Implications of the Organization of the Commodity Production and Processing Industry: The Soybean Chain in Argentina

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IMPLICATIONS of the ORGANIZATION of the COMMODITY PRODUCTION and PROCESSING INDUSTRY THE SOYBEAN CHAIN in ARGENTINA

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Dear Colleagues:

After falling sharply during the global financial crisis—in the second half of 2008—food and oil prices have resumed their upward trend. International food prices have risen almost to the levels of 2008 and some commodities like maize have reached record highs. Virtually all the commodity that matter for LAC countries are partaking in this strong wave of price increases. Moreover, the rate of price increases has accelerated in the last three to four months, with food price indices reaching roughly the same level as at their previous peak, in 2008.

This increase in food prices presents some great challenges for some LAC countries, in particular in the Caribbean, but it also presents a great opportunity, as many LAC countries are net food exporters and are a food source for other Regions in the world. It is within this context that we are launching the Sustainable Development Occasional Paper Series on Food Prices. We hope that this will contribute to add to the knowledge and exchange of innovative experiences in food policy and programs in LAC.

The Occasional Paper Series on Food Prices is expected to include country-specific as well as regional analytical work related to food, logistics, and agriculture policy, and will seek to learn from the 2007-2008 food price crisis and put forward innovative concepts for improving the efficiency of food markets and for reducing the vulnerability to exogenous shocks in the food production and trade in the LAC Region. The series starts with papers on: (i) the impact evaluation of the 2008 food price subsidy on the rice sector of Haiti, (ii) an analysis of the transmission of international food prices to domestic markets in Central America, (iii) an assessment of the conditions for developing agriculture commodity exchanges in LAC, (iv) a policy guidance for improving logistics and transport efficiency in the context of food prices, and (v) an analysis on logistics and grains in Argentina.

We hope to continue publishing more papers soon to provide additional input to the debate as we take on the challenges and opportunities of the new dynamics in international food markets in the Region and elsewhere.

Sincerely,

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This study is part of a major initiative launched by the Latin American and Caribbean Chief Economist’s Office that aims to examine the challenges and opportunities associated with commodity resources in the Latin American and Caribbean Region (LCR). The purpose of the study is to better understand the implications of different structures of resource-based industries; to learn why the structural characteristics vary across commodities or across countries and what this means for development policy. The study analyzes to what extent government policies, institutions and investments are effective in increasing the efficiency and sustainability of primary commodities production, and to encourage the development of value-added products along the value chains in the countries in which the primary commodities are produced.

The global food system is facing new challenges associated with a strong demand growth projected for future decades, particularly in the case of the soybean complex, in which very few countries—including Argentina—concentrate most of the production and exports. The soybean chain case has been selected in the Argentine study because it is an active part of the global food value chain (providing protein feed, vegetable oil, bio-fuel and many other processed goods) and such industry has registered significant organizational and structural changes during the last two decades, which resulted in improved competitiveness and in dramatic increases in the area planted and resources destined; in the volume of production; and in the value of exports of the soybean complex (in 2007/08 Argentina was the largest exporter of soybean meal -around 50% of total exports- and soybean oil -more than 55% of total exports-, and the third largest exporter of soybean -15% of total exports-, after the USA and Brazil).

Currently soybean cropping is the most dynamic and largest economic industry of Argentina’s farming sector; and it is the main source of national fiscal revenues. It has strong impact in the regional development of the country, particularly in the Pampas Region and the Northern provinces. The main changes occurred in the soybean industry resulted from several factors associated with: a) government policies; b) the characteristics and evolution of the domestic production and trade structure; and c) the dynamics of the soybean complex international scenario.

The study includes four sections: i) brief production background; ii) description of the Argentine soybean value chain; iii) evolution of the main policies and institutional regimes in Argentina; iv) lessons learned related to the political economy and the industrial organization. The study describes the main policies implemented in Argentina during the last two decades which had impact on the structure of the soybean value chain and its performance. The dramatic changes registered in some of such policies, as well as in the international scenario, provide interesting background to better understand the evolution and performance of the Argentine industry in the global soybean value chain.
II. BRIEF PRODUCTION BACKGROUND

The economic development of Argentina has been strongly influenced along its history by production and trade based on natural resources, including the primary commodities and the value added products processed by agro-industries. The strong economic growth and prosperity of Argentina registered during the last three decades of the second half of the XIXth Century and the first three decades of the XXth Century was associated with the development of the grain and livestock industries. It was based on the availability of natural resources (comparative advantages), on the labor input associated with large European migration inflows, and on the investment (capital inflows) and technology incorporated to production and processing of the main agricultural products (wheat, corn, beef and wool). Total trade (exports + imports) represented more than 60% of GDP. The Argentine economy was integrated to world trade, and most of the increase in production was destined to export, which was the main driving force of the sustained domestic economic growth registered during more than six decades (it has been named “the agro-export economic model”). During such period domestic prices were stable, public expenditures were small and there was no direct taxation on agricultural exports.

Later, for several decades after the 1930s’ world economic crisis and the Second World War until the 1980s, the agricultural sector growth was limited by difficulties emerging from protectionist agricultural international policies and by the changes in the domestic economic and commercial policies implemented in Argentina, which included foreign exchange controls, import taxes and import restrictions on manufactured goods (industrial incentives) and export taxes on agricultural products. The “import substitution growth strategy” resulted in negative commercial protection to agriculture; but it was not successful in promoting other sector’s international competitiveness. The long term economic performance of the country during the period 1940-1990 was very poor; it included short periods of economic growth based on domestic demand growth, followed by others characterized by stagnation and high inflation. During such period the real exchange rate had high volatility associated with recurrent balance of payment crises; currency devaluations were used to “improve” competitiveness and to resume growth; but they lasted very limited time, until a new commercial and fiscal crisis emerged again (the “stop and go” cycles which characterized the Argentine economy). Such import substitution policy had a negative impact on the performance of the agricultural sector; and it also resulted in very little long term economic growth rates of Argentina when compared with many other similar countries, like Canada, Australia, New Zealand and Brazil. During the period 1940-1990 per capita average real annual rate of growth was lower than 1%.

More recently, in 1991 deep economic and structural reforms and some key agricultural policies were implemented, including the elimination of export taxes and other quantitative restrictions, reductions in import taxes on

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1 Primary production and processing (wheat mills and slaughter houses) included most of the state-of-the-art technologies available at those dates. The Rosario grain exchange and future market was one of the leading world markets during the first decades of the XXth Century.
2 Between 33 to 50% lower than the growth registered in Australia, Brazil, Canada and USA.
The reforms reestablished price stability, reduced the anti-trade bias of previous commercial policies, and created a more favorable environment for investment and growth in the farming sector, particularly in the case of soybean, and resulted in dramatic increases in agricultural production and exports (Mundlak, Y. and M. Regunaga (2003)).

This positive trend in crop production continued during the period 2002-2007, in which the improvement in the international trade scenario for food products and other processed primary products and the decrease in the exchange rate after the huge devaluation of the peso in 2002 balanced the negative impact of the decline in the nominal rate of assistance at farm level registered during such period (Tables A 3 and A 4 in Annex), and also promoted the dynamic growth of the Argentine agribusiness sector, which was also led by the soybean industry. This process had a significant impact on regional development, because agribusiness and the related industries and services are widespread all over the country and promoted overall progress of small cities and towns.

During the last two decades most of the stages of the soybean value chain have shown very relevant organizational and structural changes, from input and services providers for primary production upstream to processing and distribution of commodities and added value products. There has been an interesting process of production differentiation and value creation, both upstream and downstream, which provided opportunities to generate economic rents along the chain and improved its international competitiveness, allowing Argentina to capture a significant share of the growing international demand of the soybean complex.

Figure 1 shows the stagnation of the area planted with cereals and oilseeds during the period 1940-1990 and its significant increase during the 1990s and the 2000s (around 60%). It also shows the limited growth in total production during most of the first period, and the dramatic growth occurred since the early 1990s until the 2007/08 crop, period in which the relative input-output prices improved and the economic environment promoted investment and innovation in crop production, processing and distribution. Total cereals and oilseeds production grew from...
38.2 million tons in 1990/91 to 98.1 million tons in 2007/08. The dramatic increases in crop production began in 1991/92, when the economic and structural reforms implemented resulted in stability and improved oilseeds-inputs relative prices. Later, since 1996 the soybean competitiveness improved more with the fast massive use of a new technological package including GMO seed, glyphosate and no till planting (Regúnaga, M. et. al. 2003). Corn GMO seed came later, by the end of the 1990s, and its massive adoption was delayed, but has also been very important to increase yields and to reduce costs during the 2000s.

Figure 2 shows that oilseeds have been more dynamic than cereals during the last 3 decades. However, during the period 1990-2008 most of the growth in total crops area was based on the increase in soybeans acreage, which replaced land destined mainly to livestock production (not cereals) in the Pampas Region and in the North East and North West Regions of Argentina.

Soybean has been the leading and more dynamic crop, based on: a) its high competitiveness vis a vis livestock and dairy production and the rest of the crops (higher gross margin per hectare); b) its lower operative costs
per hectare, which reduces risks and capital requirements (needs less doses of fertilizers than corn or wheat because more than half of the Nitrogen requirements are self provided by the plant\(^6\)); c) the crop management with the new package is very simple and allows an efficient use of the water accumulated in the soil (Regunaga, M. et al, 2003).

The area planted has expanded dramatically based on the improved competitiveness of most of the participants in the soybean value chain and on the crop adaptability to very different agro-ecological conditions (from the Northern areas –subtropical- to the colder areas in the South of Buenos Aires province; and from the more humid areas in the East of the Pampas Region to the more dry areas in the central provinces of Argentina, like Cordoba and San Luis).

The area planted with soybean grew from 4.97 million hectares in 1990/91 to 16.6 million hectares in 2007/08 (Figure 3); and production grew from 10.9 million tons in 1990/91 to 46.2 million tons in 2007/08 (324% in 17 years; 8.9 % annual cumulative growth rate). In 2007 the gross value of production of the soybean complex was estimated at 10.5 billion US Dollars.

\(^6\) Technologies to improve the Nitrogen Fixation in the soil (Rizobium) have also been very relevant.
III. DESCRIPTION of the ARGENTINE SOYBEAN VALUE CHAIN

The Argentine soybean industry is a key part of the global food system. Within the main world producers and exporters, the Argentine soybean chain is the most integrated to world trade: more than 90% of total production is destined to international markets, while in the USA and Brazil a high share of the soybean oil and the soybean meal production is destined to domestic consumption. For such reason, during the last decades Argentina has been a very active part of the reorganization and restructuring of the global soybean value chain, which impacts in many different food and fuel markets and countries.

This process is resulting in the consolidation of most of the value chain steps all over the world, including the Argentine soybean chain. Taking into account the mentioned circumstances, the description of the Argentine soybean value chain includes all the steps up to the main markets in which the products are sold, and looks at the trends on the main buyers’ preferences and the import restrictions imposed by countries on commodities and value added products.

The description of the soybean value chain involves the following stages: input providers for primary production; soybean producers; services providers; crushers, international traders; producers of related food products, bio-fuels and other industrial inputs; main international markets importers. Figure 4 provides a simplified diagram of the Argentine soybean value chain.

3.1. INPUT PROVIDERS FOR PRIMARY PRODUCTION

Main inputs for soybean production are: seeds; fertilizers; chemicals (herbicides, pesticides and other products for disease control); and machinery-equipment. The relevance of the inputs used and the role of input providers (including its human resources) have grown dramatically during the last two decades, because they involve some of the key elements of the innovations and current competitiveness of the soybean value chain. Argentine agriculture has become a very sophisticated industry, in which inputs play an important role to improve productivity and to add value.

Input providers have been very dynamic during the last two decades, both in terms of the new knowledge based products and the improved technological packages developed. They are an active part of the new networks that characterize current Argentine soybean production.

A special consideration deserves research and development (R&D) on inputs and their efficient use, which have been and will be a key factor in the competitiveness and sustainability of soybean production. At the beginning of the second half of the XXth Century, Argentina created the INTA (the national agriculture research and extension service) which, together with the Universities, played a very important role during the 1960s until the 1980s, both in the research and the extension of improved technologies (seeds, chemicals, fertilizers, machinery, soil management including no till practices, etc.).
However, the gradual reduction in public resources destined to R&D and the dynamic need of innovations resulted in a growing relevance of the private sector during the last three decades, particularly in the case of crops like soybean. This process involved private firms (input providers) and several technical farm associations, like AACREA and AAPRESID, as well as other public-private national initiatives like “Cambio Rural” and other provincial programs, which played a very relevant role in “on farm” experimentation and transfer of technology. Beyond what has been done by farm organizations, and similar to what happened in the USA, EU and other competing countries, the seed and chemical industries and their technical-commercial networks located in the main producing regions, have been crucial for recent innovations incorporated in soybean production.

Seeds. Argentine crop production is rain fed and less input intensive than production developed in the USA, EU and most of the Asian countries. It relies very much on genetics and on crop management, because these technologies provide opportunities to improve productivity at low costs of production. Such situation is associated with the domestic economic environment resulting from the agricultural policies implemented during many decades in Argentina, which have limited the use of irrigation and high doses of agrochemicals to increase productivity per hectare. Therefore, improved seeds have been tradition-

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8 Intellectual property rights have played a crucial role to promote private investment.
9 AACREA is the national association of CREA farm groups (with technical purposes, similar to the French CETAs). AAPRESID is the national association of farmers promoting no-till practices (called in Argentina direct-seeding). Cambio Rural also involves small and medium sized farm groups with technical assistance financed partially by the Secretary of Agriculture and partially by the farmers.
10 While USA and EU farmers have positive PSEs (OECD, 2007), Argentine farmers have negative PSEs resulting in less favourable relative prices which limit the profitability of intensive innovations, such as the use of high amounts of fertilizers per hectare, irrigation, and capital in general.
ally the most important tool to increase productivity and competitiveness in Argentina. R&D on seeds and the seed industry have played a key role since many decades ago.

Currently the Argentine seed industry involves more than 50 firms, including many local small and medium sized firms, as well as the main international seed companies, most of which are also producers and distributors of chemical products (Monsanto, Syngenta, Dow Agrosciences, Pioneer, Advanta, Bayer Cropscience, Nidera, Nufarm, Pannar RSA, etc.). During the last two decades there has been a consolidation process of the international firms. The seed industry has created the Argentine Seed Association (ASA www.asa.org.ar), which is very active in promoting the implementation of better intellectual property rights, that are crucial for the future development of new improved seeds.

The use of modern biotechnology had a significant impact on the seed industry, particularly in the case of soybeans. During the 1990s Argentina took the lead together with the USA in the use of biotech seed, which was available in the Argentine market since the crop 1996/97; and already in the crop year 2000/01 almost 90% of total area planted in the country involved genetically modified (GM) soybean -RR gene developed in the USA and included in varieties adapted to local conditions-. Currently almost all farms use GM crops (98% of total area planted with soybean). Despite in recent years many other countries decided to use GM crops, such as Brazil and other soybean exporters, currently Argentina is still the most intensive user of biotech seeds in the world (the share of GM crops in total planted area is higher than in the USA and the rest of the world - ISAAA www.isaaa.org). It should be noted that the success of the RR soybean in the main producing areas of Argentina is also associated with the development, by the Argentine based seed industry -not limited to the international firms-, of improved varieties adapted to the different agro-ecological conditions of the country (not just the RR gene).

The seed industry also plays an important role in the technology transfer and in the financing of the seeds to the farmers through its distribution networks. During the last decades the private sector has gradually replaced the extension services previously provided by the public sector (particularly INTA). The “Farm Shows”, in which the seed firms disclose and promote their new products and technical packages, and the networks they have in the producing areas are currently the main tools for the technology transfer. These networks also involve farmers: AACREA members and some selected farms produce seed for the seed industry, and also conduct “on farm” experiments.

Fertilizers. For many decades until the 1990s the use of fertilizers in Argentina was very low, local production was very little and domestic prices were high (resulting from lack of scale of the industry, and from import taxes and import bans on fertilizers). This situation changed dramatically since the early nineties, when relative prices improved, associated with the elimination of export taxes on grains and oilseeds, the reduction of import taxes on fertilizers and other chemicals and the elimination of import bans. Since then the fertilizers’ use in Argentina increased significantly (Tables 11 and 12).

Prices stability, crop production growth and the improvement in the climate for foreign and local investment in the oil and gas sector resulted in investments in large fertilizer plants, built by international and local firms (such as Profertil, a joint venture involving Repsol-YPF and Agrarium; and Mosaic, a joint venture involving Cargill and IMC Global). Currently Argentina produces and exports urea and phosphates to the regional market.

Fertilizers are produced or imported by a limited number of large firms. Most of them are the large grain traders and oilseed crushers (Cargill, Bunge, Nidera, Dreyfus, AGD, and the coop ACA), which sell the fertilizers to farmers at very competitive prices. They have developed distribution networks and finance the sales. Some of the fertilizer sales are in barter programs, in which farmers pay at the harvest with the delivery of the grain. The fertilizer firms are members of an association which also involves the producers of other agro-chemicals (the Argentine Chamber of Ag Sanitary Products and Fertilizers – CASAFE www.casafe.org).

11 In 1991-1992 the Secretary of Agriculture created the National Seeds Institute (INASE) and modified the Seeds Law to promote the development of Biotechnology and the investment in the industry. These reforms were successful during the 1990s, but they are insufficient today; and the lack of better IPRs is a current weakness.

12 Such barter sales reduce the transaction costs (VAT, tax on bank notes, broker’s fees, etc.).
Herbicides, insecticides, and other products. The large international seed companies are also the main producers and distributors of chemicals destined to weed, pest and disease control. During the last two decades there has been an important consolidation process all over the world, including Argentina. The main companies operating in the country are Monsanto, Syngenta, Basf, Dow Agrosciences, Advanta, Atanor, Bayer Cropscience, Nidera, Dupont, Nufarm, Merk, and Repsol-YPF. However, in this market there are also medium sized local and international firms (near 100 companies) which produce / import and distribute agro-chemicals; this is a difference with the fertilizers’ market.

The domestic agro-chemical market has been very dynamic since the early 1990s. It was also promoted by the improved relative prices resulting from the policy reforms (Tables 11 and 12). Total sales of sanitary products destined to soybeans were around US$ 585 million in 2008. The leading product was glyphosate (near 180 million liters), produced locally and imported from different countries (mainly China). In recent years, products destined to soybean rust control have also been very dynamic. Most of the chemical firms are members of CASAFE and ASA.

Machinery and equipment. Argentine agriculture is mechanized since many decades ago, and such process contributed to improve competitiveness in previous decades; therefore, the machinery and equipment industry has already a long history in Argentina. However, the economic and trade reforms implemented during the nineties also had a strong impact on the domestic industry which resulted in its restructuring. Equipment trading started within the MERCOSUR countries and the firms were supposed to modernize the equipment. This process also involved manufacturing agreements with international companies.

The country counts with many local manufacturers (over 150) and with the representatives of the main large international firms. In this industry also occurred some consolidation process; however it has been less significant than in the case of seeds and chemicals, because there are different specialized machineries for which local firms are competitive. Total sales in 2008 accounted for US$ 1,100 of which near 37% were manufactured in Argentina.

The most relevant changes occurred in this area during the last decades that improved the Argentine soybean competitiveness were: the increase in the size of the tractors, harvesters and sprayers; the massive use of no-till equipment; the development of computed controlling systems to implement precision agriculture; and the equipment developed to use plastic bag silos.

The local firms created the industry association CAFMA (Argentine Chamber of Agrimachinery Manufacturers - www.cafma.org.ar), which in 2007 developed CIDEMA, a centre for research and management development aiming to promote the competitiveness and the national and international setting of the Argentine industry.

### 3.2. SOYBEAN PRODUCERS

During the last five decades there has been a concentration process in the farming sector all over the world, including Argentina. This process involved changes in the number and in the size of the farm units. Table 1 shows the evolution in Argentina during the period 1952-2008, based on data of the National Agriculture Census for all kinds of farms13.

<table>
<thead>
<tr>
<th>Census years</th>
<th>Number of farms (thousand units)</th>
<th>Size of the farms (total hectares / unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1952</td>
<td>565</td>
<td>354</td>
</tr>
<tr>
<td>1969</td>
<td>538</td>
<td>391</td>
</tr>
<tr>
<td>1988</td>
<td>421</td>
<td>421</td>
</tr>
<tr>
<td>2002</td>
<td>334</td>
<td>524</td>
</tr>
<tr>
<td>2008*</td>
<td>274</td>
<td>560</td>
</tr>
</tbody>
</table>

Note: *Data for 2008 are preliminary.

13 The information in Table 1 is for all kinds of farms (including livestock). Average size for crop farms is usually smaller, but it is difficult to estimate because many farms involve several activities (crops, livestock and others).
The concentration is more important when production is considered, because economies of scale became very relevant tools for farming competitiveness in Argentina, and many owners prefer to rent all or part of their farms, particularly in the case of land destined to annual crops. However, the main transformation process registered in soybean production in Argentina during the last two decades is the emergence of a new organizational production and distribution model based on networks, which is replacing the traditional farming system (Figures A 1 and A 2 in Annex).

**Traditional farmers.** In the old model the farmer concentrated the ownership of the land and most of the production functions within the farm, including seed production, labor force and machinery operations (with farmer owned equipment for planting and for weed and insecticide controls). They used to be isolated economic agents, who developed little relationships along the value chain and with other farmers. The extension services made strong efforts to transfer the new technologies to most of the farmers, who were “passive agents”. However, since Argentine farmers never owned harvesters and trucks, harvesting and transportation services were always provided by specialized contractors and transport firms. On-farm storing capacity has also been very limited in Argentina; therefore most of the farmers conditioned and stored the soybeans in the facilities provided by local coops and country dealers. Such alternatives are more efficient in the use of fixed investment than the prevailing system in other countries; however, in some cases they limit the farmer’s opportunities to select the best timing for the grain sales.

**New production models.** It is estimated that most of the soybean production (60 to 70%) is currently under new models with more specialized managers, which involve different kinds of horizontal and vertical networks, in which contracts play a key role. There is not a single model and production strategy; however, there are some organizational changes which are common to the new production models. The main characteristics of the new models are:

- A substantive portion of the land is rented. Owners are replaced by production firms, who take the risks and the benefits of the business and pay a rent for the land.
- Usually they sign short term rentals, for one year.
- To reduce weather risks production firms rent land in different locations, since they do not have the rigidity of a specific owned farm. They also diversify the production portfolio including several winter and summer crops. This alternative allows them to reduce costs because they avoid crop insurance, which is expensive in Argentina (there is no massive subsidized crop insurance like in the USA).
- Production firms provide part of the working capital required to rent the land and to purchase the inputs and services. In many occasions production firms manage third parties investments (funds, “planting pools”) and therefore they take lower risks than if they use loans (they share the benefits). In addition, part of the operating capital is provided by input providers (seeds, fertilizers, and chemical products) and by trading and crushing firms. Such relationships imply the development of networks between producers and the rest of the value chain. All these financial options result in a limited demand of credit from the institutional system.
- Production firms involve different kinds of managers: i) owners of land who rent additional acreage to increase the scale and to diversify risk producing in different locations; ii) owners of machinery who used to be contractors and also perform as producers; iii) specialized teams (usually technicians) who manage funds provided by different kind of investors, involving mainly private initiatives but also public local and foreign funds (they are usually called managers of “planting pools”).

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14 This is a main difference with the USA, Canadian and European farmers, who usually own equipment. Such specialization has always been a competitive advantage of Argentine production, because the use of capital goods by specialized firms which operate all the year round is more efficient.

15 It is important to highlight that in the farming sector the commercial relationships in some occasions do not use formal contracts, because the behavior of farmers and other participants is very special (they trust each other and they comply with the commitments). However more specialized producing firms are using formal contracts; and their performance is very high, different to what happens in many other activities in Argentina.

16 After the financial crisis registered in Argentina in 2001-2002 many small investors lost confidence on the banking system and have been investing in soybean production through different kind of agreements with the production firms (they are called “planting pools”). Many of the pools are financed by individuals (lawyers, physicians, merchants and other people living in small towns and cities around the country) who have been saving money and investing in agriculture through production firms.
• Traders and crushers also invest in soybean production (managed by their own firms or by the specialized production firms). However, the magnitude of such production is very little (usually less than 10%) when compared with their total crushing / trading operation.

• Most of the improved seed is produced and provided by the seed industry. Some production firms develop provision and financing agreements with the seed firms.

• Some farmers own equipment. However, most of the on-farm operations are implemented with a network of services providers
t.

• Production firms organize production and are responsible for the technologies used. Such role has been very important for the massive use of improved technologies in soybean production, such as the package RR soybean-glyphosate-no till planting, which has been adopted in almost all the area planted in Argentina.

• The new organization of primary production in networks implies a differentiation and specialization process resulting in a very efficient system, with more economic actors involved in “on-farm” production, similar to what happens in the rest of the world with many dynamic manufacturing industries. In Argentina, such networks have been an interesting alternative to a much higher consolidation.

This evolution contributed to the creation of a structure of competitive medium sized agents, instead of employees, which is important in terms of local and regional development (local medium class). However, it requires very good links among the participants in the network. Farm managers are not supposed to just conduct production, but also to organize and manage the network. Production firms rely very much on services providers, and therefore they are supposed to help them in the improvement of their technical capacities and also in their capitalization. Many farmers prefer to hire services providers—and also to support their development—than to invest in equipment and to have too many employees.

As a result of this process, the current soybean production structure involves many independent agents developing activities in the interior of the country. The reduction in the number of farmers and the concentration process in production have been balanced with the emergence of a large number of new small and medium sized firms specialized as services providers. All of them create value in a much more sophisticated and efficient chain.

Despite the mentioned concentration process in the number and size of farm units, soybean production still involves a large number of farmers / production units of different sizes. Based on the information of soybean first sales during 2007, the ONCCA (national service respon-

17 Some of the services providers are small farmers, who own and eventually purchase machinery in excess to what they need in their farms. In many cases these alternative is easier to raise their income than purchasing land. However, more recently many large production firms promote the development of specialized services providers, to develop a permanent and trusted production network. Some firms, like El Tejar, help them in the financing of the equipment, the technical assistance of the employees and their development as specialized firms.

18 Some weed and insect controls are implemented by plains with sprayers. Such firms are usually specialized.

19 In a previous study conducted for the World Bank in 2008, we find that soybean is the single crop in which the national average yield is similar to the modern groups’ yields (like AACREA). This is not the case for other crops.

20 Labor regulations and associated costs’ risks are high in Argentina. In addition, the cost of capital has been traditionally high in Argentina, and the long term credit required for the purchase of machinery and equipment has been very limited in the institutional system.
sible for agricultural trade control) defined a stratification of soybean producers which is included in Table 2.

Taking into account that the average yield is around 3 tons per hectare, it could be estimated that 63% of production involves a reduced number of farms of the two largest size levels (around 7,500 units), who plant annually more than 330 hectares of soybeans. Most of them are very competitive producers. It should be noted that most of the farmers plant several crops, and therefore total acreage planted with crops is around 60 to 80% higher than the soybean acreage.

At the other end, there are a large number of farmers of the three smaller size levels (near 50,000) who plant less than 100 hectares of soybeans each and contribute only with 13.5% of total soybean production. Such farmers are less competitive, and currently they do not raise enough “on-farm” income to comply with their family needs (the negative impact of export taxes is very high for these farmers).

Some analysts, politicians and farm organizations criticize the recent evolution of the agricultural sector in Argentina, which resulted in a reduction in the number of farms, because it is very difficult for small farms producing soybean and other annual crops to compete and progress in the new production context. However, it should be noted that they look at the sector limited to the farm structure, which is only part of the new production model. At the same time it is emerging a medium class, living in towns and small cities of the interior of the country, involving a large number of small and medium sized specialized firms (input and services providers). In Argentina the restructuring of the soybean production system did not result in a primary production consolidation in a very little number of integrated companies, with the headquarters based in Buenos Aires or overseas (which is very frequent in other manufacturing industries). On the contrary, it resulted in the creation of many new specialized firms, which had a significant impact on the social and economic development of the interior of Argentina, particularly during the period 2003-2007. The excessive increase in export taxes and the export restrictions implemented in 2008 and 2009 deteriorated very much the farming situation, and resulted in a sharp decline in the area planted with cereals and oilseeds in 2008/09, before the emergence of the international financial crisis. The area planted in 2009/10 with total crops and the production will also be lower than in 2007/08. The technology used also went back (a sharp reduction in the use of fertilizers and less use of improved seeds). Farm organizations have issued a sentence that describes very well the process: “the recent economic development of Argentina come from the interior together with the agricultural sector growth, and the current recession and economic crisis is associated with the lack of growth of the agricultural value chains, more than from the external crisis”.

Summing up, the construction of dynamic competitive advantages implied major technical and organizational innovations. There is strong competition among farms; and the traditional farming is disappearing because the new production systems require a sophisticated management

<table>
<thead>
<tr>
<th>Categories</th>
<th>Number of farmers (units)</th>
<th>Volume sold (thousand tons)</th>
<th>Percentage of total farmers (%)</th>
<th>Percentage of total production (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 a 60 ton</td>
<td>18,897</td>
<td>578</td>
<td>25.72</td>
<td>1.51</td>
</tr>
<tr>
<td>61 a 150 ton</td>
<td>16,767</td>
<td>1,689</td>
<td>22.82</td>
<td>4.41</td>
</tr>
<tr>
<td>151 a 300 ton</td>
<td>13,644</td>
<td>2,942</td>
<td>18.57</td>
<td>7.67</td>
</tr>
<tr>
<td>301 a 450 ton</td>
<td>6,963</td>
<td>2,568</td>
<td>9.48</td>
<td>6.70</td>
</tr>
<tr>
<td>451 a 600 ton</td>
<td>4,164</td>
<td>2,168</td>
<td>5.67</td>
<td>5.65</td>
</tr>
<tr>
<td>601 a 750 ton</td>
<td>2,664</td>
<td>1,783</td>
<td>3.63</td>
<td>4.65</td>
</tr>
<tr>
<td>751 a 1000 ton</td>
<td>2,900</td>
<td>2,508</td>
<td>3.95</td>
<td>6.54</td>
</tr>
<tr>
<td>1001 a 1500 ton</td>
<td>2,901</td>
<td>3,537</td>
<td>3.95</td>
<td>9.22</td>
</tr>
<tr>
<td>More 1500 ton</td>
<td>4,577</td>
<td>20,569</td>
<td>6.23</td>
<td>53.65</td>
</tr>
<tr>
<td>Total</td>
<td>73,477</td>
<td>38,341</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

of networks and technical packages, which are systematically changing from year to year, associated with new innovations emerging from biotechnology, information technology, precision technologies, new products, increasing requirements from consumers, etc. They require specialized teams and very good management of networks for vertical and horizontal coordination, which provide more efficiency and competitiveness to the value chain.

It should be noted that during the last two decades the Argentine soybean production has been successfully moving in this direction, creating interesting rents along the value chain, and resulting in a significant growth in the value of production and in the increase of its share in total Argentine GDP, with interesting impacts on employment and on regional development. The sustained growth in soybean production has been successfully sold in the international markets, mainly as processed commodities, based on the high and “genuine” competitiveness of the Argentine soybean chain.

There are different vertical and horizontal integration strategies implemented by new production models. Some firms limit their operations to the “on-farm” production process; they concentrate their efforts on the effectiveness of the management of production, logistics and marketing activities, and in the development of reliable networks with the owners of the land, with inputs and services providers, and with the trading / crushing firms (upstream and downstream vertical coordination). They reach economies of scale through their own horizontal growth in different production regions with non correlated weather patterns. Most of the land they plant is rented and they have minimum fixed assets. The competitiveness and risk management strategies of the largest Argentine specialized production firms resulted in their regional expansion, initially within Argentina and more recently to several South American countries. This is the case of El Tejar described in Box 1.

**BOX 1. EL TEJAR**

In 1987 two cattle family farms decided to produce associated, and were the origin of El Tejar. Both families, Alvarado and Pallette, owned mid-sized farms with less than 1,000 hectares each, located in a livestock producing area of Buenos Aires province. They were members of the CREA Saladillo-Roque Pérez, a group of farmers that shared innovations and farm management strategies. In 1992 and 1993 other three members of the same CREA, McLean, Lamatina and Bosch, also joined. The five families created a special cooperation private association regulated by the Argentine Corporations Law, which allowed them to work associated but also maintaining their respective family societies. At the beginning they focused on adding value to their beef production through processing and marketing a high quality branded meat: “Cabaña El Tejar”. In 1993 they opened a healthy butchery in Saladillo city, from where they built the awareness of the brand. They also sold beef carcasses to butchers located at near cities.

In 1995 another CREA member joined the group, the Kasdorf family. At this time, they decided to create a corporation: El Tejar S.A. (ET Arg) to produce, to provide technical and management services and to market the production. Latter, other families and farmers joined ET Arg. The growth strategy was to have minimum fixed assets, renting the land and developing horizontal and vertical networks. Previous to the association, the individual family firms got annual average rates of return on net assets of around 4% (including in the assets the owned land, livestock and equipment); with the new strategy the firm targeted to achieve 20% annual rates of return in the years to come. The new company began operations in 1995 renting the 7,165 hectares owned by the six families. The first company’s board had members of the six families, and most of the managers were family’s specialists. Oscar Alvarado, a young innovative agronomist, became the CEO. Since the very beginning ET Arg gave a high priority to several values shared by the founders: growth, people development and social commitment.

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21 It is mentioned “genuine” because the growth and the access to world markets are not based on subsidies provided by the rest of the Argentine society as is the case of the USA and other countries. On the contrary, during the current decade soybean production has grown until 2007/08 despite the high export taxes applied to the soybean complex.

22 Country diversification allows them to reduce weather, price and political risks.
The first stage of the company’s development was the livestock business. It was structured in two areas: i) beef production and related services, including meat production, sales of heifers and bulls, sales of semen, technical advising and management of farms in several provinces of Argentina and later in Bolivia; ii) marketing and sales of branded beef directly to consumers: through own butcheries in Saladillo and in Buenos Aires city; through independent butchers and supermarkets located in several cities of Buenos Aires province; and exports to other countries.

The second stage was based on crop production, initially in Argentina and later in other South American countries. Technical innovations and the improved economic environment available since the early 1990s modified the production opportunities, and the crop business emerged as an interesting alternative for the firm’s growth. For that purpose the company trained its employees on improved crop production, including biotechnology and soil management, and it improved the marketing of the grain through direct sales to crushers and exporters and through the use of future markets and forward sales. During the second half of the 1990s ET Arg grew very fast with rented land and no equipment, expanding initially to other regions of Buenos Aires province, and later to other provinces to diversify weather risks and to find better production opportunities; in 1997/98 they planted 8 thousand hectares and in 2000/01 they reached 38 thousand planted hectares.

The crop business success was based on improved management and production technologies. Management included production and commercial risk mitigation, the implementation of a quality management system and the development of a strong marketing network. Production technologies included no-till practices, biotechnology and the development of a production network. In the early 2000s they already involved more than 500 members (farm owners, input providers, services providers, country dealers, processors and traders, investors, etc.). At that time they also began their internationalization strategy, to reduce risks and to find new opportunities based on their competitive approach. In 2003 their 2010 vision was to become a large agribusiness firm, planting 200 thousand hectares of cereals and oilseeds in the Southern Cone in the 2009/10 crop year, selling directly to crushers and exporters, and raising revenues of US$10 million. The main strategy was horizontal growth with networks. Oscar Alvarado defined ET Arg as “a firm operating in the first steps of the agribusiness chain with minimum fixed assets, managing businesses and organizing and leading teams, putting always the focus on the customer” (quality commitment). It was also a key objective to develop a large group of people and families sharing dreams and values. In 2002 they expanded to Bolivia, and in 2003 they began farm operations in Uruguay and in Brazil (in Mato Grosso), becoming a “multi-local” firm targeting high annual profits and also taking commitments with the local development of the areas in which they produce (they invest annually 2% of their benefits in social promotion -Corporate Social Responsibility-).

Team building within the firm and network building have been always the keys to allow a successful and aggressive growth, with the view of “building a company to last 700 years”. ET Arg managers believed that the success and good awareness of the firm resulted from their constant innovation and growth, supported by strong alliances with: i) services providers, who are considered allies and not providers or contractors; ii) farm owners, who are considered associates and not lessees; iii) investors, who are considered associates and not lenders. Alliances with third parties are not an end, but a tool to develop sustained long term cooperation relationships (fidelity) and growth. The base of the firm’s model is trust, promoting team work, communication and transparency. They have always looked at the company as the environment for individual and family development. Instead of a Human Resources department they created in 2001 a People Development department, with the mission of conducting the firm to be a school of leaders with strong social commitment and with the commitment of a continuous personal improvement. Initially they had a quality management system and currently they certify processes under: i) ISO 9001/2000 (economic-operating capability); ISO 14001/2006 (environmental care); OSHAS 18001/2006 (occupational health and safety management).
The third stage of the company’s development began in 2006 when it became a public firm with a global perspective and very ambitious growth projects, also based on minimum fixed assets, team building and network building. Their impressive growth capacity could be appraised by looking at the recent evolution: 129 thousand planted hectares in 2005/06; 182 thousand in 2006/07; 337 thousand in 2007/08; 650 thousand in 2008/09: The target for 2009/10 was 885 thousand planted hectares and a production of 2.9 million tons of cereals and oilseeds. In 2006 ET Arg received US$ 30 million equity investment from Altima Partners to expand the area planted and to purchase land (adding a new component: capital earnings through land appreciation). In 2007 ET Arg received additional US$ 20 million equity from Altima and created the firm Campos Verdes. In 2008 ET Arg and Campos Verdes merged and created El Tejar Limited (ETL) and also expanded its operations to Paraguay. In 2009 ETL received US$ 150 million equity from a large investment fund, The Capital Group Companies.

The new business model involves two components. The main one is the production business, conducted with the previous strategy of minimum fixed assets and strong teams and networks, focussed on primary commodity production in 5 countries, with EBITDA budgeted and controlled on-line by farm and by lot. The targeted growth is very ambitious: 2.0 million hectares planted area in 2014/15 in the Southern Cone, with most of the projected growth in Brazil and Uruguay. The second component is the real estate business, looking at capital gains generated with high quality land acquisitions and sales (land value arbitrage among the different countries and regions). The company has successfully invested US$ 564 million in farmland over the past two years (acquiring almost 150 thousand hectares, half of them in Brazil), taking advantage of the company’s regional network and its multi-local presence in 5 countries; they already built one of the largest privately held cropland in South America. By the end of 2008 the market value of the properties was 56% over the book values.

ETL core business is primary commodities production with minimum fixed assets and implies a redefinition of the traditional agro paradigm, which allows them to be very competitive and to achieve long term sustained growth. Business management replaces the isolated traditional farmer by a new business approach, involving strategic networks, alliances and a strong development of soft assets (know how, networking, information systems), using Montecarlo simulations to create a crop portfolio aimed to manage weather, country, environment and price risks. They implement a flexible and dynamic production strategy with annual crops, and a professionalized total quality management. Networking involves: i) the development of services providers; ii) building long term relationships with the main input providers (such as Basf, Monsanto, Petrobras Energia, ADM, Bunge, Cargill, Nidera, Isusa, Los Grobo and Baya Casal) to receive technological and logistics support, financing and just in time services; iii) building long term relationships with the main customers (such as ADM, Bunge, Cargill, Dreyfus, Los Grobo, Canta-bria, Copagran, Big Frango and others) to have a diversified client roster, to receive logistics support, differentiated commercial terms and convenient financing. Risk management includes the use of barter agreements, forward sales and futures markets; and a portfolio selection of different crops and production locations looking at different weather patterns. Strategic risk focus includes politics, macroeconomic and social issues. The firm uses high-tech just in time cutting edge technology, including no-till farming, crop rotations, double-cropping, high yielding seeds and technologies, information technologies and site specific farm management, to allow them to be a very competitive low cost producer. They also base their competitive advantages on economies of scale to reduce costs and to improve their access to technology, to financing and to markets. In terms of environment and social sustainability they produce primary products with: social responsibility, environmentally friendly technologies and customer focus; they develop young professionals and entrepreneurs; and the company is “multi-local” with social commitment in each production area.
Other large new production models do not limit their growth to primary production on rented land. They also develop upstream and/or downstream activities along the soybean value chain and in other value chains. Some of these successful firms develop seed production, import fertilizers and other chemicals, provide logistics and trading services, export, produce feed and meat and other processed products such as bio-diesel. The integration process allows them to reduce transaction costs and to increase their purchasing-selling power. In box 2 is described the case of Los Grobo, a large Argentine firm producing mainly on rented land in Argentina, and more recently in other South American countries, which has also developed several upstream and downstream activities in the soybean value chain and in other related chains.

**BOX 2. LOS GROBO**

Adolfo Grobocopatel and his brothers used to farm land and to operate as country dealers for several decades since the 1950s, based in Carlos Casares, a city located in the Center-West of Buenos Aires province. In 1984 they decided to split their company, and Adolfo created the firm Los Grobo Agropecuaria (Los Grobo) to specialize in farming and breeding livestock, leaving to his youngest brother the trading activities. He kept a 3,500 hectares farm of high quality land, and involved his sons in the management of the firm. One of them, Gustavo, a young and innovative agronomical engineer, became responsible of overall production, and Andrea, economist, got in charge of finance and administration; both contributed to professionalize the firm. They gave a high priority to increase productivity and also to improve competitiveness through costs reductions. At the beginning they had the land, 4 employees and one truck; they were a family mid size farming firm.

Initially they grew purchasing land and renting additional land to increase scale. They also developed grain trading activities, purchasing a 1,000 ton storing plant in 1985; later they purchased additional plants, totalling 8,000 ton storing capacity by 1990. Most of the growth was based on their own investment of profits and the networking; very little was funded with institutional short term credit.

During the **1980s** they consolidated an *efficient producing and trading family firm*, implementing the main technical innovations available, such as no-till farming, improved seeds and fertilizers, and developing good commercial relations with their customers. Adolfo’s dream was to grow in the ownership of land and leave a farm for each of his four children. They were able to conduct successful real estate farm businesses allowing them to increase the owned family land to 9,000 hectares by 1993.

However, taking into account the challenges and opportunities emerged with the Convertibility Plan and the economic and commercial reforms implemented by the government since 1991, by the **mid 1990’s** Gustavo Grobocopatel find that the **growth strategy** should change; it should be based on farming and trading networks, keeping as little as possible the assets and operations within the boundary of Los Grobo, renting land-associated owners- and storing facilities, and involving independent services providers. Scale, efficiency and networking were key objectives of the strategy. During the **1990s** they grew very fast and became a *large professionalized agribusiness firm*, involving hired specialized managers and external advisors. Since 2002 the agronomists working for the firm became associated services providers, receiving as payment a percentage of the crop raised; they grew as independent firms providing most of their services to Los Grobo, but also to others; and some of them run their own farming.

Since the early 1990s Los Grobo created a decentralized network of **associated regional branches** to purchase grain, to sell inputs and services, and to develop new business. Branch officers work closely with Los Grobo regional agronomists, who are supposed to purchase the inputs at the branches; and they also deliver the grain to the com-
pany. Initially the branches were located in the Province of Buenos Aires; latter they opened branches in Cordoba, Santa Fé, La Pampa, and Chaco. More recently they expanded to Uruguay, Paraguay and Brazil.

The branches are linked to Los Grobo headquarters, located in a farm near the city of Carlos Casares, where the company conducts i) the planning and monitoring of agricultural production, working closely with the agronomists; ii) the procurement and distribution of inputs through the branches; iii) the selling of the company’s and other farms grains, and the hedging through a Los Grobo owned company named Chain Services S.A. They also created SGR Los Grobo, a reciprocal guaranteeing company which finances small and medium sized network members. In addition, since 2005 they have expanded the acreage issuing agricultural trusts, beginning a new relationship with capital markets; the second two year duration trust launched in 2006 totalled US$ 12 million and was destined to plant 45,000 hectares in Buenos Aires and Entre Ríos.

During the nineties, their strategy and the favourable economic and institutional environment, allowed them to grow very fast. Technology, including biotechnology (RR soybean) and information technologies, and the development of futures markets were also key factors for their success. They continued growing during the 2000s favoured by the improved food international scenario; and they expanded operations to other South American countries to mitigate weather, market and political risks. Currently they are one of the largest grain producers in South America, with 230 thousand hectares planted in 2009/10. Most of their producing land is rented (involving different alternatives: associated owners sharing risks and rewards, owners receiving a percentage of the yield per hectare, and owners receiving a specified amount of money); they employ few strategic people, and they do not own most of the fixed assets required to sow the crops, to harvest and to transport the production to the markets / ports.

The production strategy has been to grow through “agreements with people” that provide the land and most of the services required for production, developing networks with hundreds of land owners, agronomists, contractors, branch managers and other companies along the value chain. The growth through contracting is based on customer’s trust and alliances resulting from their transparency and solvency (volume operated, the storing and processing capacity and the land owned).

The trading strategy included the origination of grain produced by the firm in own and in rented land (vertical integration), and provided by associated producers (vertical coordination), and through contracts and purchases in the market. By the mid 1990s more than ¾ of total origination was purchased in the market; while by the mid 2000s more than 70% was provided by own production, associated producers and contracts. They have concentrated operations with large customers, reducing the number and increasing the volume per customer. Since 1998 Los Grobo also provide futures markets services (mainly to their large customers), becoming by the end of the 1990s in the third largest operator in the Buenos Aires grain futures market.

The vertical integration strategy also included the purchase of a wheat mill in 2000. In 2005 they purchased a second large mill. And including an additional rented mill, they became the fourth largest milling group of Argentina. Since then they created a new business unit in Brazil: Los Grobo Agroindustrial do Brazil, through which they sell to such market Argentine high quality wheat flour and pre-mixes.

Today, the key competitive advantages of Los Grobo are: 1) Economies of scale and dynamic growth (21% annual growth in area planted and 20% annual growth in grain origination during 2002/03 to 2009/10. 2) Weather, market and political risk mitigation through diversification in four South American countries and six crops. 3) Integration: they conduct on farm research and development; they purchase and sell inputs; they provide financial services to local producers; they conduct technical crop monitoring including quality controls; they provide
hedging services; they provide marketing services (transport, conditioning, storing, etc); they sale their produc-
tion through their marketing network and operate as country dealers. 4) **Network model** they provide inputs
and services to farmers, they rent land and use services providers equipment, and they trade their own and third
parties grains; the models help them to leverage scale and operations, to receive additional sources of income,
to optimize the use of fixed assets and to mitigate risks operating in different regions of four countries. 5) **Improved
and efficient management technologies**, involving high-tech production and precision agriculture, information
technologies, best weather and market risk management practices and sophisticated trading. Quality is a main
issue involving: leadership, processes and results; already in 2000 they were ISO 9001 certified. 6) The **management
team** very innovative, with proven experience and a strong growth strategy. During the 1990s and early 2000s they
became a regional agribusiness leader, and since 2004 they began an internationalization strategy becoming one
the largest South American grain producers by the end of the 2000s with around 250 thousand planted hectares;
and a large grain trader with 3 million tons traded in 2009.

### 3.3. SERVICES PROVIDERS

Since many decades ago harvesting, transportation, conditioning and storing services have been provided
by specialized firms. Argentina has a large network of firms providing such services. More recently some services
providers are emerging as specialized firms, providing “on-farm” services for crop management and technical
advising, for planting and for sanitary controls (herbicides, insecticides, pesticides, etc.). In most of the cases they are
small or medium sized firms, which develop their activities at regional or sub-regional level, based in specific loca-
tions (towns and small cities of the main producing areas). They involve several thousands of firms for each service,
and they perform in competitive regional markets. In addition, there are other relevant services provided by public
and private organizations; the main ones are the grain exchanges and the sanitary and quality services.

### COUNTRY DEALERS AND COOPS

Most of the conditioning and storing of the soybean and other grains is provided by country dealers and coops
widespread in all the producing areas. There are about 1,200 private firms and 500 coops, who own around 54% of
the total fixed storing capacity of Argentina. The crushing industry owns 11% of total fixed capacity; port facilities
7%; and flour mills 4% (Table 3).

In Argentina the structure of the storing capacity is very different to that existing in the USA or Canada, countries
in which most of such capacity is “on-farm”. Table 3 shows that producers own only around 22% of total fixed ca-
pacity. “On-farm” fixed capacity in Argentina is relatively low when compared with total production (15.9 and 94.4
million ton respectively in 2006/07). In the last decade farmers and also some country dealers have successfully
used plastic bags as transitory silos, to overcome their

### TABLE 3. GRAIN STORING CAPACITY IN ARGENTINA IN 2007 (million tons and percentages)

<table>
<thead>
<tr>
<th>Agents</th>
<th>Total capacity (million ton)</th>
<th>Share in total fixed capacity (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country dealers and coops</td>
<td>38.20</td>
<td>53.9</td>
</tr>
<tr>
<td>Farmers (fixed silos)</td>
<td>15.90</td>
<td>22.4</td>
</tr>
<tr>
<td>Oilseed crushers</td>
<td>7.66</td>
<td>10.8</td>
</tr>
<tr>
<td>Exporters (at the ports)</td>
<td>4.76</td>
<td>6.7</td>
</tr>
<tr>
<td>Flour mills</td>
<td>2.55</td>
<td>3.6</td>
</tr>
<tr>
<td>Feed mills</td>
<td>0.79</td>
<td>1.1</td>
</tr>
<tr>
<td>Rice mills</td>
<td>0.56</td>
<td>0.8</td>
</tr>
<tr>
<td>Specialized Conditioners</td>
<td>0.52</td>
<td>0.8</td>
</tr>
<tr>
<td>TOTAL FIXED CAPACITY</td>
<td>70.93</td>
<td>100 %</td>
</tr>
<tr>
<td>Plastic bags*</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

*Source: Lopez, G. and G. Oliverio. 2008 with data from ONCCA and Agritrend SA
Notes: *Estimated. **Total grain and oilseed production in crop 2006/07 was 94.4 million ton.*
lack of enough fixed storing infrastructure. Despite farmers use plastic bag silos, they are supposed to condition and store a high percentage of their production in the facilities provided by local country dealers and / or crushers and other processors. In 2007 plastic bag silos represented around 30% of total capacity (fixed storing capacity + plastic bags).

During the last two decades total fixed storing capacity has been around 20% under total annual production23. Such situation implies a good use of fixed capital, when compared with other competitors (capital costs advantages). However, in some critical periods after the harvest of the soybean and other summer crops it creates management difficulties. The development of plastic bag silos has been a very useful innovation to improve efficiency and negotiating power, and for the management of the grains during the harvesting time, particularly for farmers who use several large harvesters at the same time. They also allow them to better manage different products / qualities.

Country dealers and coops provide conditioning and storing services, but they also operate as traders, purchasing and selling the cereals and oilseeds. Many of them also sell inputs to farmers (seeds, chemicals, fertilizers) which are partially financed by the country dealers and paid at the harvest with the delivery of the grains.

Several decades ago, most of the production was sold or delivered for deposit24 by farmers to country dealers, who conducted most of the commercial and financial relationships with the farmers. Direct sales to crushers and exporters were very limited, mainly restricted to large producers owning storing facilities; and crushers and exporters were specialized in their specific activities, with limited regional storing facilities (and they did not use to sell inputs). Deliveries to the ports and processing plants were managed mainly by the country dealers and coops. Such marketing channel included several participants (the dealer plus the broker), increasing the transaction costs.

More recently, large and medium sized farmers have developed direct arrangements and sales with crushers and exporters, which also have built / purchased storing plants and developed regional networks through which they sell and finance inputs and receive as payment the soybeans after the harvest (many of such operations are barter programs, which reduce tax costs and other brokering fees). These alternatives reduce the transaction costs along the value chain, and improve the coordination between producers and crushers / exporters, which is very important in terms of logistics, quality arrangements and traceability.

Most of the country dealers are medium sized local firms which operate at regional level. There are very limited cases of large country dealers operating at national level. Despite crushers and exporters own country elevators, their regional storing capacity is a small part of their total operation, and they need to acquire most of the grain from country dealers, coops, farmers and other brokers. In recent years, country dealers and exporters have also developed network agreements instead of consolidations, which have been more significant in other countries.

“ON-FARM” SERVICES PROVIDERS

“On-farm” services involve many different agents. The main ones are the technical advisers and the contractors. Both are key players in the soybean chain.

The progressive sophistication of the farming activities registered during the last three decades has raised the relevance of technical advisers (consultants) as key factors for the business success. In the old farming system the technical management of the farms was one of the main tasks conducted by the owners of the land or the tenants, who eventually received technical advising provided by public extension services. Later, the growing importance of innovations increased the relevance of technical advisers. Several decades ago the CREA groups were created, involving around 10 farms each, which hired a technical adviser for the activities conducted by the groups25. These groups had an important role on the farmer’s awareness of the relevance of private consulting, and helped to develop good links between the research centers and the farmers. More recently AACREA has also played an interesting role in the

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23 It should be noted that total capacity includes port and other facilities which are not totally available for storing.
24 Some farmers used to sell the cereals and oilseeds to the local dealers, who later sold them to final users (earning a margin with the prices). Other farmers just delivered the grain for the conditioning and storing at the dealers (who charged for the services provided), but maintaining the ownership until they sold it to crushers or exporters.
25 The main purpose of the CREAs (regional consortiums for agricultural experimentation) is to share experiences among the farmers of the group and to receive technical and managerial advise. They have created the national association AACREA (www.crea.org.ar).
development of the networks between farmers and the private R&D sector involving input providers.

In addition to AACREA, during the last two decades there were created other private organizations, such as AAPRE-SID (www.aapresid.org.ar), and other public-private initiatives destined to provide technical assistance to groups of farmers, such as CAMBIO RURAL and other similar organized by some Provinces.

Direct private consulting has grown dramatically during the last two decades. In the main producing areas there are small consulting firms and individuals specialized in technical advising. There are also some medium sized firms which provide technical advising and became managers of the “planting pools”. They have played a very important role in the restructuring process of the Argentine soybean production system.

There are three main kinds of contractors: i) tilling and sowing firms; ii) crop defense firms; iii) harvesting firms. They are small and medium sized firms; most of them are family firms that operate at regional level. There are several thousands of services providers, which usually use the equipment more intensively than the farmers who implement such tasks with their own equipment. The higher use of the equipment allows them to reduce the costs of the services and to reduce the period of time required for their replacement, which is important to purchase new machinery with innovations (contractors usually renew their equipment after 2 to 4 years). The massive use of no-till practices has been facilitated by such situation; the estimates for the Province of Buenos Aires are that 77% of the area planted with no-till technology is contracted.

Some of them (around 3,500) are associated to a specific chamber FACMA (Argentine Federation of Agricultural Machineries Contractors www.facma.com.ar which joins several regional chambers). Recent studies have estimated that there are near 10,000 contractors, among which there are around 1,000 harvesters and 250 firms specialized in air spraying. The chamber reports that between 80 and 85% of total spraying and harvesting is conducted by contractors. Some contractors are also soybean producers.

The quality of the equipment, particularly in the case of direct sewers, sprayers and harvesters has improved substantially during the last two decades. Such process has paralleled the increase in production and productivity of soybean and other crops in such period. Together with the incorporated innovations in the equipment, there has been also an improvement in human resources involved in the operations, which are key factors for the success of the very sophisticated production systems currently implemented. Many producing firms using networks make strong efforts to professionalize and to ensure the loyalty of its services providers; this is also an interesting process that has improved the chain’s competitiveness.

CARRIERS

Most of the soybean produced in Argentina is carried in bulk by trucks from the farms to the local country dealers/coops, and to the crushers or ports. Rail infrastructure is very limited, and the services are usually very poor. Barges are not relevant for most of the Argentine production. The estimated shares for total cereals and oilseeds carried are: 83-84% trucks; 15-16% rail; and 1-2% barges. Barges are also used to bring soybeans from Bolivia and Paraguay to Rosario port.

Taking into account that trucks are the most expensive alternative and barges the cheapest, this situation could be considered a weakness of the Argentine system. However, such weakness vis a vis other countries like the USA or Canada is less relevant in the case of Argentina, because most of the soybean is produced near the ports (around 200 to 300 kilometers); very little production is distant more than 500 kilometers. This is not the case of the competitors, USA and Brazil, because the main producing areas in the USA and the main expansion areas in Brazil are located at more than 1.5 thousand kilometers from the export ports.

Studies conducted to compare transportation costs in Argentina, Brazil and the USA show that unit costs for trucks...
(in US$ per ton and per km) for soybeans are similar in Brazil and Argentina, and higher in the USA\textsuperscript{31}. Rail freights are similar in the three countries. In the same study the average distance mentioned from origin to ports is 300 km in Argentina; in Brazil it varies from 300 km in the Southern states to 1,500 km in the Western states (Mato Grosso and Mato Grosso do Sul); and 1,400 km in the USA.

Most of truck carriers are small and medium sized firms widespread all over the producing areas. Cereals and oilseeds are the main products transported in Argentina. There are several local / Province’s chambers and the National chamber CATAC (Argentine Chamber of Load Carriers www.catac.org.ar): its associates are individuals and firms. CATAC is a very strong private organization, which sets the freights for cereals and oilseeds (usually in agreement with grain trader’s and farmer’s organizations). Currently the trucks registered are around 720 thousand\textsuperscript{31}.

**DOMESTIC GRAIN AND OILSEED MARKETS**

**Spot markets.** There are three main markets located at the ports: Rosario, Buenos Aires and Bahía Blanca. Most of the local sales, all over the main producing areas, are referred to the spot prices quoted at one of these markets\textsuperscript{32}. These three markets operate daily in spot, and the quotations are disclosed (almost on-line) all over the country through the radio and the television; and they are published in the newspapers.

The system is very transparent, because most of the contracts (spot and forward sales) use such prices and discount the brokering and other marketing costs. The net prices received by farmers or by the country dealers include in the invoice the market price and all the deductions. They are referred to a standard quality; in the contracts and in the final invoices there are also included the premiums (or discounts) for the quality.

A substantive part of the sales are forward sales (“ventas a fijar”), in which the farmer / country dealer deliver the soybean and later select the date for the final pricing and sale. The prices used for the invoices are the grain exchange quotations at the selected day, which are disclosed every day by the three exchanges (“precios de la pizarra”).

Since most of the crushing industry is located at the ports, particularly Rosario, the pricing system is relatively simple and transparent. The crushing plants located in the interior of the country (a small percentage of total capacity), usually negotiate the prices paid to farmers in the same way, using a reference port price at a selected grain exchange and deducting the marketing costs, including also transportation costs and quality premiums.

**Future markets.** The Rosario Exchange and the Buenos Aires Grain Exchange also operate with future contracts. The reforms implemented in the early 1990s promoted the use of the future markets and options; there were allowed quotations in pesos and in US Dollars. This decision and the monetary policy (currency convertibility and price stability) helped very much the development of the futures markets in Argentina, which grew dramatically during such decade. Such development helped very much to reduce risks and has been one of the relevant tools to improve competitiveness and to promote the growth of the soybean and other grains production registered during the 1990s.

The devaluation of the currency in 2002, the inflation registered after the devaluation until today, and the currency controls and market interventions (export taxes and export bans) have reduced very much the use of the Argentine future markets since then. For such reason, currently most of the domestic soybean trade is spot or forward sales “ventas a fijar” which also use the spot exchange’s prices.

Trading and crushing companies use the international future markets, like the Chicago Exchange, for their overseas operations. But this is not the case of farmers and country dealers.

**SANITARY AND QUALITY SERVICES**

Since many decades ago Argentina gave a high priority to the sanitary and quality conditions of the grains and oilseeds produced and traded. Since the 1940s until the 1980s the National Grain Board was in charge of the public controls and the setting of the standards for the domestic market and for exports\textsuperscript{33} (including also oils and

\textsuperscript{31} Bisang, R. et al. (2008).

\textsuperscript{32} There are some limited sales between farmers and country dealers that are agreed on a local price, but also in cases such prices are based on port prices, deducting all the costs incurred in sending the soybean to the ports.

\textsuperscript{33} Some international sales use additional specified standards or conditions, which are controlled by international or local firms providing such services (such as SGS, Control Union, etc.)
There are several projects in the pipeline for the next years which will add around 20 thousand tons per day. ADM, which has large operations in Brazil and the USA, did not invest in crushing facilities in Argentina. They operate in the FOB market.

In addition, within the grain exchanges, there are Arbitration Chambers aimed to resolve disputes between parties. Both kinds of services have been crucial to promote the quality and the transparency in the domestic market, and to guarantee the sanitary and quality conditions of the exported goods. Since the 1990s until nowadays the functions performed by the National Grain Board (JNG) are conducted by the SENASA (the national service in charge of sanitary and quality controls including all primary and processed agricultural products). The JNG specialized teams and functions were transferred to SENASA.

Quality and health issues are becoming more important and such priority will increase in the future, associated with consumer preferences. Traceability is becoming a need in some cases, particularly for differentiated products. The new requirements will be a challenge for the conditioning and storing capacity growth, which currently is relatively scarce.

The certification of non GMO crops and products is a service currently required for some special contracts, involving its traceability from the farm to the ports. Such service is provided by specialized private firms, which operate along the value chain and conduct the analysis at public laboratories (INTA) or those provided by the Arbitration Chambers.

3.4. CRUSHING AND OTHER PROCESSING INDUSTRIES

The Argentine crushing industry is currently the most modern and competitive of the world. The processing and storing capacity grew dramatically together with the Argentine soybean production and the growing international demand for oilseeds and protein meals. Its growth followed a competitive export strategy: i) most of the plants are located at the ports; ii) they have been built recently and they involve the most modern technology available; iii) they are large plants, with the highest average crushing capacity per day of the world. The leading firms own at least one plant with a crushing capacity over 8,000 tons per day (24 hours); and the national average is over 4,000 tons per plant per day, including the smaller firms. Total crushing capacity is around 150 thousand tons per day (assuming 320 working days per year, total capacity is around 45 million tons)\(^34\).

The main purpose of the Argentine crushing industry is the export of protein meal and crude vegetable oil, the two most traded processed commodities of the soybean complex. For different reasons, but mainly because of the tariff escalation existing in most of the relevant markets, it is very difficult to export refined oil and other value added products (packed, bottled and branded). However, some firms also process the oil in refineries for sales to the domestic market and some limited international sales (mainly to neighbor countries of Latin America and to African countries). In recent years some of the large crushing firms also built bio-diesel plants for the export market.

Similar to what happened in many other countries, during the last decades there has been a concentration process of the crushing industry, which involves some of the main international companies (Cargill, Dreyfus, Bunge, Glencore, Nidera)\(^35\) and some large local firms (Molinos Río de la Plata, Aceitera General Dehesa –AGD-, Vicentin). Table 4 shows that 6 firms concentrate almost 93% of the crushing capacity of Argentina.

The industry has storing capacity at the crushing plants and also has networks of owned country elevators in the main producing areas (strategic capacity, mainly for logistics). However, most of the storing and conditioning of the soybean crushed and exported is done at the producing areas by the country dealers and coops.

The large crushing firms are also input providers. Some of them produce seeds (Bunge, Nidera, AGD), but most produce and / or import chemicals and fertilizers. Through input sales the crushing industry usually develops trading arrangements with farmers, which in many occasions involve also financing and barter programs. This vertical coordination helps them for the logistics and the trading, and to reduce transaction costs.

Despite there is a limited number of leading crushing firms, the competition among them is very high, because they

\(^{34}\) There are several projects in the pipeline for the next years which will add around 20 thousand tons per day.

\(^{35}\) ADM, which has large operations in Brazil and the USA, did not invest in crushing facilities in Argentina. They operate in the FOB market.
try to increase their market share (all of them have been increasing their crushing capacity very much in recent years). The domestic competition strategy of the crushing firms is not limited to soybean prices and logistics provided to the farmers; it also includes the input prices sold and its financing.\(^{36}\) Such vertical integration and coordination approach has been a key factor for the competitiveness of some of the Argentine firms; this is the case of AGD, described in Box 3.

The Argentine crushing industry involves also the main trading companies and is very competitive when it is compared with the rest of the world. The main factors for its competitiveness are:

- it involves large firms with trading capacities all over the world which are focused on exports;\(^ {37}\)
- most of the crushing is conducted in modern and very large processing plants with low costs of production (economies of scale);
- the crushing plants are located at the ports, reducing transportation and loading costs;
- the domestic marketing system is well developed, and crushers have vertical coordination (and in some cases integration) with country dealers and farmers to reduce transaction costs and to implement efficient logistics;
- most of the large firms are input providers (fertilizers, chemicals, seeds), who develop barter programs with the farmers resulting in lower transaction costs;
- the government has implemented a long term policy to protect the processing industry against the tariff escalation existing in most of the importing countries, through a 3% differential export tax, which allows the crushing firms to purchase the soybean in the domestic market cheaper than the export price (FOB).

<table>
<thead>
<tr>
<th>Company</th>
<th>Number of plants</th>
<th>Crushing capacity (000 tons/day)</th>
<th>Average capacity/plant (000 tons/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargill*</td>
<td>5</td>
<td>29.6</td>
<td>5.9</td>
</tr>
<tr>
<td>Bunge**</td>
<td>5</td>
<td>26.8</td>
<td>5.4</td>
</tr>
<tr>
<td>Vicentin*</td>
<td>4</td>
<td>22.8</td>
<td>5.7</td>
</tr>
<tr>
<td>Molinos Rio de la Plata</td>
<td>2</td>
<td>21.5</td>
<td>10.8</td>
</tr>
<tr>
<td>Dreyfus</td>
<td>2</td>
<td>20.0</td>
<td>10.0</td>
</tr>
<tr>
<td>AGD**</td>
<td>4</td>
<td>20.0</td>
<td>5.0</td>
</tr>
<tr>
<td>Glencore-Moreno</td>
<td>3</td>
<td>5.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Nidera</td>
<td>2</td>
<td>4.2</td>
<td>2.1</td>
</tr>
<tr>
<td>Others</td>
<td>9</td>
<td>4.1</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>152</td>
<td>4.2</td>
</tr>
</tbody>
</table>

Source: Hinrichsen (2009), SAGPYA and companies’ websites.
Notes: *They also operate plants from other companies;**Both firms share a crushing plant in Terminal 6 (Rosario).

\(^{36}\) Many managers of the trading companies do not like to finance the inputs, because of the risks involved in activities in which they are not specialized (banking). However, input sales and financing are important tools to help them to improve their soybean's market share; and result in benefits for the farmers who have limited access to institutional credit (the banking system in Argentina is expensive and has many restrictions for small and medium sized farms).

\(^{37}\) Other industries, like the dairy industry, had a production and processing strategy focused on the domestic market, and is less competitive in the international market.
The Soybean Chain in Argentina

Box 3. AGD Group
Aceitera General Deheza Group (AGD Group) is a vertically integrated agro-industrial complex, employing more than 2,000 people and exporting to 95 countries in the five continents. Its core business is the crushing of oilseeds to produce and export protein meals and vegetable oil. However, the group is distinguished because it also involved in many strategic upstream and downstream productions and services along the soybean value chain and in other value chains, including seed production, sales of inputs (seeds, chemicals, fertilizers), technical advising to farmers, financing to farmers, primary commodities production, local storing and conditioning of the grains, transport by rail, processing and refining vegetable oil which is sold in the domestic and the export market packed and branded, production of a long list of other processed high quality products (such as mayonnaise, ketchup, soybean beverages, fruit juices, soya-lecithin, peanut butter, flavored and roasted peanuts). AGD group operates a railway and built ports to export the oilseed complex products, grains and other food. Since 2007 the group also produces and exports biodiesel.

AGD today is a global player. It accounts for over 14% of Argentina’s total edible oil and meals exports. In 2008 its world trade market shares were: 7.7% of total soybean meal exports; 7.2 of total soybean oil exports; 5.2% of total sunflower meal exports; 2.5% of total sunflower oil exports; and 15.8% of total peanut oil exports. They also market around 1.5 million tons of cereals. In the 2008/9 fiscal year AGD had a turnover of approximately 3150 million dollars, counting the totals of exports and sales in the local market.

The first crushing plant was built by Adrián Pascual Urquía and some friends in 1948. It was located in a small town of Córdoba province, General Deheza, where they still have the head office and some of the main processing facilities, including a refinery, a peanut selection plant and a bottling plant. Since early youth Urquía had a clear vision of the huge potential of the edible oil industry. He thought that the natural comparative advantages of the countryside should be enhanced with a vigorously modern, integrated and competitive processing industry. His projects carried out in the interior of the country allowed him to be recognized as an undisputed pioneer and leader of this successful story of the Argentine agribusiness community.

Initially, during the 1950s and 1960s AGD expanded and modernized the business producing sunflower and peanut oil destined to the local domestic market, improving the crushing technology with solvent plants and developing several brands of refined oil. Technical innovation and quality production have been always main priorities of the company.

As from the seventies the members of a new generation of the Urquía family and other men from General Deheza began to take responsibilities in the company. His cousin Alberto and his sons Adrian and Roberto joined the company during such decade and hold key positions in the group. Later, in 1985, his daughter Adriana also joined. Despite they have professionalized the company together with the growth AGD is still a family firm in which the Urquía family holds strategic managing responsibilities.

During the 1970s the company projected itself nation wide and later internationally wide, increasing the crushing capacity and building storing facilities in several locations to facilitate and guarantee the provision of oilseeds; they expanded the crushing operations to Santa Fe province, where they built a plant in Chabas city (at the heart of the Argentine corn-soybean belt distant 100 km from Rosario port). They also built the first export facilities by the Paraná River and began to export. Since then, and particularly during the 1990s and the 2000s when the soybean production raised significantly, AGD had an aggressive growth strategy including: i) new large and modern crushing plants, including port and crushing facilities on the Paraná-Paraguay waterway. Among them AGD built Terminal 6 in partnership with other firms, a port and a state-of-the-art soybean processing plant located in Puerto San Martín.

The Soybean Chain in Argentina 27
(near Rosario city), with a crushing capacity of 9,000 ton per day. AGD’s total crushing capacity is currently over 20,000 tons per day; ii) a network of storing facilities located mainly in Cordoba and Santa Fé, but also in other 8 provinces. They have 35 storing facilities and a storing and export plant in Mendoza; iii) taking advantage of the structural reforms implemented by the government during the early nineties the company got the concession of the railway Nuevo Central Argentino, which was strategic to improve their competitiveness for the purchase of the soybean and other grains and to improve the export logistics, which has been always a main issue in Argentina; iv) the vertical integration strategy included also farming of around 200 thousand hectares, involving land owned by the company, rented land and joint ventures with other farmers in Argentina’s prime growing areas for soybeans, sunflower, peanuts, wheat and corn.

In 1979 AGD diversified production building a peanut selection facility in General Deheza (currently it is the largest peanut processing plant in MERCOSUR). Since then they produce, process and export peanuts and peanut products. Later they expanded the peanut processing capacity, building plants in the South of Córdoba and in San Luis province, where they produce flavored and roasted peanuts, sauces and dressings, beverages from organic soybeans and other fruit juices. They have developed several high quality certified brands, including also organic products. Currently AGD’s peanut processing capacity is 1,000 tons per day.

AGD is an exclusively Argentine privately owned company that carries out most of the main stages of the production and distribution processes, producing ISO 9001 certified finished products for the domestic market and for export. It is a solidly constituted firm with a competitive profile based on several features: integration, diversification and high technology. The logistic chain has become a key strategic element to optimize AGD’s high productivity, allowing it to operate with high efficiency in the Argentine and global markets. Its business goal is constant growth, based on seven strategic pillars: qualified human resources; the integration of production processes; origination; technology innovation; profit reinvestment; the development of a solid logistics structure; and a real competitive vocation.

Most of their impressive growth has been based on own savings. However, they have received strategic long term financing from the banking system, leaded by Rabobank and the IFC. They also get short term financing in the Argentine capital market.

One of the key components of AGD growth and competitive strategy has been the origination and supplies. For that purpose they produce cereals and oilseeds; they have developed commercial links with more than 6,000 farmers including the sales of seeds, chemicals and fertilizers, technical advising, financing, logistics and the purchase of the grains (cereals and oilseeds).

Financing of farmer’s purchases of inputs is a strong competitive tool to assure the provision of the grains. To partially support such service AGD created a Reciprocal Guarantees Society (Agroaval SGR) involving 900 associates, in which the company acts as “protecting associate”, providing guarantee funds. The society operates as a guarantor for primary production loans funded in the domestic capital market, financing around 35/40 million US dollars at very competitive rates when compared with other local alternatives (7% annual in US dollars for 270 days, which is the duration of the production cycle).

Another pillar of the impressive development of AGD Group is its efficiency in logistics, aimed at integrating all the different sectors of the company. This is why the industrial group operates the Nuevo Central Argentino railroad and two highly efficient port facilities in Rosario and Puerto San Martín.
Summing up, AGD competitiveness is based on several strategic factors: i) economies of scale resulting from large and modern crushing and processing plants; ii) vertical integration which reduces transaction costs and risks; iii) product and market diversification which also reduce risks; iv) the location of the plants at the heart of the soybean corn belt and at the main export ports; v) the network of country silos and the origination strategy; vi) the railway and ports (other crushers and exporters do not own railways); vii) the alternative production of biodiesel; viii) the added value production with high quality certification and branded, which is destined mainly to the domestic market but also to export markets.

The refining and packing capacity is very little when compared with the crushing capacity. Some of the large crushing firms (Bunge, Molinos, Vicentin, AGD) have refining plants with capacities ranging between 500 to 1,000 tons per day. There are also other medium sized crushing firms, food firms and coops which produce refined oil, margarine and other processed products. Both kinds of firms also bottle and pack the oil with their own brands. Most of the refined oil is destined to the domestic market for direct consumption, and for the production of margarine, mayonnaise and other related food products. However, there are also some exports of refined soybean oil. Total Argentine refining capacity is around 5.1 thousand tons per day.

The quality of the soybean oil for domestic consumption improved very much during the 1990s. This evolution together with the marketing strategy conducted by some of the large crushing firms, promoted the domestic use of soybean oil replacing part of the sunflower seed oil, which was for many decades the main vegetable oil consumed in Argentina (more than 90% of total domestic demand until the 1980s). Currently around 40-50% of total consumption is soybean oil.

Bio-diesel. During the last three years since 2007, many bio-diesel plants were built in Argentina, following the increasing international demand and the projected local demand. Most of the large bio-diesel plants were built nearby the crushing plants located at the ports (almost all in the Rosario area). There are already in operation 10 large plants located at the ports, with capacities ranging from 100 to 300 thousand tons per year; total capacity in 2008 was 2.0 million tons per year. There is also a long list of small plants destined to supply the domestic market, which are located at different cities in the interior of Argentina.

In 2006 the Argentine Congress passed the Biofuels Law that mandates the use of 5% blends, beginning in 2010 (both for gasoline and for fuel oil, called in Argentina “gasoil”). The country has also promoted the production and export of bio-diesel, through a differential export tax on the soybean oil and on the bio-diesel. Such differential has been the main driving force for the huge investment in bio-diesel plants located at Rosario during 2007-2009. They exported around 840 million US Dollars (0.7 million tons) of bio-diesel in 2008.

The emergence of an alternative demand has been an advantage for the crushing industry and particularly for the firms which built bio-diesel plants at the ports. The profit raised by such firms has been very high in 2007 and part of 2008, years in which there was a growing international demand; and exports of bio-diesel benefited also from the differential export tax. However, the current situation has changed very much, after the financial crisis and the decline in oil prices registered after September 2008.

3.5. EXPORTS. TRADING COMPANIES
Most of the soybean and soybean products are destined to export. The development of the Argentine soybean production during the last two decades was driven by a very dynamic international market, in which Argentina is one of the three leading exporters. Table 5 shows that Argentina is the largest exporter of soybean oil (around 55% of total exports) and soybean meal (around 48% of total exports); and the third largest exporter of soybean (around 12-16% of total exports).

The structure of the trading sector is similar to the crushing industry (Table 6). During the last two decades there has also been a concentration and consolidation process in trading, resulting in a reduced number of international and local very competitive firms, which concentrate a
high share of total exports of the Argentine soybean complex. The trading sector involves almost the same crushing firms. In 2008 the 5 larger crushing firms exported 82.8% of total soybean oil exports and 80.0% of total protein meal exports. However, only 3 of them are large exporters of soybean, accounting for 40.8% of total exports. ADM, Nidera, Noble and Toepfer are also relevant exporters of soybeans (in the range of 10-12% each).

Some of the main trading companies are the same firms operating in Brazil and the USA. The rest of them are local firms that have shown their ability to compete with the large multinational trading companies. Therefore, the whole system is very competitive and allows Argentina to be an efficient player in the global soybean value chain. Since several decades ago Argentina counts with a well developed and transparent export market for forward and spot sales, the FOB market, in which trading companies operate daily on the basis of premiums against the main international markets (Chicago, Kansas and others, depending on the commodity and destination of the sale). There are also some flat quotations. FOB quotations are published daily in the newspapers and other media. They are used as the reference price for the export taxes calculation, for the conversion into local currency and for the domestic pricing system.

### TABLE 5. SOYBEAN COMPLEX EXPORTS. MAIN EXPORTING COUNTRIES

(million tons and percentages of total exports)

<table>
<thead>
<tr>
<th>PRODUCTS</th>
<th>Units</th>
<th>2000/01</th>
<th>2005/06</th>
<th>2007/08</th>
<th>2009/10*</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SOYBEAN</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>Million tons</td>
<td>7.4</td>
<td>7.2</td>
<td>13.8</td>
<td>9.7</td>
</tr>
<tr>
<td>Brazil</td>
<td>Million tons</td>
<td>15.5</td>
<td>25.9</td>
<td>25.4</td>
<td>24.0</td>
</tr>
<tr>
<td>USA</td>
<td>Million tons</td>
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<td>25.6</td>
<td>31.5</td>
<td>34.4</td>
</tr>
<tr>
<td>World total</td>
<td>Million tons</td>
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<td>63.8</td>
<td>79.6</td>
<td>76.0</td>
</tr>
<tr>
<td>Argentine share</td>
<td>%</td>
<td>13.8</td>
<td>11.3</td>
<td>17.3</td>
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<tr>
<td><strong>SOYBEAN OIL</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Argentina</td>
<td>Million tons</td>
<td>3.2</td>
<td>5.6</td>
<td>5.8</td>
<td>5.4</td>
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<td>Brazil</td>
<td>Million tons</td>
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<td>2.5</td>
<td>2.4</td>
<td>1.8</td>
</tr>
<tr>
<td>USA</td>
<td>Million tons</td>
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<td>0.5</td>
<td>1.3</td>
<td>1.5</td>
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<tr>
<td>World total</td>
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<td>7.1</td>
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<td>10.9</td>
<td>9.8</td>
</tr>
<tr>
<td>Argentine share</td>
<td>%</td>
<td>45.1</td>
<td>57.1</td>
<td>53.2</td>
<td>55.1</td>
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<tr>
<td><strong>SOYBEAN MEAL</strong></td>
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<tr>
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<td>37.5</td>
<td>46.7</td>
<td>48.0</td>
<td>48.6</td>
</tr>
</tbody>
</table>


Note: * The relative reduction in Argentine oil export shares is associated with the dramatic growth in production and exports of biodiesel, which begun in 2007.

---

38 There are some differences because some large international crushers and traders (ADM, Toepfer) did not invest in crushing plants in Argentina. The large local crushing firms do not export soybeans. Some of them export other grains and processed products.

39 The SAGPYA establishes periodically the FOB minimum export prices, which are used for the calculation of the export taxes, based on the FOB market.
3.6. MAIN IMPORTERS

Argentina has a long list of markets of destination of the soybean complex products. In recent years soybean exports reached more than 30 countries; crude soybean oil exports reached almost 50 countries; refined soybean oil reached around 45 countries; and soybean meal exports reached near 60 countries.

However the main destination for soybean is China; its market share in Argentine exports has grown dramatically during the last decade. In the last 3 years China concentrated more than 60% of total world imports. Other important markets for Argentine soybean are several South East Asian countries (Indonesia, Malaysia, Thailand), some EU countries, Egypt, and Chile. The main markets for Argentine crude soybean oil are China, India, Morocco, Algeria, Bangladesh, Egypt and several Latin American and EU countries. In the case of refined oil the main markets are Angola, South Africa, Columbia, several EU countries and India. The main soybean meal market is the European Union (the largest world import market); other relevant markets are Philippines, Indonesia, Malaysia, Thailand, Vietnam, South Africa, Korea, and several North African and South American countries.

Despite Argentina’s soybean production is almost 100% GMO, the long list of countries of destination, including the EU and many African countries, shows that the

TABLE 6. EXPORTS OF THE SOYBEAN COMPLEX: SHARES OF THE MAIN EXPORTING COMPANIES IN 2008 (percentages of total exports)

<table>
<thead>
<tr>
<th>Companies</th>
<th>Oil (%)</th>
<th>Protein meal (%)</th>
<th>Soybean (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGD</td>
<td>13.8</td>
<td>16.5</td>
<td>--</td>
</tr>
<tr>
<td>ADM</td>
<td>1.9</td>
<td>--</td>
<td>11.4</td>
</tr>
<tr>
<td>Bunge</td>
<td>16.2</td>
<td>18.1</td>
<td>10.6</td>
</tr>
<tr>
<td>Cargill</td>
<td>27.5</td>
<td>22.0</td>
<td>19.8</td>
</tr>
<tr>
<td>Dreyfus</td>
<td>15.2</td>
<td>13.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Molinos Rio de La Plata</td>
<td>10.1</td>
<td>10.2</td>
<td>--</td>
</tr>
<tr>
<td>Nidera</td>
<td>2.9</td>
<td>2.4</td>
<td>10.1</td>
</tr>
<tr>
<td>Noble</td>
<td>--</td>
<td>--</td>
<td>12.3</td>
</tr>
<tr>
<td>Toepfer</td>
<td>--</td>
<td>--</td>
<td>10.2</td>
</tr>
<tr>
<td>Vicentin</td>
<td>4.3</td>
<td>9.4</td>
<td>--</td>
</tr>
<tr>
<td>Subtotal 10 Firms</td>
<td>91.9</td>
<td>92.0</td>
<td>90.3</td>
</tr>
</tbody>
</table>

Source: Data from SAGPYA. www.sagpya.gov.ar

TABLE 7. IMPORT TARIFFS APPLIED FOR THE SOYBEAN COMPLEX IN SELECTED COUNTRIES ("ad valorem" percentages)

<table>
<thead>
<tr>
<th>Countries</th>
<th>Soybean</th>
<th>Soybean meal</th>
<th>Crude oil</th>
<th>Refined oil</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>2.4-3</td>
<td>5</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>European Union</td>
<td>0</td>
<td>0</td>
<td>6.4</td>
<td>9.6</td>
</tr>
<tr>
<td>USA</td>
<td>0</td>
<td>2</td>
<td>19.1</td>
<td>19.1</td>
</tr>
<tr>
<td>Mexico</td>
<td>0</td>
<td>15</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>Colombia</td>
<td>15</td>
<td>15</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Chile*</td>
<td>0-6</td>
<td>0-6</td>
<td>4.2-6</td>
<td>6-6</td>
</tr>
<tr>
<td>India</td>
<td>30</td>
<td>15</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Indonesia</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Source: WTO tariffs database.
Note: * Argentina has preferential import taxes resulting from the FTA; all soybean products will be 0% in 2011.
country has no major difficulties to sell the products of the complex (currently the three main exporters are GMO countries). FOB quotations of Argentine soybean and products reflect the difference in freights, protein and oil contents, and short term market conditions vis a vis other competitors (i.e. USA Mexican gulf prices). For most of the markets the GMO condition does not result in price differences, except in the case of Japan, in which there are premiums for non GMO soybeans). In the case of soybean meal the Brazilian price has a premium associated with its higher protein-oil (pro-fat) content.

The soybean complex benefits with relatively low import tariffs in most of the main importing countries, when compared with other agricultural products. Such situation has been one of the reasons that explain why oilseeds (particularly soybean) are the commodities with higher ratio imports/consumption in world trade. It also explains why Argentine soybean production has grown more than cereals, livestock and other agricultural goods during the last decades; all of the other products are subject to substantially higher import taxes in most destinations.

However, the soybean complex is affected by tariff escalation in the main markets, because most of the countries try to import primary goods and process locally (to add value and employment in the respective country). Table 7 shows import taxes charged on the main soybean products traded in selected countries.

The soybean complex tariff escalation applied in the main world markets results in distorted international relative prices (primary products are priced relatively higher than the value added products of the chain). To partially balance this situation Argentina has implemented differential export taxes on the primary and processed products\(^3\), which provide and advantage to the crushing industry vis a vis the other two main exporters (Brazil and USA).

3.7. THE COMPETITIVENESS OF THE ARGENTINE SOYBEAN CHAIN

The concept of competitiveness is dynamic and changes over time, because it involves not only the own supply chain, but also the quantitative and qualitative evolution of demand and the behavior of competitors. Taking into account this approach, we can say that the Argentine soybean value chain is competitive when it can grow and increase its market share in the domestic and the international markets.

From the supply side view, the overall competitiveness of the value chain is associated with three different components which interact among them and finally result in the ability of the soybean value chain to compete (Figure 5). The competitiveness of the Argentine soybean value chain results from the efficient structure and performance of the private sector firms and organizations, together with the public institutions which are also participants in the chain (micro and meso competitiveness). All of them have been -and are also currently- influenced by Argentina’s public policies and institutional regime (macro approach to competitiveness)\(^4\).

Public policies implemented during the early 1990s created a favorable economic and institutional environment that promoted very interesting structural changes in the

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\(^3\) The differential export tax is limited to the first processing of the soybean to crude oil.

\(^4\) Public policies have changed substantially during the last decade. Some of them have been very positive for the competitiveness of the chain, while other ones are having negative impacts, as will be described in next chapter.
soybean value chain and resulted in its improved competitiveness and production growth.

During the last two decades the soybean production and its market share has grown in the domestic market: i) the area planted with soybean replaced areas previously destined to livestock and to other crops; ii) there has been an increase in the domestic vegetable oil market, showing its competitiveness vis-a-vis the sunflower seed oil.

However, the main destination of the production growth has been the international market, in which Argentina is very competitive. The global competitiveness of the Argentine soybean chain results from a very efficient structure of production, processing and marketing involving all the key participants:

- Modern and competitive input’s industry with very good links with producers.
- Very competitive and innovative producers (a high percentage of production involves networks with competitive access to capital, technology and markets). Large average size of farms and production units vis-a-vis other competitors.
- Developed services providers, including also sanitary and quality services. Efficient networks allow economies of scale and high rotation of capital goods.
- Transparent soybean domestic markets.
- Very competitive crushing industry which also owns port facilities (scale, technology, vertical coordination, differential export taxes on processed commodities).
- Large and competitive trading companies (in many cases the same crushing firms).

The international scenario has also been a driving force for the development of the soybean chain, particularly during the last six years in which domestic public policies once again discriminated against agriculture, and export taxes and other export controls were reestablished. The growth in international prices partially compensated the impact of export taxes and other domestic market government interventions until the 2007/08 crop, in which the level of such taxes went too high and reduced incentives to continue with the production growth trend registered during 1991-2007.

The main improvements in the competitiveness of the Argentine soybean value chain during the period 1991-2007 have been associated with:

- a) a favorable institutional, economic and commercial environment for investment and trade during more than ten years;
- b) added value through better inputs and high tech technologies, which allowed the increase of the productivity per hectare and the reduction in costs of production;
- c) production consolidation and coordination generated economies of scale at farm level (rented land, networks allowing an efficient use of equipment and other fixed assets) and resulted in lower costs of production and better management of risks;
- d) vertical coordination and integration has reduced transaction costs and capital costs associated with improved logistics;
- e) consolidation and huge investment in the crushing industry provided economies of scale and improved technologies, which reduced processing and marketing costs, including also the port costs;
- f) large trading firms (consolidation process) provided economies of scale and good access to the main international markets;
- g) exports of processed products promoted markets’ diversification and added value through sales of oil and meal.

3.8. EMPLOYMENT IN THE ARGENTINE SOYBEAN CHAIN AND IMPACT ON REGIONAL DEVELOPMENT

Many old sector studies have raised the idea that agriculture is not relevant in job creation. That is one of the reasons why the import substitution strategy implemented during many decades in Argentina protected other manufacturing industries, while the agricultural sector was discriminated against, mainly through commercial and differential rate of exchange policies. Such views were based on information limited to primary production, or even included primary goods processing, without taking into account the whole value chain from input providers, to farmers, to services providers in the different stages up to the processing, trading and distribution system (all the soybean cluster).

Information in Table 8 was increased 14.5% in all the components related to area planted (seeds, fertilizers and chemicals, machinery, primary producers and contractors) and by 46.2% in all the components associated with production (country dealers, carriers, crushers).
As is has been described in sections 3.1. to 3.5. the soybean chain involves many different stages and participants, and they have significant impact on employment and on regional consumption, particularly in the case of services providers. In recent years the agro-industrial chains became more sophisticated and promoted the development of several specialized industries; some of them are high-tech, like biotechnology and precision farming. They have created opportunities for new and more specialized jobs. Therefore, several studies have been conducted trying to estimate employment in the agribusiness sector as a whole and in some value chains, including all participants. Among them, in 2006 Bisang, R. and S. Sztulwark conducted a study on the employment in the soybean chain, from input providers up to crushers (it does not include exports and other related services like financing, quality services, and technical services). Their estimates for 2003/04 crop include a range of maximum and minimum jobs for each step (different assumptions), which are included in Table 8. Total direct employment in 2003/04 was estimated in the range of 215 to 304 thousand jobs. Most jobs are associated with total soybean acreage and production, which were respectively 14.5 million hectares and 32 million tons in the 2003/04 crop.

Using similar assumptions to those included in the study, our estimates for the 2007/08 crop, which totaled 16.6 million hectares and 46.2 million tons, range from 266 to 381 thousand jobs. Such numbers are very relevant when compared with employment in other protected manufacturing industries, such as the automotive and spare parts value chain. Following a similar approach to Bisang and Sztulwark, Victoria Castillo et. al. (2007) conducted a study for the automotive and spare parts chains (from autoparts to distributors) which is also part of the same book published by the Ministry of Labor in 2007. Total direct employment in 2006 was estimated at 90 thousand jobs (autoparts and vehicles: 57.6 thousand jobs; spare parts: 18.4 thousand jobs; official distributors: 14.0 thousand jobs).

Most of the employment in the soybean value chain involves small and medium sized firms (primary producers, contractors, country dealers and carriers) which are based in towns and small cities of the interior of Argentina. The recent evolution of the industry organization has been very positive because, despite the concentration of primary production and crushing, it has provided opportunities for the emergence and development of local services and input providers, who live and consume in small cities and towns of the main producing areas, most of them belonging to an emerging middle class.

The regional distribution of the owners of the firms and its employees is very important in terms of social and regional development. The good performance of the soybean chain has an immediate impact on local demand of products and services and on regional welfare. This has been the case during recent years until 2007, and explains why the social and political reactions and shows against the export taxes and other distorting agricultural policies registered during 2008 involved most of the population and different organizations of the interior of the country (they were not limited to farm organizations).

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**TABLE 8. EMPLOYMENT IN THE ARGENTINE SOYBEAN CHAIN IN 2003/04 (number of jobs)**

<table>
<thead>
<tr>
<th>Steps / Participants</th>
<th>Minimum estimate</th>
<th>Maximum estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeds</td>
<td>1,250</td>
<td>1,250</td>
</tr>
<tr>
<td>Fertilizers and chemicals</td>
<td>1,878</td>
<td>10,500</td>
</tr>
<tr>
<td>Agricultural Machinery</td>
<td>19,350</td>
<td>23,000</td>
</tr>
<tr>
<td>Primary producers</td>
<td>91,498</td>
<td>108,500</td>
</tr>
<tr>
<td>Contractors</td>
<td>37,700</td>
<td>66,500</td>
</tr>
<tr>
<td>Country dealers - coops</td>
<td>36,961</td>
<td>55,035</td>
</tr>
<tr>
<td>Carriers</td>
<td>19,000</td>
<td>38,000</td>
</tr>
<tr>
<td>Crushers</td>
<td>7,000</td>
<td>11,000</td>
</tr>
<tr>
<td>TOTAL JOBS</td>
<td>214,641</td>
<td>303,786</td>
</tr>
</tbody>
</table>


---

42 On the contrary, most of the car industry cluster is located in the suburbs of the large cities (Buenos Aires, Rosario and Córdoba).
IV

CHARACTERIZATION of the POLICY AND INSTITUTIONAL REGIME in ARGENTINA

THE POLICY AND INSTITUTIONAL INCENTIVES DURING THE 1990s

The recent evolution of the structure and performance of the Argentine soybean value chain is associated with the policy and institutional context that were put in force since the early nineties. The period selected for the analysis is 1990-2008, because beginning in 1991 there were implemented several significant policy and institutional reforms which had major impacts on soybean production and exports.

Several studies conducted recently44 highlight that the Argentine crop production, and particularly soybean, has registered dramatic growth and structural changes during the 1990s associated with an improved economic, commercial, institutional and technological environment put in place since 1991. The main factors were:

• Stabilized domestic prices associated with the free convertibility of the currency and other sound macroeconomic and fiscal policies implemented since 1991.
• Elimination of export taxes for most agricultural products. Export taxes reached 41% for soybean in May 1989 (with the previous Administration), and they were reduced to 20% in March 1990 with the new Administration. Later for the crop 1991/92 they were reduced to 3.5%. And in 1992 it was eliminated the 1.5% export tax destined to INTA.
• Opening of the economy, including the reduction of import taxes on agricultural inputs and the elimination of import taxes on capital goods. Elimination of quantitative restrictions on imports.
• Tax reform, including the elimination of taxes on production and trade.
• New legislation promoting foreign investment (no discrimination; bilateral investment agreements with the main countries)
• Elimination of quantitative restrictions on trade, and elimination on price controls and other non tariff barriers. Elimination of government intervention through the National Grain Board.
• Promotion of future markets for grains and oilseeds.
• Privatization of public services, through the sale / concession to the private sector of port and country elevators, ports, highways, railways, energy and other government owned firms.
• Creation of the National Seed Institute (for IPR controls and seed quality controls) and new Seeds Law to adapt to the UPOV intellectual property principles.
• Biotechnology policy to promote the development and use of GMO seeds, including the creation of the CONABIA (biotech and biosafety national organization) within de SAGPYA, and strengthening of the Biotechnology programs in INTA.
• Public and private promotion of the use of no till practices.

The main impacts of such policies have been:

a) Dramatic reduction of inflation, which was a serious limit to long term investment and to production intensification for decades in Argentina. The parity 1 peso = 1 US Dollar and the commercial policies remained unchanged during 10 years since 1991. Figure A 3 in Annex shows the systematic changes in commercial policies in previous decades and the stability during the 1990s. The free convertibility of the currency and domestic prices stability reduced risks and helped very much for doing business, particularly related with trade. The increased use of future markets was also facilitated by price stability, currency convertibility and regulations allowing futures trading in US Dollars.

b) Improvement of the climate for foreign and local investment was crucial for input providers, producers, crushers and traders. It resulted in huge investments in seed production, in fertilizer and chemicals plants, and in crushing, storing and ports facilities. In recent decades the private sector has played a key role in R&D and in production, processing, trading and logistics (services); therefore a good climate for investment (IPRs, free movement of capital, non discrimination, stability) has been strategic for the soybean chain development. Development of input providers has been strategic for the new technologies implemented and for the financing of production. Currently Argentina counts with the main international firms; they produce and import the most modern inputs available in the world. Based on information provided by Lopez, G. (2003 and 2008), we have estimated investment in storing and crushing capacity during the period 1990/91-2007/08^45, which is included in Table 9. Storing capacity increased 97 % during such period, while crushing capacity increased 256 %. During the mentioned period, total investment in storing capacity and the related facilities was around US$ 2,160 million; and total investment in crushing capacity and the related facilities was 3,580 US$ million. Additional information on investment is included in Annex, tables A.1, A. 2. and A. 3.

c) Improvement in domestic relative prices (tons of soybeans needed to purchase seed, chemicals, fertilizers, fuel, vehicles, machinery and other capital goods) resulted in the use of more intensive production systems and increased productivity. Table 10 shows the significant reduction in selected input prices quoted in US Dollars after the implementation of the reforms in 1991. Table 11 shows the reduction in relative prices (soybean-inputs) when compared with 1980s relative prices. Table 12 shows the evolution of annual sales index of selected inputs after the policy reforms. Table 13 shows the evolution of soybean yields and gross margins per hectare; the use of some key inputs for soybean production; and total use of fertilizers. Soybean productivity per hectare is currently higher in Argentina than in the USA and Brazil. The Argentine soybean average yield for the period 2005/06-2006/07-2007/08 was 2.82 tons per hectare, including single crops and second crops planted after wheat or another crop in the same year (they were 2.24 tons in the period 1990/91-1991/92-1992/93).

d) Improved returns attracted investment in soybean production. Banking financing grew substantially during the first half of the 1990s. However most of the large investments in the soybean industry were provided by other sources, such as: foreign and local private investment;

<table>
<thead>
<tr>
<th>Periods</th>
<th>Increase in capacities (million ton)</th>
<th>Investment (million US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Storing</td>
<td>Crushing</td>
</tr>
<tr>
<td>1990/91-1999/00</td>
<td>17</td>
<td>15.1</td>
</tr>
<tr>
<td>1999/00-2007/08</td>
<td>19</td>
<td>20.7</td>
</tr>
<tr>
<td>1990/91-2007/08</td>
<td>36</td>
<td>35.8</td>
</tr>
<tr>
<td>% increase 1990/91-2007/08</td>
<td>97</td>
<td>256 %</td>
</tr>
</tbody>
</table>


^45 Actual information on investment is not available; therefore we have estimated investment based on the evolution of physical capacities, and the prices involved in the usual storing facilities and crushing facilities.
short term credit provided by trading companies and input providers; and domestic savings invested in primary production, which provided good opportunities to generate and share the rents (formal and informal financing through local “planting pools”).

e) Biotech policies have been very successful for the improvement of soybean production competitiveness, particularly on the reduction of production costs and the efficient use of technical packages aimed to allow better management of the soil and the water, such as no-till sewing (Argentine soybean is rainfed) in different regions of the country. Adoption of biotech soybean was massive in a very short period of time: in the last three years (2007-2008-2009) more than 98% of total area planted involved GMO varieties. Direct sewing -no till practices- also grew dramatically during the last decade, and currently near 70% of area planted with soybean is no till (Figure A 6). f) Increase in exports of value added commodities (oil and meal) supported by the differential export tax and by a very efficient crushing industry. The 3% higher export tax charged to soybean than to processed products provides an advantage to crushers, because they can purchase in the domestic market the bean 3% cheaper. Assuming a quotation FOB of 330 US Dollars per ton for the soybean, such difference implies a theoretical cost reduction of 10 US dollars per ton\(^46\). In addition to such trade policy advantage the crushing industry has also cost competitive advantages vis a vis the USA and Brazilian crushers associated with the scale, the location of the plants at the ports and the technologies used. All these factors allowed Argentina to be the export leader of processed soybean commodities (oil and meal)\(^47\).

The gradual appreciation of the Argentine peso during the 1990s -which was “pegged” to the US Dollar- was not a major problem for the soybean expansion during such period, because domestic prices of some key inputs like fertilizers and herbicides, as well as other services priced in US Dollars or in soybean tons were also influenced by

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoil</td>
<td>100 liters</td>
<td>32.5</td>
<td>31.3</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Truck freight</td>
<td>100 kilos</td>
<td>1.38</td>
<td>1.29</td>
<td>1.27</td>
<td>1.47</td>
</tr>
<tr>
<td>Di-ammonium Phosphate</td>
<td>ton</td>
<td>382</td>
<td>356</td>
<td>333</td>
<td>367</td>
</tr>
<tr>
<td>Urea</td>
<td>ton</td>
<td>304</td>
<td>301</td>
<td>279</td>
<td>293</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>100 liters</td>
<td>12.4</td>
<td>10.8</td>
<td>10.5</td>
<td>8.8</td>
</tr>
<tr>
<td>Lazo</td>
<td>100 liters</td>
<td>5.14</td>
<td>5.16</td>
<td>4.82</td>
<td>5.0</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Period</th>
<th>Gasoil (1000 liters)</th>
<th>Tractor 100 HP (Unit)</th>
<th>Glyphosate (1000 liters)</th>
<th>Treflan (1000 liters)</th>
<th>Di-ammonium (1 ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985-1987</td>
<td>1.4</td>
<td>125</td>
<td>109</td>
<td>37</td>
<td>2.0</td>
</tr>
<tr>
<td>1988-1990</td>
<td>1.6</td>
<td>127</td>
<td>82</td>
<td>35</td>
<td>2.1</td>
</tr>
<tr>
<td>1991-1993</td>
<td>1.6</td>
<td>144</td>
<td>64</td>
<td>25</td>
<td>1.8</td>
</tr>
<tr>
<td>1994-1996</td>
<td>1.2</td>
<td>120</td>
<td>49</td>
<td>22</td>
<td>1.7</td>
</tr>
</tbody>
</table>


\(^46\) In the reality domestic crushing margins change during the marketing seasons, associated with short term changes in the domestic supply and demand situation. But the long term scenario provides a support to Argentine crushers.

\(^47\) In addition to the competitiveness of the Argentine crushing industry, the demand of meal and oil is relatively lower in Argentina when compared with Brazil and the USA. Such countries produce and export more meat (poultry, pork and beef) than Argentina.
the local currency overvaluation. In addition, the increase in total factor productivity of soybean also hided partially the impact of the rate of exchange. Table 13 shows that the negative impact of the overvaluation of the peso was more relevant since 1998, when soybean margins per hectare declined until 2003.\textsuperscript{48}

**POLICY REFORMS IMPLEMENTED DURING THE PERIOD 2002-2008**

The 2001 financial domestic crisis resulted in the discontinuation of the currency convertibility and in a significant devaluation of the Argentine peso in early 2002 (more than 200\% in few months). Such change in the monetary policy had severe impacts in the short term (particularly on 2001/02 previous input sales and other contracts which denominated in US Dollars, including the future contacts). With the purpose of limiting the impact of the devaluation on the cost of living and to improve fiscal revenues, the Administration implemented controls on prices of food products and services and imposed export taxes on all commodities.\textsuperscript{49} Agricultural commodities were taxed with higher levels than the rest of the products, particularly in the following years when international prices increased. In March 2002 soybean exports were taxed 13.5\%, and in April 2002 they were raised to 23.5\%. Such level was maintained until January 2007, when soybean export taxes were raised to 27.5\%. Figures A 3 and A 4 show the stability of relatively neutral commercial policies during the 1990s, and the changes in the nominal rates of assistance at farm level for selected agricultural products and specifically for soybean since 2002.

The export taxes imposed since 2002 limited the impact on domestic prices of the devaluation of the currency and the raises in international prices. Actually domestic quotations in the grain exchanges almost did not change substantially in 2003-2007, despite the increases in FOB prices. Table 13 shows that margins per hectare were still attractive during such period (over 300 US Dollars per hectare).

**TABLE 12. EVOLUTION OF ANNUAL SALES INDEX OF SELECTED INPUTS DURING THE PERIOD 1990-1997**

(index: 1990 =100)

<table>
<thead>
<tr>
<th>Years</th>
<th>Fertilizers</th>
<th>Herbicides/pesticides</th>
<th>Tractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1991</td>
<td>108</td>
<td>113</td>
<td>74</td>
</tr>
<tr>
<td>1992</td>
<td>170</td>
<td>133</td>
<td>106</td>
</tr>
<tr>
<td>1993</td>
<td>196</td>
<td>160</td>
<td>113</td>
</tr>
<tr>
<td>1994</td>
<td>304</td>
<td>206</td>
<td>139</td>
</tr>
<tr>
<td>1995</td>
<td>399</td>
<td>247</td>
<td>100</td>
</tr>
<tr>
<td>1996</td>
<td>545</td>
<td>313</td>
<td>167</td>
</tr>
<tr>
<td>1997</td>
<td>495</td>
<td>366</td>
<td>165</td>
</tr>
</tbody>
</table>


\textsuperscript{48} It should be noted that the peso overvaluation affected all crops and livestock productions, and soybean was the most competitive primary production.

\textsuperscript{49} Despite the Constitution rules that export taxes must be established by the Congress, several years ago a Law delegated in the Administration the establishment of export and import taxes.
### TABLE 13. SOYBEAN YIELDS, MARGINS, NO TILL ACREAGE, GMOS SHARES; AND TOTAL USE OF FERTILIZERS IN ALL CROPS

<table>
<thead>
<tr>
<th>Years</th>
<th>Yields* (ton/ha)</th>
<th>Gross margins (US$/ha)**</th>
<th>No till soy (million ha)</th>
<th>GMO soy (%)</th>
<th>Fertilizers (000 tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Soybean 1</td>
<td>Soybean 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>2.16</td>
<td>120</td>
<td>77</td>
<td>0.05</td>
<td>--</td>
</tr>
<tr>
<td>1990</td>
<td>2.28</td>
<td>185</td>
<td>96</td>
<td>0.08</td>
<td>--</td>
</tr>
<tr>
<td>1991</td>
<td>2.29</td>
<td>272</td>
<td>154</td>
<td>0.28</td>
<td>--</td>
</tr>
<tr>
<td>1992</td>
<td>2.16</td>
<td>357</td>
<td>186</td>
<td>0.44</td>
<td>--</td>
</tr>
<tr>
<td>1993</td>
<td>2.04</td>
<td>376</td>
<td>201</td>
<td>0.78</td>
<td>--</td>
</tr>
<tr>
<td>1994</td>
<td>2.05</td>
<td>383</td>
<td>200</td>
<td>1.35</td>
<td>--</td>
</tr>
<tr>
<td>1995</td>
<td>2.11</td>
<td>400</td>
<td>194</td>
<td>1.67</td>
<td>--</td>
</tr>
<tr>
<td>1996</td>
<td>1.72</td>
<td>568</td>
<td>291</td>
<td>2.15</td>
<td>--</td>
</tr>
<tr>
<td>1997</td>
<td>2.69</td>
<td>696</td>
<td>374</td>
<td>2.86</td>
<td>5</td>
</tr>
<tr>
<td>1998</td>
<td>2.45</td>
<td>480</td>
<td>239</td>
<td>3.32</td>
<td>25</td>
</tr>
<tr>
<td>1999</td>
<td>2.34</td>
<td>226</td>
<td>81</td>
<td>3.78</td>
<td>57</td>
</tr>
<tr>
<td>2000</td>
<td>2.59</td>
<td>396</td>
<td>229</td>
<td>5.02</td>
<td>76</td>
</tr>
<tr>
<td>2001</td>
<td>2.63</td>
<td>309</td>
<td>155</td>
<td>6.66</td>
<td>87</td>
</tr>
<tr>
<td>2002</td>
<td>2.80</td>
<td>293</td>
<td>170</td>
<td>8.67</td>
<td>93</td>
</tr>
<tr>
<td>2003</td>
<td>2.21</td>
<td>309</td>
<td>243</td>
<td>9.78</td>
<td>95</td>
</tr>
<tr>
<td>2004</td>
<td>2.73</td>
<td>585</td>
<td>415</td>
<td>11.39</td>
<td>91</td>
</tr>
<tr>
<td>2005</td>
<td>2.68</td>
<td>297</td>
<td>257</td>
<td>11.54</td>
<td>98</td>
</tr>
<tr>
<td>2006</td>
<td>2.97</td>
<td>368</td>
<td>319</td>
<td>12.41</td>
<td>98</td>
</tr>
<tr>
<td>2007</td>
<td>2.82</td>
<td>421</td>
<td>373</td>
<td>n.a.</td>
<td>98</td>
</tr>
</tbody>
</table>


Notes: * Yields are referred to crop years; i.e. 2007 is crop year 2007/08; ** Constant US Dollars per hectare.
Total cereals and oilseeds production continued growing during 2003-2007 (Figure 1), as a result of the increases in yields of the main crops and in the soybean acreage growth (Figures 2 and 3). However, several studies conducted on the potential growth of crop production associated with the improved international prices (Nogués, J. and A. Porto et al 2007), show that the raise in export taxes limited significantly agricultural potential growth.

In December 2007 soybean export taxes were raised to 35%; and in March 2008 there was implemented a variable levy associated with the evolution of FOB prices (which could have reached 50% or more in March-April 2008). The last decision was seriously challenged by farm and other organizations (small farmers revenues were seriously affected by export taxes during 2008). Taking into account the political situation, the Congress decided to eliminate the variable export tax; therefore, the remaining tax on soybean since 2007 until nowadays has been 35%. Such level of taxation is too high, and together with other government interventions (export restrictions, currency controls, etc) and the effect of a drought resulted in a dramatic decrease in 2008/09 total crop production: 63.4 million tons (it was 96.4 in 2007/08).

The commercial policies not only limited the potential production growth but also created disincentives, particularly in the case of cereals, and will result in a low total 2009/10 crop which is having good weather conditions. Estimates for the 2009/10 crop forecast total crop production in around 82 million tons, also a significant reduction when compared with 2007/08 crop and with previous projections\(51\). The main projected declines are in cereals production (actually there has already registered a sharp decline in area planted with wheat and with corn), because the relative margins among crops are still favorable to soybean, and such crop is the cheapest in terms of direct costs per hectare\(52\) (the farmer prefers to reduce the expenditures, particularly because the financial situation is not good). In addition, government intervention in soybean has focused on the export tax (no bans on exports), while cereals have lower export taxes but are subject to price controls and quantitative export restrictions (export bans which add additional risks and domestic price reductions); such bans had serious impacts on domestic prices during the last three years, which had an equivalent effect to an export tax\(53\). Figure A 5 shows the impact of non tariff barriers on wheat prices received by farmers.

It should be noted that government market interventions are unpredictable and add risks which result in increased transaction costs and create frictions among participants in the value chain, limiting vertical coordination and reducing the competitiveness of the Argentine value chain. Usually the main losers are the farmers, which have less market power in the chain.

\(50\) According to CAFMA information, national production of total machinery and equipment declined from 21,086 units in 2007, to 16,504 units in 2008 (and to 6,738 units during 2009 first semester). Production of tractors declined from 1,160 units in 2007 to 870 in 2008; for the same years, production of sewers declined from 5,300 to 4,300 units, production of harvesters declined from 785 to 355 units, and production of trailers from 1935 to 1452 units.

\(51\) Taking into account the previous trend and after the 2007/08 crop of 96.4 million tons, three years ago projections for 2010 forecasted total production at 99 - 100 million tons.

\(52\) Wheat and corn use higher doses of fertilizers per hectare than soybean.

\(53\) In a previous study we find that total export taxation on corn and wheat was over 40% during the marketing season, including the effect of the export bans (more than the 35% for soybean). Figure A 5 shows the impact of non tariff barriers on wheat prices.
LESSONS LEARNED RELATED to the POLITICAL ECONOMY and the INDUSTRY ORGANIZATION

The Argentine experience on the soybean chain performance during the last two decades provides interesting lessons, particularly because some policies have had significant impacts on production and on the restructuring and modernization of the key participants in the value chain. Some policies remained without major changes during the period 1990-2009, such as the biotech policy, the land use policy, the reduction in import taxes on inputs and the privatization of public services (elevators, ports, highways, railways, etc.). Other ones, which had very positive impacts in the early nineties, had changes in recent years, and they are already affecting the current and future development of the value chain. Therefore it is interesting to identify the key policies that have been driving forces for production and employment growth, to promote structural changes, and to improve the industry’s competitiveness. The main interesting lessons that emerge from the Argentine experience are summarized below.

a) The soybean industry responds rapidly when the economic, commercial and institutional environment is favorable

A fist general lesson emerging from the Argentine experience is that the soybean industry responds to sound macroeconomic and market oriented trade policies, particularly when there are good opportunities in the international markets. During several decades previous to 1990, Argentine macroeconomic policies resulted in high price instability, the institutional environment did not promote investment, and trade policies strongly discriminated against primary agriculture production (the economy’s most efficient and competitive tradable sector). Non-agricultural productions were highly protected through import taxes and quantitative restrictions and resulted in non-competitive manufacturing industries. The anti-agriculture bias of such policies resulted in very little investment and growth of the agricultural sector, including the soybean value chain. In such context, soybean and other crops had limited impact on job creation along the different steps of the value chain and on the regional development of the country, speeding up the rural urban migration process; the income distribution lag between the large urban centers and the small towns and cities of the interior of the country increased.

The dramatic reforms implemented during 1991 on macroeconomic, trade, agricultural and institutional policies created a favorable environment for investment and for the reorganization of the soybean chain. Price stability, currency free convertibility, improved relative prices, the lack of government intervention in agricultural markets and the opening of the economy had very positive results: i) promoted the development of a competitive input industry which currently provides the most modern technologies available; ii) attracted capital and technology to primary production resulting in: increased yields, acreage expansion, and the restructuring of the traditional farming system becoming a more competitive production system; iii) promoted huge investments in manufacturing plants, elevators, ports, highways and other logistics facilities; iv) helped the development of transparent markets, including the future markets, allowing to reduce transaction costs among different participants along the value chain and to mitigate market risks. All these improvements
resulted in a very competitive chain, which has increased production and exports of the soybean products complex, taking advantage of the dynamics of the international markets.

Rents along the value chain improved, particularly in the primary production stage, in which better relative prices promoted yield increases through the use of higher doses of fertilizers and chemicals as well as other new improved technologies. They also contributed to the restructuring of the production system, resulting in lower costs of production and transaction costs. The elimination of government intervention in agricultural trade contributed to provide a more stable and predictable environment and helped the development of vertical coordination among input providers, producers, crushers and traders, and resulted in lower transaction costs along the value chain and in reduced risks.

The mentioned improvements created a “virtuous circle” which attracted new private investors to primary production and provided incentives to increase productivity and the acreage destined to soybean production. Production growth prospects also promoted large investments in input production and in processing and logistics, which in turn resulted in higher crushing productivity and reduced logistics costs. In sum, it resulted in production growth and increased productivity (Figure 6).

b) Open capital markets and a good institutional environment attract strategic direct investment

The reforms in foreign investment legislation, including free movement of capital, free currency convertibility and non-discrimination, and the bilateral investment treaties signed with the main developed countries, created a favorable environment and resulted in large investments in the seed, chemical and machinery industries, which currently involve most of the main world players.

They also attracted large investments in production, crushing, storing, ports and highways. Currently Argentina counts with very competitive and large local and global primary producers, crushers and traders; most of them are world class firms, which are crucial for commodities competitiveness (low costs of production and crushing, high productivity, good access to capital and to markets).

c) Dynamic and profitable productions attract capital to allow growth, despite the lack of enough institutional credit

Most of the financing of the growth in Argentine soybean production and processing during the last two decades

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**FIGURE 6. VIRTUOUS CYCLE: POLICIES - ORGANIZATION OF PRODUCTION- COMPETITIVENESS - GROWTH**
came from private sources, attracted by the existing opportunities to earn potential rents in different stages of the value chain. This is the case for the investment done by input providers, primary producers, services providers, crushers and traders. Only a small part of total investment was financed by local and international banks.

It is interesting to highlight the case of primary production investment, in which the bank financing was very limited and not enough to support the growing requirements of capital associated with the dynamics of the soybean markets. Since most of the farmers are small and medium sized firms, they usually have difficulties to comply with all the banking system requirements (accounting information, tax payments, collaterals, etc). Despite such situation, the dynamics and high expected revenues of soybean production promoted the emergence of other sources of financing of the operational costs including own farm savings, investment funds, “planting pools”, and foreign investors. In addition, input costs were financed by input providers and crushers / traders involving mainly barter programs and forward sales.

Large investments by input providers, crushing plants, ports and other facilities also resulted from local savings and foreign investment\(^{54}\). They have been only partially financed by local and international banks. During the 1990s monetary policies (including free convertibility and no restrictions on capital movements) promoted the use of cheap short term international credit using future exports as collaterals; a regime called “prefinanciación de exportaciones” was implemented to accede to cheap international loans, taking advantage of the fact that most of the soybean production is exported.

However, institutional credit has been very important for long term financing, needed mainly for investment in facilities; in this sense the IFC has played an important role as a source of medium to long term credit and to help local firms to accede to other private long term bank financing.

There is a high potential for growth in the soybean industry, based on the domestic competitiveness, on the opportunities provided by the availability of natural resources and by innovations that are currently in the pipeline, and on the dynamics of the international markets. The new organization of production and trade provides also a solid and competitive basis to continue with the growth trends registered during the last two decades.

The successful growth during the period 1991-2007 provides support and lessons to promote the future expansion of area planted, production and exports. The country has already experienced the importance of the soybean chain on the country’s economic growth, on job creation and on regional development, when the economic and institutional environment is favorable.

This industry is strategic because it is one of the relevant sectors in which Argentina is very competitive in international terms, and could be a base of sustained economic growth through exports. This is not the case of other protected manufacturing industries which are not competitive and only contribute to short term domestic based economic growth.

As it has been highlighted in section 3.8., the soybean chain is very relevant in job creation, more than other protected industries, such as the cars and autoparts chain. This has been a mis-undertstanding which has backed some of the wrong policies implemented in Argentina for several decades, including the recent policies described in the previous section.

Most of the job creation by the soybean chain is located in the interior of the country. Therefore, its impact on regional development is higher than the case of the manufacturing industries, which are mainly located near the large urban centers.

e) Strategic sector policies could lead to significant improvements in competitiveness

Biotech policies implemented since the early nineties have been a crucial component of the Argentine soybean chain competitiveness. Such policies needed to

\(^{54}\) Such firms are supposed to finance, in addition to their specific investment and operational needs, part of the inputs used by the farmers.
have a global approach taking into account bio-safety, intellectual property rights, human resources training, and large investment in public and private infrastructure.

This is an area in which the private sector has played a key role, and the creation of attractive conditions for its development was a major challenge. The intellectual property legislation and the controls put in place in the early 1990s, together with the favorable environment for foreign investment were strategic for the initial development of the seeds’ biotech industry. However, it should be highlighted that the evolution of private sector requirements has not been followed in recent years (particularly since 2002) by improved legislation, and this situation is creating uncertainties related to future investment in the soybean seed industry. Currently some of the leading biotech firms find better institutional and IPR environment in Brazil, and are destining most of the investment to such country.

It is interesting to note that several studies conducted on the impact of biotech soybean conclude that most of the participants in the value chain have received part of the additional rents associated with improved seed and improved competitiveness of the soybean crop vis a vis other crops and livestock productions. Most of the benefits were captured by farmers (Regúnaga, M. et al. 2003; Trigo, E. et al. 2002)

f) The relevance of networks to improve competitiveness in the value chain: organizational innovations

One of the key factors explaining Argentine soybeans competitiveness and growth is the substantial restructuring of the farming system, resulting in larger and very competitive producing firms. Currently, a significant share of soybean production involves networks, which allowed reducing costs of production (scale, specialization, and better use of fixed capital) and transaction costs. Most of production is conducted by firms that do not own the land and other fixed assets (machinery, silos, trucks, etc); therefore the rates of return on their assets (operating capital) are very high, and have attracted investors from other economic sectors. Such specialized and large production firms are much more competitive than traditional farmers, also because they have improved their access to capital and technology; they also have improved logistics and access to markets, they have much better management of weather and price risks and they have lower transaction costs. Networks imply different kinds of relationships among participants. In the agriculture sector many of them are informal agreements, because it is usual to give a high priority to personal relations (based on personal reputation). Trust is a word that has a different meaning in the urban society and the rural sector and also in the grain trade sector (in these cases huge amounts of money are committed just by phone or mail).

However, gradually the main participants in the value chain are paying more attention to implement formal contracts, particularly when the capital involved in not owned. Actually the large firms, like El Tejar, Los Grobo, and others, already have developed and use formal contracts with the owners of the land and the services providers. This is an issue that will have a growing role in the future development of Argentine agriculture; particularly it would be important to look at private dispute-settlement mechanisms, taking into account the weaknesses of the Argentine Justice.

g) Cooperation between public and private institutions is crucial to provide strategic services (meso-competitiveness)

Global value chain competitiveness is also associated with the quality and cooperation of different public and private organizations (meso-competitiveness). It is not just an issue of having competitive firms along the value chain (micro-competitiveness).

This is the case of several developments occurred in the Argentine value chain: technological innovations, quality controls and certifications, development of grain markets.

The cooperation between INTA, the private input providers, some private technological organizations (like AACREA and AAPRESID) and some mixed initiatives involving the SAGPYA and some Province’s governments and private groups of farmers, has been very important for research, development and adoption of innovations in soybean production.

Quality controls and certifications are not limited to the public services provided by SENASA. Modern systems involve an active relationship between SENASA, the producers and the private sector providers of certification and quality control services (i.e. certifications related with non-GMO crops and other differentiated soybean
products require the participation of farmers, private specialized firms and the government to follow and certify traceability).

Soybean markets trade on the basis of a standard. The government has established quality standards and certifies the sanitary situation of soybean exported. The reliability and transparency of the domestic and the export market depends on public and private certifications, and within the grain exchanges operate Arbitration Chambers, which resolve private disputes in a very efficient way.

In sum, a competitive and efficient soybean chain relies very much on the existence of a developed and cooperative structure of private and public organizations, which have performed very well during the last decades in the Argentine case.
ANNEX

FIGURE A 1. TRADITIONAL FARMING: VERTICAL INTEGRATION MODEL

Source: adapted from Bisang, R. et al. (2008)

FIGURE A 2. NEW NETWORK PRODUCTION MODEL

Source: adapted from Bisang, R. et al. (2008)
FIGURE A 3. NOMINAL RATE OF ASSISTANCE AT FARM LEVEL FOR THE MAIN ARGENTINE AGRICULTURAL PRODUCTS. 1960-2005 (simple average of covered products)

Note: selected products are corn, soybean, sunflower, wheat, beef and milk (data for oilseeds begin in 1997).

FIGURE A 4. NOMINAL RATE OF ASSISTANCE AT FARM LEVEL FOR SOYBEAN. 1994-2005

Note: NRAs measured by the explicit export tax.
FIGURE A5. IMPACT OF NON TARIFF BARRIERS ON THE DOMESTIC WHEAT MARKET. OFFICIAL EXPORT TAXES AND TOTAL EFFECTIVE EXPORT TAXES* (“ad valorem” percentages referred to the FOB price)

Ref: Total effective export taxes are estimated comparing market prices with the theoretical market prices based on the FOB price deducted by fobbing costs and the official export taxes (tariff equivalents).

FIGURE A6. ADOPTION OF NO TILL PRACTICES IN SOYBEAN AND TOTAL CROPS

Source: AAPRESID. www.aapresid.org.ar
TABLE A 1. INVESTMENT BY PRIVATIZED / CONCESIONED COMPANIES*
(million A pesos, equivalent to million US$)

<table>
<thead>
<tr>
<th>Years</th>
<th>Fuels</th>
<th>Telecom.</th>
<th>Railways</th>
<th>Roads**</th>
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<tr>
<td>1991</td>
<td>822</td>
<td>345</td>
<td>--</td>
<td>100</td>
</tr>
<tr>
<td>1992</td>
<td>825</td>
<td>1,232</td>
<td>10</td>
<td>200</td>
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<tr>
<td>1993</td>
<td>1,215</td>
<td>1,927</td>
<td>35</td>
<td>240</td>
</tr>
<tr>
<td>1994</td>
<td>1,760</td>
<td>2,082</td>
<td>52</td>
<td>628</td>
</tr>
<tr>
<td>1995</td>
<td>2,787</td>
<td>2,089</td>
<td>78</td>
<td>595</td>
</tr>
<tr>
<td>1996</td>
<td>1,883</td>
<td>2,089</td>
<td>240</td>
<td>348</td>
</tr>
<tr>
<td>1997</td>
<td>1,987</td>
<td>1,704</td>
<td>416</td>
<td>392</td>
</tr>
<tr>
<td>Total 1991-97</td>
<td>11,146</td>
<td>11,468</td>
<td>831</td>
<td>2,503</td>
</tr>
</tbody>
</table>

Note: *Previously Government owned companies. ** Vialidad Nacional. Most of the large highways were concessioned and are not included under this company.

TABLE A 2. INVESTMENT IN FOOD AND BEVERAGES PROCESSING INDUSTRIES. PERIOD 1990-2005
(000 million US$)

<table>
<thead>
<tr>
<th></th>
<th>Period 1990-2000</th>
<th>Period 2001-2005</th>
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<tbody>
<tr>
<td></td>
<td>Foreign</td>
<td>National</td>
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<tr>
<td>Capital formation</td>
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<tr>
<td>- Greenfield</td>
<td>1.68</td>
<td>1.00</td>
</tr>
<tr>
<td>- Additions</td>
<td>2.68</td>
<td>2.63</td>
</tr>
<tr>
<td>- Subtotal</td>
<td>4.36</td>
<td>3.63</td>
</tr>
<tr>
<td>Mergers and Acquisitions</td>
<td>4.15</td>
<td>1.73</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8.51</td>
<td>5.36</td>
</tr>
</tbody>
</table>
TABLE A3. INVESTMENT IN AGRICULTURAL MACHINERY AND IMPORTS OF CAPITAL GOODS DESTINED TO THE PRIMARY SECTOR (million 1993 Arg $, units, and million US$)*

<table>
<thead>
<tr>
<th>Years</th>
<th>Consumption (million 1993 Arg $)</th>
<th>Machinery and equipment</th>
<th>Capital Goods Imports</th>
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<tr>
<td></td>
<td></td>
<td>Tractors (units)</td>
<td>Harvesters (units)</td>
</tr>
<tr>
<td>1992</td>
<td>800</td>
<td>4,871</td>
<td>415</td>
</tr>
<tr>
<td>1993</td>
<td>844</td>
<td>4,338</td>
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<td>1,051</td>
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<tr>
<td>1995</td>
<td>737</td>
<td>4,615</td>
<td>662</td>
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<tr>
<td>1996</td>
<td>1,149</td>
<td>7,720</td>
<td>1,560</td>
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<tr>
<td>1997</td>
<td>991</td>
<td>7,601</td>
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<td>1998</td>
<td>883</td>
<td>5,925</td>
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<td>1999</td>
<td>511</td>
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<td>2000</td>
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<td>2,108</td>
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<td>2001</td>
<td>340</td>
<td>1,328</td>
<td>597</td>
</tr>
<tr>
<td>2002</td>
<td>261</td>
<td>1,188</td>
<td>560</td>
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<tr>
<td>2003</td>
<td>629</td>
<td>4,102</td>
<td>2,334</td>
</tr>
<tr>
<td>2004</td>
<td>805</td>
<td>6,163</td>
<td>3,080</td>
</tr>
<tr>
<td>2005</td>
<td>na</td>
<td>6,315</td>
<td>1,950</td>
</tr>
<tr>
<td>2006</td>
<td>na</td>
<td>5,882</td>
<td>1,650</td>
</tr>
<tr>
<td>2007</td>
<td>na</td>
<td>7,880</td>
<td>2,415</td>
</tr>
</tbody>
</table>
REFERENCES

The Soybean Chain in Argentina


The cases described in the boxes also included meetings with high executives of AGD, El Tejar and Los Grobo.
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