weed and insect control, harvesting, marketing, and storage) (see Figure 3). The business in general is designed to improve the profitability of the actor responsible for the investment and coordination (as a result of increased scale of operations).

Sometimes producers coordinate planting on their own land with the leasing of additional hectares based on the use of contractors’ services or their own machinery. In other cases it is a service provider who develops contracts with landowners to take advantage of their structure and minimize their fixed costs per unit of planted area (in this case, the contractor becomes a producer, not only a service provider). Contractual forms among the different participants vary in the way the contract is settled: fixed cash payments in advance or at the time of the harvest, or payments based on a percentage of production (i.e. crop share).

According to the surveys conducted, the cases of this type of hybrid form involve production areas that range from 3,000 to 10,000 hectares, some of which are the property of those who work the land (from 20% to 30%) and some leased (fixed cash rent and crop share). These cases are not geographically restricted to any particular production region.

The transaction dimension and the endogenous dimension of this organizational design are presented in the following tables. Regarding the transaction dimension (Table 2), the specific asset involved in the transaction is the local know-how (contacts, technological know-how, etc.). The transaction frequency is medium between producers and land owner, dependent on market price and trust; between the producer and input suppliers the frequency is high, due to the suppliers’ reputation

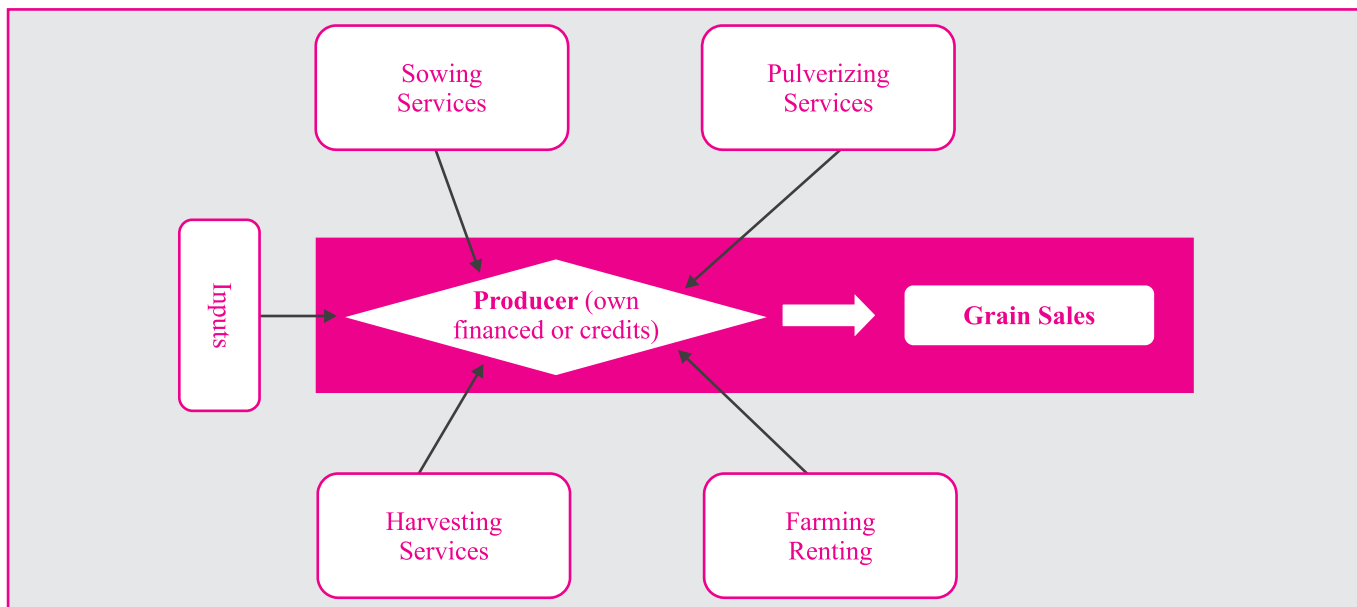


Figure 3: Informal Hybrid Forms

Table 2

Transaction Dimension for Informal Hybrid Form

Transaction Dimension				
Specific Assets	Frequency	Uncertainty	Information Sharing	Trust/ Reputation
Productive and local know-how	Producer-land owner: medium (depends on market price and trust)	Medium: informal contracts; <i>ex post</i> transaction costs	Low (individual investments)	Not very important
	Producer / input suppliers: high (credits, just in time)			

and producers’ need for credits. Uncertainty is medium, due to the informal nature of the contracts. There is little sharing of information, and trust/reputation is not very important.

Regarding the endogenous dimension (Table 3), there is one coordinator and different partners in the social structure; generally actors use owned capital and input suppliers credits, and the incentives and control are long-term contracts and practices that respect land sustainability. Other characteristics of the endogenous dimension are mentioned above.

The interfirm collaboration type may be characterized as sequential inasmuch as the coordinators of this hybrid form organizes the different activities and transactions based on a specific activity that involves sowing their own land or that of third parties, and later the harvest and marketing of the production (according to LAZZARINI, CHADDAD, and COOK, 2001). This form of organization is the one with the lowest level of specific investments (regarding the relationship itself) and the one that can be most easily dismantled in case the national and/or international conditions should not be favourable for agricultural production.

4.3. Agricultural trust fund (*fideicomiso*)

A *fideicomiso* is a contractual-legal figure enforced by Law 24,441/95. There are two types of *fideicomisos*: financial (issue

of participation securities to gain access to the capital market), and common or non-financial (private contracts between parties). The *fideicomiso* must necessarily involve a controller, a role often performed by the banks in conjunction with lawyers. This type of organizational form arises from the need to finance production growth of agricultural organizations with venture capital and external investors (mainly since the 2002 crisis).

Figure 4 shows a typical agricultural trust fund. Basically, there is an investor and a group of actors, linked to an investment capital receiver (the coordinator of the organization). There is, in turn, a third party (generally banks) that guarantees that the coordinator’s obligations are fulfilled unquestionably. As for the purchase of input supplies – such as equipment, seeds, fertilizers, and agricultural chemicals – estimates are requested and purchasing is done on a quality/price basis, always authorized by the third party. Most farm work and land leasing is carried out by means of contracts between service providers or owners and the coordinator. This type of hybrid form is not geographically restricted to any particular production region in Argentina.

In short, a hybrid organization of several actors is formed with the object of carrying out an agricultural activity in which each actor performs a specific function based on a mandate established by the trust fund, receiving in exchange a percentage of the business profits or a fixed amount per service rendered

Table 3

Endogenous Dimension for Informal Hybrid Form

Endogenous Dimension				
Social Structure	Evolution	Productive Area	Financial Sources	Incentives & Control
One coordinator and different partners	Started by the end of 1980s.	3,000 to 10,000 hectares	Owned capital and input suppliers	Long-term contracts (with land owners) because of performance
	Most common organizational design			Land sustainability safeguards

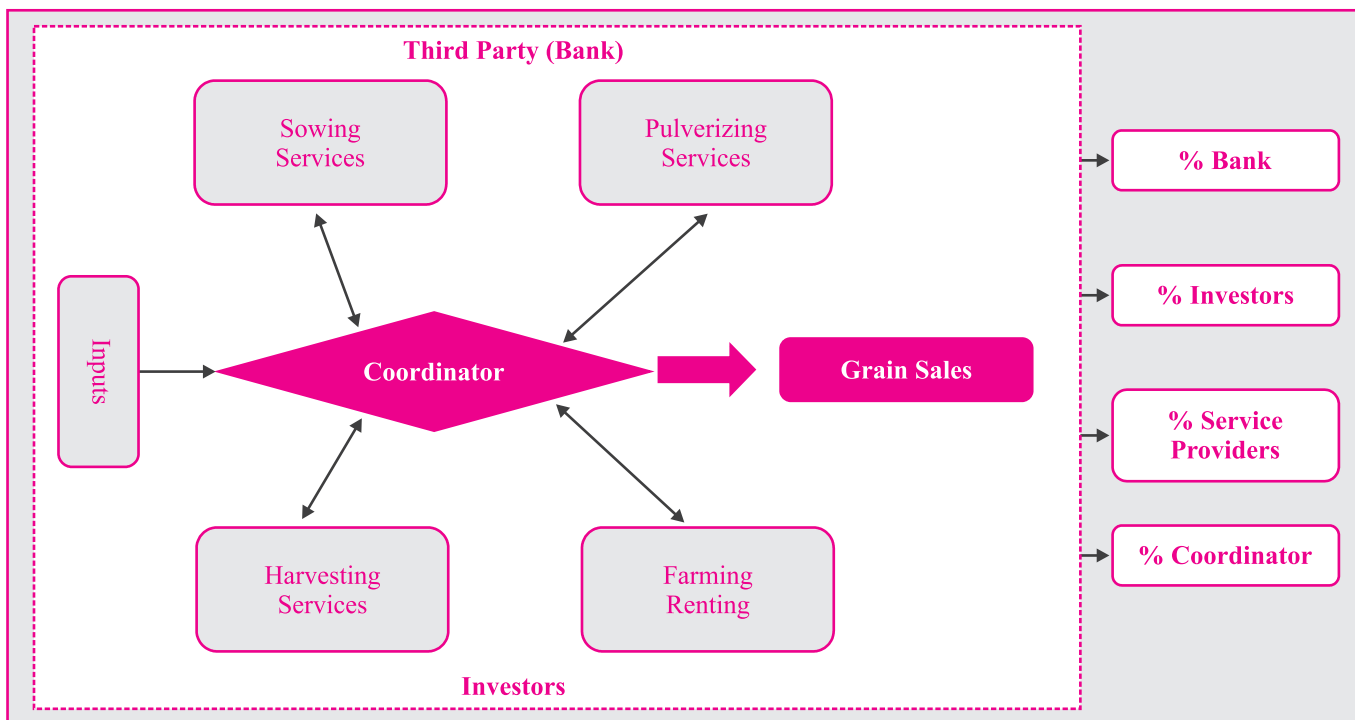


Figure 4: Agricultural Trust Fund Organization

or property (e.g., agricultural machinery or farm) leased to the trust fund. This type of contract is in general short-lived, since it is generally set up to develop one agricultural cycle, or up to 3 seasons. This is mainly due to the short-term horizon of investors that are willing to participate in this type of arrangement.

The transaction dimension and the endogenous dimension of this organizational design are presented in the Tables 4 and 5. Regarding the transaction dimension, there is a low level of specific assets involved from the point of view of fixed capital, but a medium level from the point of view of business know-how. The transaction frequency is low due to the short term contracts. Uncertainty is low, due to bank and law enforcement. The sharing of information is high due to the importance of transparency for investors. Trust/reputation should be high because reputation gives the providers the possibility of being part of the organization.

Regarding the endogenous dimension, the formal character of the social structure is very important and decisions should be pre-informed and approved. This hybrid form generally uses rented land. They appeared during the economic crisis of 2002, but now are less frequent. Each fund is typically 5,000 to 10,000 hectares. Regarding financial sources, the trust fund has financial agreements with banks and investors. The incentives are high and all the activities should be controlled by the bank.

This type of hybrid form could be described as a pooled interfirm collaboration, since each individual within the group makes a clearly defined and differentiated contribution to a

definite task (according to LAZZARINI, CHADDAD, and COOK, 2001).

#### 4.4. Investor-oriented corporate structure

The investor-oriented corporate structure model is a way to organize agricultural production using capital funds from several partners. Although often associated with common investment funds, investor-oriented corporate structures appear more private, between producing parties and investing parties. Starting with increased technological intensification and production area expansion, the different actors have to secure their own financing for productive processes from independent investors. They began during the 1990s, planting large areas in the pampas region (Buenos Aires, Santa Fe, and Córdoba). Once the production processes became more efficient and technology made it possible to reach other less stable productive areas, they moved to other regions in the northeast and west of the country.

The investor-oriented corporate structure appears to be a more flexible organizational form since contractual forms may be highly varied. Investors may receive one fixed percentage-based payment at the end of the harvest, agreed upon before sowing, or they may participate in the future risks and benefits of the business, as a residual claimant of the system once the production has been harvested and marketed. This second option is the less frequent, since it involves a higher degree of trust among the parties and, very often, accounting and admini-



Table 4

*Transaction Dimension for Agricultural Trust Fund*

Transaction Dimension				
Specific Assets	Frequency	Uncertainty	Information Sharing	Trust/Reputation
Low from the point of view of fixed capital	Low: short-lived contracts (one- -three years)	Low (bank/law enforcement)	High, due to the importance of transparency for investors	High: reputation gives to providers the possibility of being part of the organization
Medium from the point of view of business know-how (contacts, contracts, administration, logistics etc.)				

Table 5

*Endogenous Dimension for Agricultural Trust Fund*

Endogenous Dimension				
Social Structure	Evolution	Productive Area	Financial Sources	Incentives & Control
Formal	Since 2002, increased rapidly.	5,000 to 10,000 hectares	Financial agreements with banks	High: actors are willing to participate
Decision-making acquires greater transparency	Nowadays, due to institutional hazards, they are less common.			All activities are controlled by the bank
In general with rented land				

nistrative audits. In the first case, the investor already knows how much money will be received at the end of the season, independently of production and commodity prices. In general, contracts are short-term, based on the agricultural season or year in which the investment is made.

As can be observed in Figure 5, either the producer or the coordinator of the system – often not a landowner – coordinates contracts among different service and input suppliers and tenants. Production inputs and costs are mostly paid with external investor capital in order to obtain better prices by paying cash for large input volume. Regarding land leases, these coordinators in general choose to pay cash in advance to the owners of the land, because of growing competition with similar hybrid forms in the same production area.

Sometimes the coordinator will sell grain to pay the investor the promised profit; often the contractors receive part of their payment as a crop share. The coordinator’s profit equals the difference between the income, on the one hand, and the production costs (inputs, services, land leasing) and investor’s participation on the other. In some cases, coordinators themselves invest their own capital (money, machinery, and/or land) in the system. Due to the openness involved in this type of contracts, coordinators are obliged to show great transparency and share information with investors.

The transaction dimension and the endogenous dimension of this organizational design are presented in Tables 6 and 7. In the transaction dimension (Table 6), there is a medium level of specific assets from the point of view of business know-how (contacts, contracts, administration, logistics, etc.). The transaction frequency is low with the investors (generally short term contracts, one season), but is high with service and inputs providers. Uncertainty is low, due to reputation and trust (local actors). The share of information is high since transparency is important for investors. Finally, trust/reputation is very important for coordinators in obtaining the money.

Regarding the endogenous dimension (Table 7), the social structure is informal with service and inputs providers but tends to be formal (higher security) for investors. This hybrid form began in the 1990s, mainly in the Pampas region, but expanded to other agricultural regions. It generally involves areas between 10,000 and 100,000 hectares depending on the number of outside investors. A high level of incentives is very important for the structure, since all participants must fulfil the agreement.

It should be noted that each particular actor carries their investments individually based on the service performed for the trust fund. In some cases there may exist collective investments, especially when an organization starts gaining ground

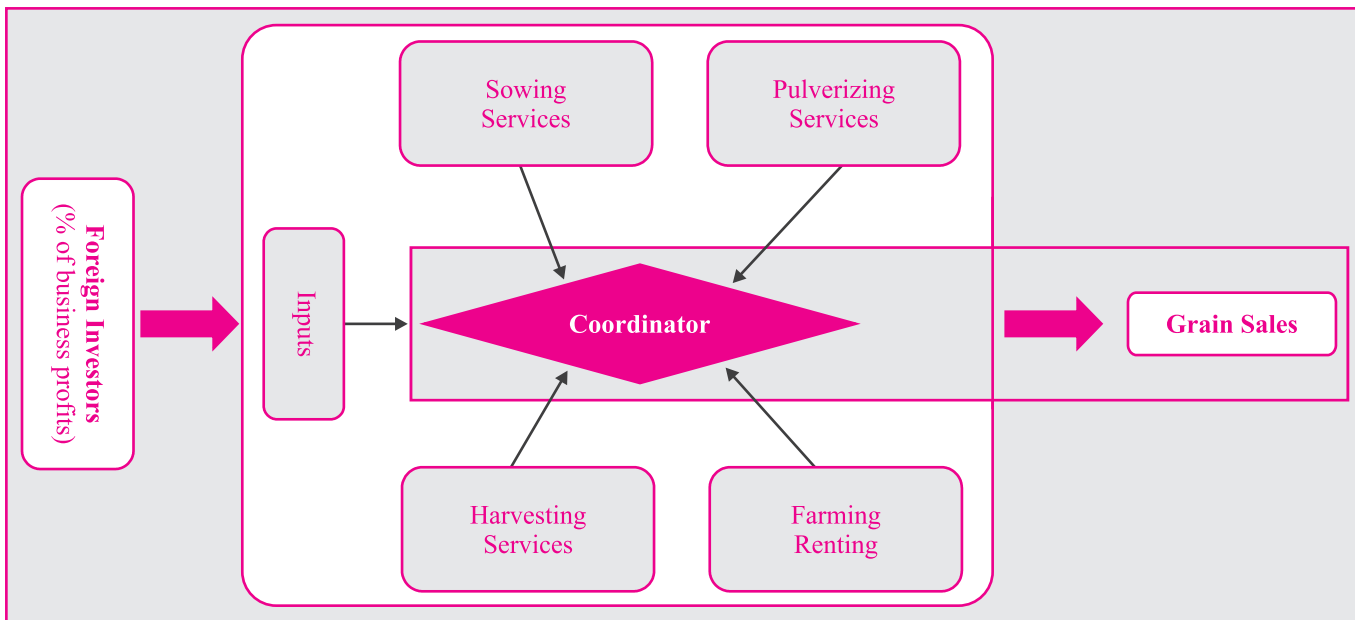


Figure 5: Investor-Oriented Corporate Structure Organization

Table 6

Transaction Dimension for Investor-Oriented Corporate Structure

Transaction Dimension				
Specific Assets	Frequency	Uncertainty	Information Sharing	Trust/Reputation
Medium from the point of view of business know-how (contacts, contracts, administration, logistics etc.)	Low with investors (one season) High with service and inputs providers	Low: depends on reputation and trust	High: investors know what would be produced and how	Very important to obtain money in advance

Table 7

Endogenous Dimension for Investor-Oriented Corporate Structure

Endogenous Dimension				
Social Structure	Evolution	Productive Area	Financial Sources	Incentives & Control
Coordinator-outside investors-service and inputs providers Tends to be formal (higher security for investors)	Started in 1990s, mainly in Pampas region; subsequent expansion to other agricultural regions	10,000 to 100,000 hectares	Outside investors	High, since all participants must fulfil the agreement

and partnerships between service providers and coordinators last longer. In this case there may appear shared fixed capital investments in storage, machinery, and logistics. Finally, this hybrid form may be considered a pooled form, according to the classification proposed by Lazzarini, Chaddad, and Cook (2001).

**4.5. Network of networks**

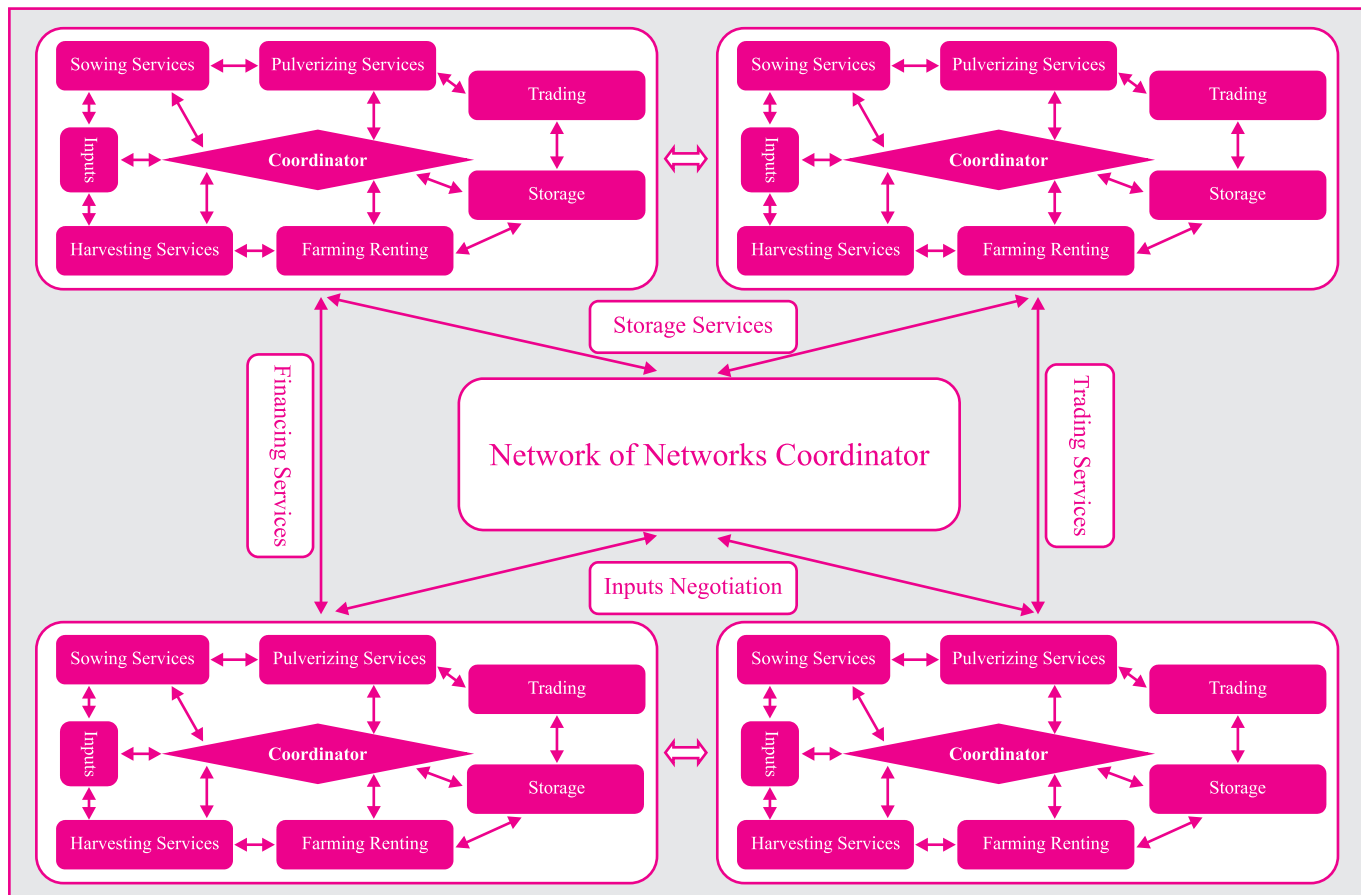
The strategy of this type of organization is based on creating a network of contractors with local, specific knowledge. These contractors may be investment partners or network service providers. Generally, the whole network is kept in a specific area of influence, but this know-how has been spread to other regions beyond traditional ones.

The model of this type of organization involves a coordinator of the network and technical people in charge of production and the network’s activities in each region (see Figure 6). The different activities are production (sowing and pulverizations), harvesting, storage, agricultural input selling, trading, financial services, etc. (depending on the network). The network of networks is structured as a multidivisional

form with different business units in different regions: each unit is important to the contribution of the network. The areas of influence have generated the network of branches. In these branch offices grain is purchased, inputs are sold and business contacts explored.

The coordinator “opens” business units in different regions similarly to a franchise system. A network of networks could be characterized as a sum of formal and informal networks in different regions, coordinated by a central manager (in Figure 6, “local coordinator”). The reputation of the coordinator is very important for developing the region and expanding the network. The conditions offered by the coordinator often are sufficient for striking a bargain between similar agents in the region. As a result, a network of networks has long-term contracts (more than five years) with participants as a means to establish itself in a region, centrally coordinated but enhancing the empowerment of each partner.

The transaction dimension and the endogenous dimension of this organizational design are presented in the following tables. Regarding the transaction dimension (Table 8), there is a high level of specific assets from the point of view of business know-how (contacts, contracts, administration, logistics,



**Figure 6: Network of Networks Organization**

Table 8

Transaction Dimension for Network of Networks

Transaction Dimension				
Specific Assets	Frequency	Uncertainty	Information Sharing	Trust/Reputation
High: know-how, innovations (tech), human resources	High: long-term relationships (credible commitments)	Low (importance of trust) Processes are standardized	Very high	Trust is the result of transparent operations and solvency of the network

etc.), technological innovations (GPS, no-tilling systems, etc.) and human resources. Frequency is high due to the long-term contracts creating credible commitments. This, along with the standardized processes, allows for lower uncertainty. Information sharing is very high, and so is the trust and reputation of the coordinator.

Regarding the endogenous dimension (Table 9), the social structure has a local coordinator with a high level of local know-how, but management is totally centralized. This hybrid form started in the 1990s in the Pampas region and expanded to other regions, as well as other countries (Uruguay, Brazil, Paraguay, Bolivia), involving productive areas from 20,000 to 350,000 hectares. Financially speaking, coordinators use their own budget, but they also include foreign investors, banks, equity markets, and members of the network. Finally, incentives and control are very high, since all participants must fulfil the agreement.

This organizational form could be represented as a reciprocal interfirm collaboration (LAZZARINI, CHADDAD, and COOK, 2001).

5. CONCLUSIONS

The study of hybrid forms in Argentine agriculture allows researchers and managers to better understand organizational innovation in a global and local perspective. Starting with the innovations of the 1990s, farmers/producers, service providers, and input suppliers developed a complex contracting system in order to expand agricultural production to until then almost virgin areas. Main organizational forms were the “informal hybrid form” and the “investor-oriented corporate structure”, and most recently the “network of networks”. These institutional arrangements were supported in informal relationships, accompanied by high levels of trust, reputation, and symmetry of information.

Following the Argentine economic crisis in 2001 and 2002, these actors also started to create alliances with other actors outside the formal agrifood business circuit. Banks, financial organizations and even common people began to finance the agricultural sector. The institutional and financial crisis also generated an environment with lower trust, resulting in the

Table 9

Endogenous Dimension for Network of Networks

Endogenous Dimension				
Social Structure	Evolution	Productive Area	Financial Sources	Incentives & Control
Local coordinator (know-how, contacts), professional HH.RR	Started by 1990s, mainly in Pampas region, expanded to other agricultural regions and countries	20,000 to 350,000 hectares (neighbouring countries such as Uruguay and Paraguay)	Own budget, input providers, foreign investors, banks, equity markets	Very high, since all participants must fulfil the agreement
Management is totally decentralized			Include financial assistance for member of the network	
Each responsible person loads the information at his own workplace	High level of technology	Generally contracting		

necessity of more formal contracts. For this reason, during the period 2002-2007 the “agricultural trust-fund” and “investor-oriented corporate structure” organizational forms saw a rapid increase.

Informal contracts seem to be the most common way of organizing the agriculture process, but these are short term and marked by sequential interfirm collaboration. Networks of networks involve long-term relationships and social development, and reciprocal interfirm collaboration. Agricultural trust funds and investor-oriented corporate structures have combined interfirm collaboration and medium-term relationships. In all cases, hybrid forms involve a group of actors linked by common objectives, mainly to gain scale, share resources, and improve the profitability of the business.

Agricultural contracts constitute autonomous specialized nodes that work in a coordinated fashion, assisted by modern information and communication technologies (ICT), trust, a shared vision, and the capacity to coordinate different agricultural processes. These organizations are competitive because they enjoy aligned incentives, flexibility, and adaptability. The more hectares the organizational form has, the more reciprocal or combined is the interfirm collaboration. High uncertainty due to information problems leads to more certain organizational interactions.

The experts surveyed state that these organizational forms are highly flexible and show a great capacity to adapt to the challenges. For instance, during 2008 and 2009 two restrictions appeared in the sector: institutional intervention (with higher export taxes) and an important drought. As a result those organizational forms with non-agricultural investors (especially the agricultural trust fund and investor-oriented corporate structure) faded from the system, driving other players in the chain (i.e. industry or exporters) to develop new organizational forms through network of networks, service providers (contractors), or informal hybrid forms, by financing inputs or land renting, in order secure the supply of grains. It could be characterized as a sequential interfirm collaboration, but with strong contracts and combined relationships; it is a typical netchain organization.

All that is left is to ask whether this type of highly competitive organizational design will be sustainable and continue to dominate Argentine agricultural production. The risk is that, if it does not function correctly or the institutional environment constrains its development, the design will crumble, and the autonomous nodes could be more vulnerable to transaction costs. This could result in lower investments, lower use of workforce, lower specialization, lower productivity, or even occupying the land with low-cost crops (i.e. soybean). ♦

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ABSTRACT

**Networks in Argentine agriculture: a multiple-case study approach**

Argentina is among the four largest producers of soybeans, sunflower, corn, and wheat, among other agricultural products. Institutional and policy changes during the 1990s fostered the development of Argentine agriculture and the introduction of innovative process and product technologies (no-till, agrochemicals, GMO, GPS) and new investments in modern, large-scale sunflower and soybean processing plants. In addition to technological changes, a “quiet revolution” occurred in the way agricultural production was carried out and organized: from self-production or ownership agriculture to a contract-based agriculture. The objective of this paper is to explore and describe the emergence of networks in the Argentine crop production sector. The paper presents and describes four cases that currently represent about 50% of total grain and oilseed production in Argentina: “informal hybrid form”, “agricultural trust fund”, “investor-oriented corporate structure”, and “network of networks”. In all cases, hybrid forms involve a group of actors linked by common objectives, mainly to gain scale, share resources, and improve the profitability of the business. Informal contracts seem to be the most common way of organizing the agriculture process, but using short-term contracts and sequential interfirm collaboration. Networks of networks involve long-term relationships and social development, and reciprocal interfirm collaboration. Agricultural trust fund and investor-oriented corporate structures have combined interfirm collaboration and medium-term relationships. These organizational forms are highly flexible and show a great capacity to adapt to challenges; they are competitive because they enjoy aligned incentives, flexibility, and adaptability.

**Keywords:** contracts, hybrid forms, network of networks, interfirm collaboration, relationships.

RESUMEN

**Redes en la agricultura argentina: un estudio de caso múltiple**

La Argentina está entre los cuatro mayores productores mundiales de soja, girasol, maíz y trigo, entre otros productos agrícolas. Los cambios institucionales y políticos que ocurrieron en la década de 1990 fomentaron el desarrollo de la agricultura argentina y la introducción de innovaciones de productos y tecnologías (siembra directa, mayor uso de agroquímicos, cultivos transgénicos, GPS) y las nuevas inversiones en plantas de *crushing* en soja y girasol. Además de los cambios tecnológicos, una revolución silenciosa tuvo lugar en la producción agrícola: de la agricultura de autoproducción o propiedad a una agricultura basada en el contrato. El objeto en este trabajo es explorar y describir la aparición de redes en el sector de producción agrícola en Argentina. Se presentan y describen cuatro casos que actualmente representan aproximadamente el 50% del total de siembra de granos en el país: forma híbrida informal, fideicomiso, estructura orientada hacia los inversores y red de redes. En todos los casos, se analizan las formas híbridas que involucran a un grupo de actores unidos por objetivos comunes, principalmente con el fin de aumentar la escala de producción, compartir recursos y mejorar la rentabilidad del negocio. Estas formas de organización son muy flexibles y muestran una gran capacidad de adaptación a los desafíos. Además, son competitivas porque cuentan con incentivos alineados y flexibilidad.

**Palabras clave:** contratos, formas híbridas, red de redes, colaboración entre empresas, relaciones.

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