Quantification and Coordination of Agro-Industry Systems: The case of Wheat in Brazil*

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ABSTRACT

The article presents the panorama of the Wheat agro-industry system in Brazil. Departing from a methodology developed for mapping and quantifying agro-industry systems, the “design” of the respective system is presented, with the main sectors identified and quantified (revenue of the sector with the Wheat chain sales in Brazil in 2002). Also identified were the main problems of coordination present in the system, as well as a work agenda containing a list of collective actions that should be implemented by the private initiative, aimed at minimizing the existing problems. It was proposed a sequence of steps to establish the organizations that integrate the different sectors in the agro-industry system.

Keywords: Agro-industry systems; wheat; Distribution channels

1 – Introduction and Method

Utilized in the manufacture of cakes, cookies, breads, noodles, among others, wheat is a fundamental product for human alimentation. Highly dependent on the importation of this grain (approximately 65% of the product consumed comes from other countries – mainly Argentina), Brazil produced around 3.9 million tons of wheat in the 2001/2002 crop, occupying an area of two million hectares (Conab, 2003). According to the sixth survey of crop forecast and follow-up, conducted by Conab (2003), Brazilian wheat production in the 2002/03 crop should reach 5.1 million tons.

Wheat production in Brazil is concentrated in the South, with emphasis on the states of Paraná and Rio Grande do Sul. However, there has been a process of crop expansion towards the central region of the country, especially in the state of Mato Grosso do Sul. The mills, in turn, are distributed around all the Brazilian regions, with the greatest grinding capacity installed in the Southeast region of the country.

The present work will present, by means of a descriptive survey, the characterization of the Wheat agro-industry systems in Brazil. The methodology utilized in this study was developed and applied by Neves et al. (2001) in the study of the Brazilian orange agro-industry system. The referred methodology applied in this work is made up of the following steps:

1st Step – Description of the System (design);
2nd Step – Initial interviews for adjustments in the design;
3rd Step – Research by data from sales in associations and other sources of secondary data;
4th Step – Interviews with representatives of the organizations involved;
5th Step – Quantification (revenue of the sectors participating in the agro-industry system);
6th Step – Validation of the results by means of a Workshop.

The objectives of the present article are:
• Formulation of the “design” of the Wheat agro-industry system in Brazil;
• Identification of the main participating sectors in the referred System;
• Quantification of the sectors (revenue of each Sector, in 2002);
• Identification of coordination problems;
• Elaboration of a work agenda containing collective actions that can minimize the problems of coordination existent in the system;
• To present a sequence of steps to integrate the system.

2 – Agro-industry system Design, Identification of the Sectors and Quantification

Based on the bibliography and the personal interviews with specialists from the sector (executives and researchers), a simplified structure of the wheat agro-industry system in Brazil was structured, where the main sectors were quantified (sector revenue obtained with the wheat chain commercialization in 2002). The design containing the system structure and the quantification of the sectors is presented in figure 1. This structure contains the various segments participating in the referred system, positioned in levels, following the product flow.

Figure 1 - The Wheat Agro-Industry System in Brazil

For the identification of the main sectors participating in the “central-axis” of the wheat agro-industry system, the conceptual proposal presented by Zylbersztajn (2000) was utilized. According to this author, the agro-industry systems supply the following fundamental elements for their descriptive analysis: agents, relations between them, the sectors, the support organizations, and the institutional environment. These elements are schematized in figure 2.

Figure 2 – Agribusiness Systems and Typical Transactions

In the Wheat agro-industry system the Inputs Sector is composed of the following industries: Seeds, Agrochemicals, Farm Machines and Implements, Fertilizers and Correctives. While the Industries of Agrochemicals and Farm Machinery are composed of a few large multinationals (Bayer, Basf, DuPont, Monsanto, Syngenta, AGCO, John Deere, Valtra, among others), the Sectors of Seeds, Fertilizers, and Correctives are composed of innumerable firms, most of which are small. The second level of the agro-industry systems is composed of the group of farmers. These wheat farmers are spread out around several regions of the country, though more than 90% of the production occurs in the South Region of Brazil, mainly in the states of Paraná and Rio Grande do Sul. The third level of the system is made up of primary wheat processing, which takes place in the mills. Though there are more than 200 firms acting in the market, mostly small, the sector of Brazilian grinding is characterized by idle capacity, around 47% (Garcia and Neves, 2001) and concentration (less than 10% of the mills are responsible for more than 65% of the grinding). The fourth level of the agro-industry systems is responsible for the second industrialization process of the system. Hence, this sector is made up of the Food Industry (Baking, Cookies, and Noodles). Though there are several firms acting in these industries, especially in the noodles segment, the sector dominated by the large companies (Nestlé, Parmalat, Dias Branco, among others).

The distribution channels make up the fifth and sixth levels of the agro-industry system. The Brazilian wholesale sector is composed of 800 thousand points of sale and a storage area of 4 million square meters, where the four largest firms are responsible for around 18% of the revenue of this segment. The sixth level of the agro-industry systems is the retail sector. In this sector, for the distribution of wheat derivatives, of note are the self-service, bakeries, and collective meals companies. Food self-service is characterized by the existence of a large number of establishments (around 70 000 stores), though the five largest chains represent
about 40% of the sector revenue. The wheat derivatives (breads, flours, cookies, noodles, and others), essential food products, correspond to 8.2% of the revenue of supermarkets. Approximately 50 thousand bakeries are active in the country, 73% of which are small, 22% medium, and 5% large. Approximately 33% of the revenue of bakeries is obtained with the sale of wheat derivatives. The sector of collective meals as a whole supplies 4.9 million meals/day, moves upwards of US$ 1.3 billion a year, offers 150 thousand direct jobs, consumes daily a volume of 2.5 thousand tons of food and represents to the government an annual revenue of upwards of US$ 300 million between taxes and contributions. Wheat derivatives (bread, flour, and noodles) are responsible for about 8% of the value of the ingredients of collective meals.

The main characteristics of Brazilian end consumers are the diversity (demographic, behavioral, geographic, and psychographic) and the low purchasing power of the majority of the population. The small per capita consumption of some wheat derivatives, especially noodles (5.7 kg/year), is not explained only by the low purchasing power of the population, but also by the eating habits. The Brazilian has historically adopted rice as the main source of carbohydrates in his diet.

The present situation of the agro-system industry of wheat in Brazil can be resumed in the following data:

- The present wheat harvest will be estimated at over 5.1 million tons;
- The domestic plantation of wheat provides about 35% of internal needs;
- Most of the import comes from Argentina;
- More than 90% of domestic production is grown in the South of the country;
- More than a hundred mills are producing in low basis in the country;
- Wheaten products are in the fifth place (income) in the food industry;
- In general, the baker shops work in low basis and with poor technology;
- Bread consumption per capita is nearly 30 kg/year;
- Paste consumption per capita is nearly 5.5 kg/year;
- Biscuit consumption per capita is nearly 5.9 kg/year.

3 – Problems of system coordination

About 50 specialists (sector executives, researchers, and sectoral leaderships) met at the Workshop that took place on 09 May 2003 at the School of Economics, Business, and Accounting (FEA) of the University of São Paulo (USP) and together prepared the following list of main coordination problems existing in the Wheat agro-industry system in Brazil:

- Lack of integration among the various sectors in the system;
- Low per capita consumption of some wheat derivatives (mainly noodles and breads);
- National wheat production is small in relation to the quantity demanded by the chain;
- Need to increase the investment in agricultural research, aiming at productivity gains of qualitative aptitude;
- Lack of a communication plan for the entire chain;
- Problems of informality, generating unfair competition and threatening the quality of the system;
- Unskilled labor acting in several parts of the system, especially bakeries;
- Existence of a technological lag in bakeries;
- Scarcity of public resources for financing costs and investment in the Sector;
- Fiscal problems stemming from cascade taxes and lack of equalization.
4 – Collective actions proposed to minimize the problems of chain coordination

After brainstorming the coordination problems existent in the chain, the specialists at the Workshop prepared a list of collective actions that can minimize these problems. The main actions proposed were:

- **Chain coordination.** An immediate need was observed for an organizational structure that allows the total integration between the different “links” of the system and their respective sectoral associations. The creation of “Trigo Brasil” was suggested.

- **Increasing the consumption of wheat derivatives.** The low per capita consumption of wheat in Brazil goes beyond the debate of the known problems of low and bad distribution of income of the Brazilian population, being also the result of the existing eating habits in the country and the “taboos”, such as “bread and pasta are fattening”. In contrast with several other countries, the basis for carbohydrates in the Brazilian diet is rice and not wheat derivatives, such as pasta and bread. Developing the taste and custom of the Brazilian for the various recipes based on wheat derivatives is an important action for the entire wheat chain.

- **Increasing wheat production in Brazil.** The increase of rural production is sustained on two main actions: expansion of the cultivated area and increase of productivity. The Brazilian edapho-climactic diversity allows the cultivation of different types of wheat in different seasons of the year; hence, the stimulus to increase rural production should not be aimed solely at the quantitative increase of production, but also at the production of different types of wheat required by the industry and in different seasons of the year. It is necessary to stress that public and private actions to guarantee the long-term economic viability of wheat cultivation for the farmer are essential to avoid the traditional “seesaw effect” of Brazilian agriculture.

- **Incentive for Agricultural Research.** Derived from the previous action, the incentive for agricultural research is essential to the increase of the quality and productivity of wheat cultivation. The seed improvement sector should continue to develop more productive varieties that are resistant to pests and diseases, adapted to the different natural conditions and from classes of wheat desired by the industry. The extension activity should guarantee the improvement of agricultural practices and the inputs industry should prepare more products specific to the culture, increasing the efficiency of cultivation in our country. Also important is the incentive to research involving food technology, aiming at improving the productive processes.

- **Prepare a communication plan.** There is a need to prepare a communication plan that emphasizes the nutritional/functional importance of the products derived from wheat in human consumption. The Food Pyramid could be a good starting point for this plan.

- **Fighting informality.** “Informal” participants are harmful to the chain, because, in addition to not paying taxes and functioning as unfair competition, they diminish the credibility and quality of the entire Sector.

- **Skilled labor.** The different sectoral associations should be committed to the development of training programs and development of labor acting in the wheat sector. This action is aimed at productivity and quality gains, remembering that human resources are a source of competitive advantage for the system. The critical points isolated at the meeting were farmers and bakery employees.

- **Investing in technological updating.** Several “links” of the system, especially bakeries, are lagging behind technologically. The technological updating of these firms will provide an increase in productivity and quality, in addition to the possibility of developing new products.
• **Project Bakeries.** A project involving several agents of the productive system and the Government for the modernization of this channel is of fundamental importance.

• **Discussing sources of financing with the Public Authority.** Resources from the government for financing farm activities, scientific research, technological renovation, among others, are vital to the development of the system.

• **Discussing the tax issue with the Public Authority.** A proposal consolidated by all members of the chain would facilitate the discussion.

5 – Integration of the sectors

Aiming to establish a script for the formation of integrative organizations of an agroindustrial system, in the model of Trigo Brasil, the following sequence of steps was determined:

1st step: **Mapping and quantification of the system.** The first step should be to identify and quantify the participation of the various agents that act in the system, including the function and relevance of each one.

2nd step: **Workshop.** With the purpose of aggregating the sector and presenting the proposal of integration, a workshop should be organized including participants of all the links of the system. In this section of work the need for integration should be justified by means of the benefits deriving from collective actions. The common objectives should be reinforced and individual objectives discarded.

3rd step: **Proposing the idea for the organization.** At the end of the event the idea for the organization should be presented, already with a name defined (in this study the suggested name was Trigo Brasil).

4th step: **Establishing the organization.** In this stage the founding agents of the organization will be defined. Also at this point the bureaucratic questions should be resolved (adequacy to legislation, preparation of the by-laws, among others).

5th step: **Forming the board of directors.** Once the agents interested in investing in the viability of the organization are established, the board should be formed taking into consideration the heterogeneity and relevance of the agents to the system.

6th step: **Elaborating the operational structure.** The participation fee demanded from the agents will finance the operational structure needed for running the organization. The initial structure should be simple (in the case of Trigo Brasil it will be virtual, the physical needs will initially be supplied by the facilities of an organization participant), growing according to needs and additions.

7th step: **Increasing number of associates.** Following the establishment of the organization, the first actions should be geared to bringing in new associates. Aiming to increase the degree of involvement of the participants, in all cases a periodic participation fee will be charged.

8th step: **Implementation.** The board should establish a single mission for the organization. This mission should be clear and geared to questions of interest of the entire system. From this mission a work agenda should be established containing well-defined actions. Strategies to achieve the goals proposed should be elaborated.

9th step: **Controls.** The result obtained with the implementation of the actions should be constantly monitored by means of the definition of performance indicators. The monitoring will serve as an important follow-up tool, where deviations will be controlled with corrective actions.

10th step: **Measuring performance.** The results obtained with the achievement of the work goals should be measured, preferably with quantitative criteria (increase of consumption, production, jobs, profit margins, among others) and widely divulged to all the participants of the organization. New mapping of the system showing the advances obtained should be conducted.
6 – Conclusions

This article aimed, by means of a systemic view, to characterize the Wheat agro-industry systems in Brazil. The information presented sought to demonstrate the importance of this system to the country’s economy. The complexity and relevance of this chain can be observed by the design of the system and by the quantification of the various sectors participating in it. As a result of the workshop, involving about 50 specialists from the Sector, the main coordination problems of the system were identified. From these problems, the same specialists prepared a list of collective actions that should be implemented in order to improve the efficiency of the system. It should be emphasized that the focus of these actions is on private policies and, therefore, does not depend on the public authority, though the help of the government would evidently be very important to the chain. As an initial action, the formation of an integrative organization of the system has been suggested, known as “Trigo Brasil”, in the same model as “Laranja-Brasil” (http://www.laranjabrasil.com.br) proposed by Neves et al (2001) and successful so far. The challenges pinpointed in this study indicate a fertile field of work for marketing professionals, especially in the area of distribution channels.

7 – References


Figure 1 - The Wheat Agro-Industry System in Brazil

Figure 2 - Agribusiness Systems and Typical Transactions

Organizational Environment: Associations, Information, Research, Finance, Cooperatives, Firms

Institutional Environment: Culture, Traditions, Education, Customs
