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Analysis of competitive factors for exports of the Brazilian and Argentine Soybean Complex

Análise dos fatores competitivos das exportações do Complexo Soja Brasileiro E Argentino

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Abstract: The study aimed to investigate which factors explain the intensification in exports of soybean derivatives by Argentina, and of grains by Brazil. For this, the method of content analysis was used through semi-structured interviews. The results show that the soybean processing segment in Argentina has comparative advantages derived from the concentration of production, industrial plants with high processing capacities, facilitated logistics, tax differential, restricted domestic demand and the collection of royalties. While Brazil intensified grain exports, mainly due to Chinese demand, the imposition of trade barriers on derivatives, tax incentives and long distances.

Keywords: Exports. International Trade. Soy Complex.
JEL classification: Q13; Q17; Q18.

Resumo: O estudo objetivou investigar quais fatores explicam a intensificação nas exportações de derivados da soja pela Argentina, e de grãos pelo Brasil. Para tal, utilizou-se o método de análise de conteúdo através de entrevistas semiestruturadas. Os resultados mostram que o segmento de processamento de soja na Argentina possui vantagens comparativas derivadas da concentração da produção, plantas industriais com elevadas capacidades de processamento, logística facilitada, diferencial tributário, restrita demanda doméstica e cobrança de royalties. Por outro lado, o Brasil intensificou as exportações de grãos, principalmente em função da demanda chinesa, imposição de barreiras comerciais nos derivados, incentivos tributários e grandes distâncias.

Palavras-chave: Exportações. Comércio Internacional. Complexo Soja.
Classificação JEL: Q13; Q17; Q18.

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1. Introduction

In international trade, the main soybean producers and exporters are the United States, Brazil, Argentina and Paraguay, which together accounted for 83.81% of total production and 93% of world exports in the 2019 harvest (USDA, 2020). In this scenario, Argentina holds 15.69% of total soy production in the world, and Brazil holds 36.42% of this total, while, in total exports of the soybean complex worldwide, Brazil holds 50.96% and Argentina 5.50% (USDA, 2020). This share is due to the conditions created internally to produce and export the product.

In this market, countries consolidate themselves as producers and exporters of a product through factors that impact export trajectories, as nations do not advantageously produce all the goods and services they need. This situation stems from various factors, including differences in the geographical distribution of natural resources, climate and soil, production and distribution techniques, availability of capital, and State regulation based on the economic policies implemented in the sectors (Cardoso, 2004).

Together, these elements make up the global or systemic competitiveness of each soy-producing country and determine the country's ability to maintain or expand its share of the world market. Therefore, the survey of these factors is important for each country to formulate competitive strategies that preserve and expand their market shares.

Through interviews with market professionals, this study aims to contribute to the study by Sampaio et al. (2012), which describes Brazil's global competitive factors compared to its main exporting competitors of both soybeans – the United States – and derivatives – Argentina – on the international soybean market through a bibliographical survey.

In this context, this study aims to answer the following question: What factors explain the intensification in exports of soybean meal and oil from Argentina and soybeans from Brazil? The study aimed to investigate which factors explain the intensification in exports of soybean meal and oil by Argentina, and soybean grain by Brazil. To meet the objective, the study used qualitative methodology, as it collected primary data through semi-structured interviews applied to professionals linked to exports of the soybean complex, the results of which were explored through content analysis. It is noteworthy that the interviews are an important tool for analysis, as they are used to collect data that describes the reality of the sector, as well as the interviewees' experiences on the subject.

The study is divided into four sections, in addition to this introduction: in the second section, the methodological procedures are presented; in the third section, the research results; finally, in the fourth section, the final considerations are stated.

2. Literature review

Figure 1 shows the framework that guided this research. For this purpose, analytical categories, also called nodes, have been formulated: Structuring Policy, Macroeconomic

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Policy, Industrial Policy, Instrumental Policy, and Comparative Advantages. Within each analytical category, the analytical subcategories are presented.

It is noteworthy that economic regulation occurs based on economic policies. Instrumental and structuring economic policies are guided by an industrial policy, which has sectoral objectives. In addition to economic regulation, the country may be endowed with comparative advantages, which manifest themselves in locational advantages, such as small distances and soil advantages and high fertility.

Therefore, the following theories were used to frame this study: Theory of Economic Regulation (Posner, 1974), Economic Policies (Ferraz; Paula; Kupfer, 2002), Theory of Comparative Advantage (Krugman; Obstfeld, 2005), and Competitiveness (Porter, 1990).

Economic regulation refers to all types of tax subsidies, and explicit legislative and administrative controls over fees, market entry and other facets of economic activity (Posner, 1974). This author's definition is the most explanatory regarding how State regulation occurs, and is also the base definition considered in this study, when the central hypothesis is raised that the different forms of regulation can explain the process of intensification of exports of soybean meal and oil in Argentina and soybean grain in Brazil.

Regulation is rooted in a set of policies and instruments that are articulated and synchronized around a growth and development strategy that can have a positive impact. Among these policies, there is industrial policy and trade policy. The main concepts of industrial policy are that it is necessary to overcome macroeconomic constraints on economic growth, and that government action at the microeconomic level can lead to the maintenance of stability and thus to a greater degree of freedom, rather than to additional constraints (Kupfer, 2003). According to Ferraz, Paula and Kupfer (2002), the aim of this policy is to promote productive activities towards higher levels of development than those that exist in a given national territory.

Trade policy is also an instrument of government regulation, especially in issues related to Foreign Trade. According to Krugman and Obstfeld (2005), this policy includes the measures adopted by the government in international trade, and the various actions and mechanisms on international transactions, such as subsidies and tariffs. The central idea of the policy is to protect or subsidize a particular sector.

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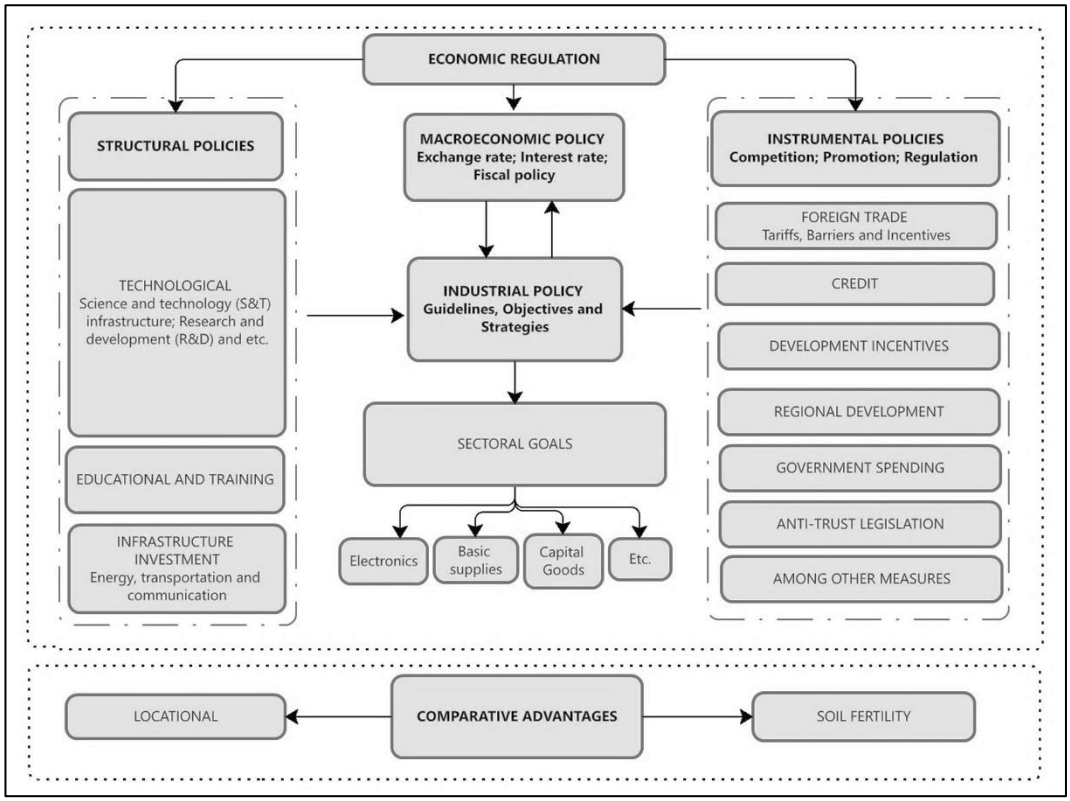
Figure 1. Framework



Source: Adapted from Suzigan (1993).

In addition to economic policies, there is also the Theory of Comparative Advantage, which explains the benefits in international trade realized by nations that do not have absolute advantages in the production of any good, as long as that nation specialized in production with the least absolute disadvantage (Krugman; Obstfeld, 2005). Therefore, the existence of a country's revealed comparative advantages in a given good is considered, and these can be in terms of cost or natural resources, and should be considered in trade gains.

Another key factor for analysis is competitiveness, which refers to the conditions created by a nation. For Porter (1990), the nation is competitive when it has competitive companies, and companies are competitive when the nation has natural resources. This happens especially when it creates national strategies to assist – in this case, government policies – that encourage the productivity of resources, such as education and training, research, infrastructure and the formation of industrial hubs. In other words, nations do not compete in the global marketplace, but companies do, and nations have the critical role of

providing an enabling environment in which competitive companies are forged. Therefore, the role of the government must be to stimulate these environmental conditions, which include the training of human resources, infrastructure, stimulation of competition, and informing and educating buyers.

Finally, this research analyses each country's economic policies, national competitiveness and comparative advantages to understand the factors that explain the intensification of soybean grain exports by Brazil and soybean meal and oil by Argentina.

3. Methodology

This section presents the methodological procedures used in the research.

3.1. Research classification and specification

This research is classified as applied, since it aims to generate knowledge for practical application and to solve specific problems, involving local truths and interests (Silva, 2005). The approach is qualitative because it consists of techniques aimed at interpreting phenomena, such as content analysis. From an objective standpoint, the research is defined as exploratory, since it consists in identifying the phenomena that explain the object under study (Silva, 2005).

To achieve the proposed objective, interviews were conducted with "sector specialists" between January and July 2019, and the data were processed using content analysis with NVivo9 software. Bibliographical research was also used as support. Data were gathered using a semi-structured questionnaire.

Data collection was carried out through interviews with five professionals related to soybean exports – four representatives in Brazil and one in Argentina – to learn about their perceptions and contributions about the situation in both countries. These interviewees were selected based on a previous study about the subjects, directly involved in the export of the soy complex. The Brazilian interviewees include a chief economist, two commercial managers and a production manager; the Argentinean interviewee is a manager of economic and commercial affairs.

For the interview, a script of open-ended questions was developed aiming to provide the interviewees with more freedom within their answers, and allowing the interviewer to reflect about her experiences on the subject. The sample is intentionally non-probabilistic, as it is not necessary to have a representative segment, but rather representative elements to understand the diversity of peculiarities that the sector has been and is experiencing. Data collection was conducted by the researcher, and each interview lasted approximately 30 minutes, conducted in a single meeting with each interviewee, accompanied by the research supervisor and co-supervisor. According to Oliveira and Gomes (2005), reflection and the ability to describe and clearly express the social context of the subject's life and experiences are necessary, as well as a research approach that promotes the description of relationships and interrelationships without making value judgments.

4. Results and discussion

This section presents the findings and discussion of the research.

4.1 Qualified Informants' Perceptions of the Differences between Brazil's and Argentina's Soy Complex Exports

Table 1 presents the main results found in the interviews, according to the studied analytical category. The data represent the percentage of the source coded in the analytical category, i.e. the density of the analytical category in the total interview. The following analytical subcategories were identified: demand, domestic demand, international demand, incentives, tariff, barriers, infrastructure logistics, technologies, intellectual property, climate, scale, soil fertility, locational advantage, power shifts, difficulty in operating with derivatives, negotiations and quality standards. The content of the analytical categories is discussed in the following subsections.

Table 1 – Percentage Coded in Analytical Category of Interview Total
Source: Research results.

Analytical category		Source 1	Source 2	Source 3	Source 4	Source 5
3.1.1.	Demand	-	-	-	6.83%	-
3.1.1.1	Domestic demand	0.38%	-	10.39%	5.05%	5.49%
3.1.1.2	International demand	6.41%	-	-	8.69%	-
3.1.2.1	Incentives	4.66%	3.22%	6.04%	3.06%	2.46%
3.1.2.2	Tariff	6.19%	2.60%	1.46%	2.12%	18.59%
3.1.2.3	Barriers	0.72%	5.06%	8.90%	14.75%	17.44%
3.1.3.1	Infrastructure logistics	5.83%	2.38%	-	2.80%	4.17%
3.1.3.2	Technologies	8.58%	-	-	1.55%	-
3.1.4	Intellectual property	5.93%	-	-	-	-
3.1.5.1	Climate	0.62%	-	-	2.27%	-
3.1.5.2	Scale	-	6.80%	-	0.68%	3.14%
3.1.5.3	Soil fertility	0.91%	-	-	-	-
3.1.5.4	Locational advantage	0.69%	2.35%	8.69%	15.98%	10.45%
3.1.6.1	Power shifts					9.69%
3.1.6.2	Difficulty operating with derivatives	-	-	10.62%	-	-
3.1.6.3	Negotiations	14.39%	-	5.27%	3.68%	4.04%
3.1.6.4	Quality standards		-	5.80%	-	-

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4.1.1 Analysis of the analytical category: Demand

The "Demand" node covers a percentage frequency of 6.83% of the informant's total speech, as shown in Table 1. This result shows that, according to the qualified informant, one of the factors explaining the intensification of exports of soybeans by Brazil and soybean meal and soybean oil by Argentina is demand.

According to the interviewed source, the analytical category "demand" refers to a key variable in companies' decisions about selling one product or another to meet domestic or international needs, i.e. according to the manager, grains or derivatives are sold to the domestic or international market based on the highest margin achieved.

This category also considered the impact of domestic and international demand, presented in the next two subsections, as factors that may have influenced the export trajectories of Brazil and Argentina.

4.1.1.1 Domestic demand

The "Domestic demand" node accounts for 0.38% of the total interview with source 1, while, for source 4, it represented 5.05% of the total interview with the company; in source 5, 5.49% of the total interview was obtained and 10.39% of the total interview with source 3, according to Table 1. This result shows that one of the factors explaining the intensification of exports of soybeans by Brazil and soybean meal and soybean oil by Argentina is domestic demand.

According to the interviewees' considerations, Brazil has greater domestic trade than Argentina; therefore, despite the fact that the production capacities of the two countries are similar, Brazil has mainly satisfied domestic demand. Argentina, as it had lower domestic demand, ended up structuring itself to export, and thus meet international demand.

4.1.1.2 International demand

International demand is the second analytical category considered by interviewees as one of the explanations for the export trajectories of Brazil and Argentina. The "International demand" node accounted for a percentage frequency of 6.41% of the total interview with source 1, while for source 4 it represents 8.69% of the total interview. This result shows that one of the factors explaining the intensification of exports of soybeans by Brazil and soybean meal and soybean oil by Argentina is international demand.

In the analytical category "international demand", the interviewees identified the emergence of China in international trade as a factor that has explained the greater export of grains by Brazil. China represents a country that has structured itself to import grains and therefore has an impact on soybean exports, mainly from Brazil. The managers

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consider that China started demanding grains in Brazil when it didn't have a structure for exporting derivatives, while Argentina already did.

China was once a country with high production and exports of soybeans in the world, but lost its position as a world leader and became a net importer of the grain, meal and oil in 1980. This situation defined strong investments in milling industries in the following years, a result of the effective internal industrial policy, which made it an importer of grain due to the loss of strength in its own production. The privatization of the soybean chain has had a notable impact on the production of other countries, including Brazil (Brum, 2002). Consequently, there has been a notable increase in interest in Brazilian soybeans from China, which began consuming them in 1996 and more effectively in 2000.

Coronel et al. (2009) consider the growth effect of world trade to be one of the factors that most contributed to exports, both of grain and meal and oil. This growth was significantly influenced by the expansion of global trade in the soy complex between 2002 and 2004, which impacted Brazilian exports. This period coincides with the entry of China, Brazil's primary trading partner, into the global market.

Subsequently, Brazil has augmented its involvement in the global market through soybeans, while sustaining comparable levels of exportation of processed commodities such as soybean meal and soybean oil. For example, during the 1977/78 harvest, Brazil exported 830,000 tons of soybeans, 6.31 million tons of soybean meal, and 675,000 tons of soybean oil. This shift in the soybean industry was most notable in the 1999/2000 period, when exports reached 11.1 million tons, while soybean meal exports reached 9.95 million tons and soybean oil exports reached 1.13 million tons. In recent years, this transformation has intensified. In the 2019/20 harvest, exports of soybeans reached around 76 million tons, while other products remained at similar levels: soybean meal reached 15.4 million tons and soybean oil only 1.5 million tons (USDA, 2020).

Similarly, China witnessed a shift in the pattern of its exports and imports over the same period. In the 1977/78 harvest, China exported 90 million tons of soybeans, 17 million tons of soybean meal and 2 million tons of soybean oil. In the 2000/01 harvest, China exported 208 million tons of soybeans, 155 million tons of soybean meal and 53 million tons of soybean oil. In the 2019/20 harvest, soybean exports reached 1.25 million tons, while soybean meal exported 9.50 thousand tons and soybean oil 1.50 thousand tons (USDA, 2020).

The most striking evidence of market transformation can be observed in the context of China's imports. In the 1995/96 harvest, China imported 795 million tons of soybeans, 1.17 million tons of soybean meal and 1.44 million tons of soybean oil. In the 1999/2000 harvest, China imported 10.1 million tons of soybeans, 636 million tons of soybean meal and 682 million tons of soybean oil. This situation reached a crescendo in the 2019/20 harvest, when China began importing 85 million tons of soybeans, 50.000 tons of soybean meal, and 1.200 tons of soybean oil (USDA, 2020). This scenario is the result of significant internal political decisions in China that have had a profound impact on international trade, consequently affecting Brazil's exports due to the robust trade relations between the two countries.

4.1.2 ANALYTIC CATEGORY ANALYSIS: FOREIGN TRADE

This subsection is divided into three analytical subcategories, which describe the policies of Brazil and Argentina. In their study, Bertrand et al. (2001) highlight a similarity between the macroeconomic policies of Brazil and Argentina (stabilization, liberation and privatization) and observe that both countries have reduced their foreign trade tariffs.

4.1.2.1 Incentives

The analytical subcategory Incentives presented a percentage frequency of 2.46% of the total interview with source 5; in source 4, 3.06% was obtained; in source 2, 23.22%; source 1 presented 4.66%; finally, 6.04% of the total interview was obtained from source 3, as shown in Table 1. This result shows that one of the factors explaining the intensification of exports of soybeans by Brazil and soybean meal and soybean oil by Argentina is the Kandir Law.

In this regard, all five sources underscored the pivotal role of the Kandir Law in reshaping the taxation landscape. While the law has had a discernible impact on the competitiveness of Brazilian processing, it has also contributed to the depreciation of inland processors' positive margins.

Exports of all primary products and a series of semi-finished products were formerly taxed by ICMS (Imposto sobre Circulação de Mercadorias e Serviços). Among these products, there were soybeans, meal and oil. This led to concern about the decreased competitiveness of national products. Furthermore, the situation gained momentum, particularly when Brazil's trade balance, which had been in surplus in 1994, shifted to a deficit in 1995 and 1996 (Leitão, 2007). In these circumstances, the so-called “Kandir Law” (Complementary Law No. 87 of September 13, 1996) was enacted, exempting the payment of ICMS on exports of primary and semi-finished products or services, i.e. primary products, such as soybeans, and semi-processed products, such as soybean meal and oil (Brasil, 1996).

Therefore, the Kandir Law allowed, on the one hand, greater competitiveness in exports destined abroad, at the same time resulting in greater positive effects on the country's trade balance and, on the other hand, significantly reducing the viability of the production of processed products, such as soybean meal and oil (Leitão et al., 2012). The results of the Kandir Law were immediate: soybean exports increased from 3.45 million tons in 1995/96 to 8.76 million tons in 1997/98, resulting in twice as much growth in the period. This shift in exports had a notable influence on the quantities supplied to the industry for oil and bran production (USDA, 2020).

According to ABIOVE (2011), soybeans were subject to a 13% tax on exports, regardless of the exporting state. After the Kandir Law, soybeans became exempt from taxation on exports, regardless of the exporting state.

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Regarding the export of soybean meal and soybean oil, in the year before the Kandir Law there was an average ICMS rate of 10%; in the period following this law, these commodities became exempt from ICMS. However, the disparity in taxation on the export of derivatives is contingent upon a stage preceding the exportation of the by-product. Specifically, the processing industry is subject to a 12% interstate ICMS tax on the acquisition of raw materials from another state.

According to ABIOVE (2011), the Kandir Law has an imbalance in ICMS taxation in the domestic market, divided into two parts: the first refers to the purchase of raw materials in the same state as the industry; and the second refers to the purchase of raw materials in a different state from the industry. Furthermore, ICMS is levied on the sale of the product within the domestic market, whether in the same state or in different states.

In the first scenario, when the industry purchases raw materials in the same state where it resides, there is no ICMS taxation to produce soybean meal and soybean oil; however, when the industry needs raw materials from another state, it is subject to 12% interstate ICMS taxation to then produce soybean meal or soybean oil.

In the second scenario, it refers to the sale of by-products on the domestic market. In exports, the exporting industry is not subject to ICMS taxation. However, in the case of sales made on the domestic market, there is a distinction in the applied rate. When the processing industry sells soybean oil to the same state as the industry, a 7% ICMS tax is levied. This is an illustrative example of the taxation of derivatives as presented by ABIOVE. However, according to source 3, the taxation of soy derivatives is more complex. The sale of soybean meal is taxed at 18% within the state for trading, 12% outside the state for trading, and 8.4% outside the state for feed industries. Furthermore, soybean oil is subject to a 7% tax within the state for packaging, a 12% tax within the state for feed industries, and a 12% tax outside the state.

The Kandir Law had the effect of discouraging the oil industry by imposing a tax on the interstate sale of soybeans for crushing (12% ICMS). The law discouraged the industry because the main areas of cultivation and crushing are distributed across different states. This resulted in a process of deindustrialization of the production circuit and an increase in the sale of unprocessed grains. Consequently, Argentina was able to increase its share of the export of derivatives (Bender, 2017).

The processing sector appears to have lost some of its competitiveness after the enactment of the Kandir Law. Furthermore, China's preference for importing soybeans in international trade, coupled with its strong trade relations with Brazil, resulted in an expansion of the soybean market and a consequent curtailment of the growth of Brazilian domestic processing.

4.1.2.2 Tariff

The tariff was identified as a key analytical subcategory within the proposed framework, with the potential to significantly influence the intensification of soybean meal

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and oil exports by Argentina. The "Tariff" node presented a percentage frequency of 1.46% of the total interview with source company 3; from source 4, 2.12% of the total interview; from source 2, 2.60%; 6.19% from source 1; finally, 18.59% of the total interview with source 5, as shown in Table 1. These findings indicate that one of the key factors contributing to the increased exports of soybean meal and soybean oil by Argentina has been the imposition of export duties.

The interviewees identified a number of considerations, including export duties. These duties imply a higher rate for the export of soybeans, while the rate for oil and flour is lower. This has resulted in Argentine industries adding greater value.

As observed by Hanickel and Román (2008), *retenciones* emerged over different historical periods, including the 19th century, the 1930s, the 1970s, and the present era. These taxes have been recorded over many years for the nation of Argentina. The purpose of this taxation is twofold: firstly, to protect the processing industry, and secondly, to encourage the export of flours and oils rather than grains.

According to Bolsa de Comércio de Rosário (BCR, 2019) and Cámara de la Industria Aceitera de la República Argentina (CIARA, 2019), in the historical context of export taxes in Argentina, in 1982, soybeans, along with their meal and oil derivatives, were subject to an export tax rate of 25%. In the following periods, between 1983 and August 1984, soybeans were exempt from the tax. Soybean meal was subject to a 13% tax in 1983 and a 7% tax in July 1984. In December 1983, soybean oil exports were taxed at 13%. This increased to 19% in May 1984 and then to 10% in August 1984. In the following years, this dynamic was reversed: exports of soybeans were taxed at even higher rates than soybean oil and soybean meal. This period coincides with the implementation of government reforms and the increase in the number of domestic processors discussed in the preceding sections. This allows us to conclude that there was a change in taxation policy designed to encourage the expansion of industrial capacity in Argentina.

From December 1984 to March 1990, export taxes ranged from 10 to 41% for soybeans and from 10% to 33% for soybean derivatives. In the following period, there was a decrease in the tax, and soybeans obtained a tax of only 6% in March 1991 and 3.5% in December 1992, while taxes on derivatives were extinguished. In the following years, from 1992 to 2002, export taxes were also abolished for soybeans, in addition to derivatives, which allowed exports without paying a portion of taxes to the government (BCR, 2019; CIARA, 2019).

After a period without charging export taxes, in March 2002, the government returned to charging *retenciones*, and after this period, the taxes were continuous and at very high rates; however, always with the tax differential between soybeans and processed soybeans. Currently, this export tax is around 23% for soybeans and 20% for soybean meal and soybean oil (BCR, 2019; CIARA, 2019).

4.1.2.3 Barriers

"Barriers" was one of the analytical subcategories proposed by the framework and highlighted during the interviews. The "Barriers" node presented a percentage frequency of 0.72% of the total number of interviews with source 1; from source 2, 5.06% of the total interview; from source 4, 8.90%; from source 3, 14.75%; finally, 17.44% of the total interview with source 5.

The interviews revealed that the trade barriers imposed by importing countries have, in the majority of cases, a relatively limited impact. However, it was revealed that the trade barriers imposed by China have a more significant impact, primarily due to the fact that the country is the primary grain trader for Brazil and Argentina. Additionally, the interviewees highlighted the extent to which the imposition of trade barriers by China affects the United States.

In light of the interviews conducted on the trade barriers imposed on grain trade between Brazil and Argentina, the existing literature has identified the international barriers that have an impact on the soy complex exports of these countries. It is noteworthy that the trade restrictions imposed by China have had the greatest significant impact in this context. In this case, the objective is to understand the impact of the trade barriers that Brazilian soybeans suffer due to international trade, and the trade barriers that soybean meal and soybean oil suffer on Argentine exports.

With regard to soybeans, a considerable number of the aforementioned barriers are not specific to this complex; in the majority of cases, they pertain to agribusiness, agriculture, commodities, and grains in general. Examples of measures employed in this market include the imposition of tariff peaks and tariff escalations, which have the effect of destabilizing markets and discouraging value addition (Rodrigues et al., 2011).

According to ABIOVE (2011), the tariff escalation applied by China is evident in the import tariff on soybeans, which represents 3%, soybean meal, 5%, and soybean oil, 9%. China has implemented higher tariffs on processed goods than on unprocessed commodities, thereby encouraging the importation of raw materials. In this manner, China has leveraged import tariffs to promote domestic processing, which has led to an intensification of soybean exports from Brazil in response to Chinese demand.

Nevertheless, Coronel et al. (2009) argue that Brazil must pursue alternative strategies at the World Trade Organization (WTO) to reduce the tariff and non-tariff barriers imposed by major importers on the soybean agribusiness.

The average ad valorem tariffs in the HS code per Chinese by-product in the initial years from 1996 to 2001 were considerable, representing 114.0 on crushed soybeans; soy flour, 40.0; crude soybean oil, whether or not degummed and soybean oil, whether or not refined 121.6; soy sauce, 35; and in bagasse and other residues from soybean oil extraction, 5.0. In the following years, there was a drop in tariffs imposed by China, possibly due to the country's entry into the WTO. This resulted in reduced tariffs, which in 2017 stood at 3.0 for soybeans, 9.0 for soybean meal and oil, 28.0 for soy sauce, and 5.0 for bagasse and other residues in soybean oil (WTO, 2019).

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Following an analysis of the barriers imposed by China, the primary market for grain exports from Brazil and Argentina, this study focuses on the barriers that impact Argentina. In regard to the trade barriers imposed on Argentine exports of the soy complex, as stated by Freitas et al. (2001), the country implemented a mechanism, known as *retenciones*, to safeguard its domestic industry. This export tax is designed to retain raw materials within the country, imposing higher rates on grain exports and ensuring that local processing occurs. Thus, the tax creates an incentive for the production of soybean oil and meal, but does not provide similar incentives for consumption. Furthermore, soybean meal exports benefit from *reintegro*, a discount on domestic taxes in the range between 1.4% and 6.8% (BCR, 2018).

The import tariff escalations imposed on the soybean crushing industry are evident in the main destination for soybean exports, which is China, accounting for 89% of exports. This importing country has implemented different import tariffs, of 3% for soybeans and 9% for soybean meal and oil, as it is also the primary destination for Brazilian soybean exports (BCR, 2018).

4.1.3 Analysis of the analytical category: structuring policies

This subsection is divided into two analytical subcategories. Despite the similarities in macroeconomic policies, agricultural policies for regional development have differed between the two countries; however, both Brazil and Argentina invested in infrastructure in the 1990s and 2000s (Bertrand et al., 2001).

4.1.3.1 Infrastructure logistics

The infrastructure logistics analytical subcategory presented a percentage frequency of 2.38% of the total interview with source 2; 2.80% of the total interview with source 4; 4.17% of the total interview with source 5; finally, 5.83% of the total interview was obtained from source 1, as shown in Table 1. This result shows that one of the factors explaining the intensification of exports of derivatives by Argentina is the infrastructure logistics.

According to the interviewees, Argentina has structured itself to be an exporter of industrialized products, which requires structural policies to improve internal logistics. This has led to the development of infrastructure and waterways that favor industrial plants in the country.

According to the Brazilian Agricultural Research Corporation (EMBRAPA, 2007), Brazil has territorial, climatic and technological advantages in the soy production process; however, this advantage decreases when considering international competitiveness in terms of transport logistics (roads, railways, waterways and ports) and storage capacity, in addition to losses in transport and storage.

In terms of transportation, road is the primary mode of transport in Brazil, with costs that are 67% higher than rail and more expensive than waterways. Given the higher cost of this mode of transportation, it should be reserved for the final stages of the journey, namely, delivering the products to the rail and waterway terminals. These account for only 28% and 5% of the total soybeans transported, respectively. In Argentina, road transportation is also the primary mode, accounting for approximately 80% of soybean transport. However, the distances covered are relatively short, ranging from 250 to 300 km, compared to the longer distances in Brazil, which vary from 900 to 1,000 km. Therefore, the cost of transporting domestic production in Brazil is, on average, 94% higher than in Argentina (EMBRAPA, 2007).

In terms of infrastructure logistics, Coronel et al. (2009) consider that, to continue as an important exporter of the soybean complex, Brazil needs to overcome several internal obstacles, such as reduced transport and logistics costs, better infrastructure conditions, and investing more in research.

4.1.3.2 Technologies

The analytical subcategory technologies presented a percentage frequency of 1.55% of the total interview with source 4 and 8.58% of the total interview with source 1, as shown in Table 1. This category was presented to the interviewees, but it was determined that it did not contribute to the differentiation of the trajectories between Brazil and Argentina.

The interviewees indicated that seed, research, and equipment technologies, among others, are present in both countries. They believe this process was largely driven by the opening up of the two countries' economies and the subsequent influx of large multinationals.

The trade opening that took place in Argentina and Brazil has led to a reduction of differences between the technologies used in the three exporting countries – Argentina, Brazil and the United States –, mainly in terms of modified seeds. Additionally, the same firms or players are present in all three countries, including Bunge, ADM, Louis Dreyfus, and Cargill, companies that are positioned across all stages of the soybean production chain. (Wesz Junior, 2014). Therefore, the entities engaged in the soy production chain in Brazil, as well as in Argentina, are marked by large national and foreign conglomerates.

Furthermore, the production method is becoming increasingly uniform, with transgenic (or genetically modified, GMO) seeds being used across the board in Argentina, the USA, and Brazil. Transgenics boost production, minimize losses and costs, and consequently enhance profitability (Sampaio et al., 2012).

The study by Sampaio et al. (2012) considers that the trade opening that occurred in Argentina and Brazil has narrowed the technological gaps between the three exporting countries, with the same firms now present in all three. The adoption of transgenic seeds is becoming increasingly prevalent across the globe, with Argentina, the United States, and Brazil leading the way.

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In terms of research, EMBRAPA has played an instrumental role in developing seeds that have adapted to the Brazilian Cerrado, enabling the expansion of the crop throughout the region at high levels of productivity. Additionally, Embrapa has been at the forefront of seed development. EMBRAPA is also responsible for new strategies to combat diseases and pests (Bertrand et al., 2001). In Argentina, the institute equivalent to EMBRAPA is the National Institute of Agricultural Technology (INTA). However, INTA has been replaced by private research. Its main activities include the development of crops in the Pampa region and the rapid spread of GMO seeds (Sampaio et al., 2012).

4.1.4 Analysis of the analytical category: intellectual property

"Intellectual property" was identified as an analytical category during the interview, representing a variable that influenced the intensification of meal and oil exports by Argentina due to the non-payment of royalties to Monsanto. The "Intellectual property" node covers a percentage frequency of 5.93% of source 1's total interview, as illustrated in Table 1.

The interviewee stated that Argentina seized a market opportunity by exporting soybean meal and soybean oil to the European Union, without paying royalties to Monsanto. This was because derivative products would not be embargoed, reducing product costs and making possible to reach a market that was heavily occupied by Brazil.

The expansion of soybean cultivation in Argentina can be attributed to the combination of direct planting with the use of RR seeds by researchers (Bertrand, 2001). Monsanto entered the Argentine market in the 1990s. At that time, the country's seed and patent legislation did not allow intellectual protection for biotechnologies, seeds, and varieties – especially for the technological processes applied to the development of RR seeds. Therefore, the collection of royalties or compensation for unauthorized use of the echnology was not permitted (Wilkinson et al., 2005).

In other words, Argentina does not recognize property rights over varieties, cultivars or technologies incorporated into the plant breeding process, whether conventional or genetically engineered. Therefore, the Argentine farmer obtained an economic benefit from the technologies in question, in addition to the economic advantage over adhering to the RR technological package (Wilkinson et al., 2005).

4.1.5 Analysis of analytical categories: comparative advantages

This subsection is divided into four analytical subcategories: climate, scale, soil fertility and location.

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4.1.5.1 Climate

Among the variables that are key to increasing the export of grains by Brazil and meal and oil by Argentina is the analytical subcategory “Climate”. This node presented a percentage frequency of 0.62% of the total interview with source 1, and 2.27% with source 4, as shown in Table 1. This result demonstrates that climate conditions influence the application of fertilizers, thereby conferring a competitive advantage on Argentina in terms of production costs compared to Brazil.

According to the interviewees, the climatic differences between Brazil and Argentina give the latter a competitive advantage due to the lower use of pesticides. Consequently, Argentina can maintain its competitiveness even when there are export taxes, also known as *retenciones*.

The USA and Argentina have temperate climates, while the Brazil has a more tropical climate; however, the climatic characteristics of southern Brazil are similar to those of Argentina. The Central-West and Cerrado regions also feature a humid and tropical climate with low fertility. EMBRAPA has developed varieties of crops that are well-suited to these regions. Brazilian farmers in the two main producing regions (in the South, in the state of Paraná, and in the Central-West) use more fertilizers and chemicals than their counterparts in Argentina and the USA. The soil in the Central-West's Cerrado region is acidic and oxidized, lacking in nutrients. However, it has characteristics suitable for agricultural production (Sampaio et al., 2012).

4.1.5.2 Scale

The second analytical subcategory, “scale of production”, also explains the intensification of grain exports by Brazil and meal and oil by Argentina. The “Scale” node presented a percentage frequency of 0.68% of the total interview with source 4; 3.14% of the total interview with source 5; and 6.80% of the total with the interview with source 2. This result indicates that one of the factors contributing to the increased export of soybean meal and soybean oil in Argentina is the investment in large-scale industrial facilities, which has led to the production of significant quantities of derivatives on a large scale.

The interviewed managers consider that the high investment in larger industrial crushing plants by Argentina resulted in the large-scale production of soybean meal and soybean oil, which has had a positive impact on the country's cost and competitiveness in the production of derivatives.

In the United States, the installed capacity to process oilseeds is 210,000 tons per day, distributed among 70 plants in all regions of the country; in Brazil, processing capacity is approximately 160,000 tons per day, spread over 116 plants. In Argentina, however, the installed milling capacity is 217,000 tons per day, and 80% of this production takes place in just 20 plants, located in the Greater Rosario area. Furthermore, these industrial plants

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still process soybeans from Paraguay and Bolivia, arriving by waterway via the Paraná River (Wesz Junior, 2011).

In short, Argentina has a high soybean milling and storage capacity, and this infrastructure is concentrated close to the main soybean crops, which allows for faster flow and processing at lower costs, which increases competitiveness in relation to competitors in international trade.

4.1.5.3 Soil fertility

The analytical subcategory “soil fertility” is considered one of the factors that have contributed to exports of the soybean complex. The analytical category “Soil Fertility” presented a percentage frequency of 0.91% of the total interview with source 1, as shown in Table 1. This result demonstrates that the variable soil fertility is one of the factors that represent Argentina's comparative advantage in production costs.

For those interviewed, Argentina has an advantage in soil fertility compared to Brazil. As a result, Argentina is able to compete in the production of soybeans, which leads to lower production costs. As outlined in the study by Sampaio et al. (2012), American and Argentine soils are more fertile than Brazilian soils, with emphasis on the high fertility of the Argentine Pampas. Brazil's two main producing regions (in the South, in the state of Paraná, and in the Central-West) utilize a greater quantity of fertilizers and chemicals than Argentina and the USA.

Argentina's diverse soil fertility levels result in varying yields across the country. The Pampas, one of the main agricultural and economic regions in Argentina, contains much of the soil considered to have the highest fertility in the world, with the exception of only the province of Tucumán. These soils have characteristics that favor root development and good water run-off. They are dark, deep soils, rich in humus and minerals and have a significant amount of organic matter in their composition, making them highly productive and suitable for agriculture. This extensive area of productive, higher-quality soils is referred to as the "prime agricultural zone". These are the areas with the highest yields, and their location coincides with the ports and agro-industrial export areas of greater Rosario and Quequén (Bender, 2017).

The predominant soils in Brazil, particularly in the municipality of Sorriso and across much of Mato Grosso (the primary region for soy production), are characterized by high porosity and depth. In its natural state, the soil exhibits extremely low phosphorus levels and a high aluminum content, which affects plant development. In general, these soils present significant fertility challenges. Phosphorus and potassium are essential chemical elements, and their scarcity can be compensated with fertilizers, but this leads to an increase in production costs. As a result, Brazil also has higher fertilization costs, at around 25 to 35%, when compared to Argentina, which has costs of around 10.4% (Bender, 2017).

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4.1.5.4 Locational advantage

Finally, the last analytical category, defined as “locational advantage”, represented one of the most important variables in explaining the intensification of exports of soybean meal and oil by Argentina. The “locational advantage” node presented a percentage frequency of 0.69% of the total interview with source 1; 2.35% of the total interview with source 2; 8.69%, with source 3; 10.45% with source 5; and 15.98% with source 4, as shown in Table 1. This result demonstrates that one of the factors that have explained the intensification of exports of soybean meal and soybean oil in Argentina has been the locational advantage.

The interviewees indicated that Argentina has a competitive advantage in logistics. The industrial crushing plants are concentrated within a radius of no more than 300 km from the soybean production, and are close to the production flow to the international market. This reduces logistics costs in Argentina's domestic crushing, making it more competitive than Brazil.

One of the main competitive factors that increased soy processing in Argentina is the distance traveled from soy production to processing and ports. This factor, shown in Figure 2, considerably reduces production costs. According to Bender (2017), location is a fundamental factor in competitiveness, and in Argentina one of the main characteristics of soybean producing companies – and what differentiates them from their Brazilian competitors – is precisely their location.

Argentina's ports and crushing facilities are concentrated in the city of Rosario, around the heart of the country's primary soybean production region. Furthermore, in this river zone of Argentina, on the right bank of the Paraná River, also called up-river private agroports, is where the main agro-industrial and port companies producing grains and derivatives are located, as well as where the main communication routes and the largest domestic crushing capacity per plant are located, as shown in Figure 2 (b) (Bender, 2017).

One of the key factors influencing a country's competitiveness is the proximity of a product to the market. Argentina's soybeans have the advantage over Brazil's due to the concentration of their crops around agro-industrial ports. As shown in Figure 2 (a), soybean cultivation in Argentina is in the lands of central and southern Santa Fé, north of Buenos Aires, east of Córdoba and west of Entre Ríos. Additionally, to a lesser extent, in the Northwest region, mainly in the provinces of Tucumán and Santiago del Estero (Bender, 2017).

The distances to be covered by the trucks and trains transporting grains to Rosario’s the agroindustries are tipically no more than 300 or 400 km, with the majority of the harvest occurring within a 200 km radius. In contrast, the distance from Sorriso, Mato Grosso, to the port of Santos in Brazil is approximately 2,000 km, which illustrates the significant logistical advantage enjoyed by Argentina (Bender, 2017).

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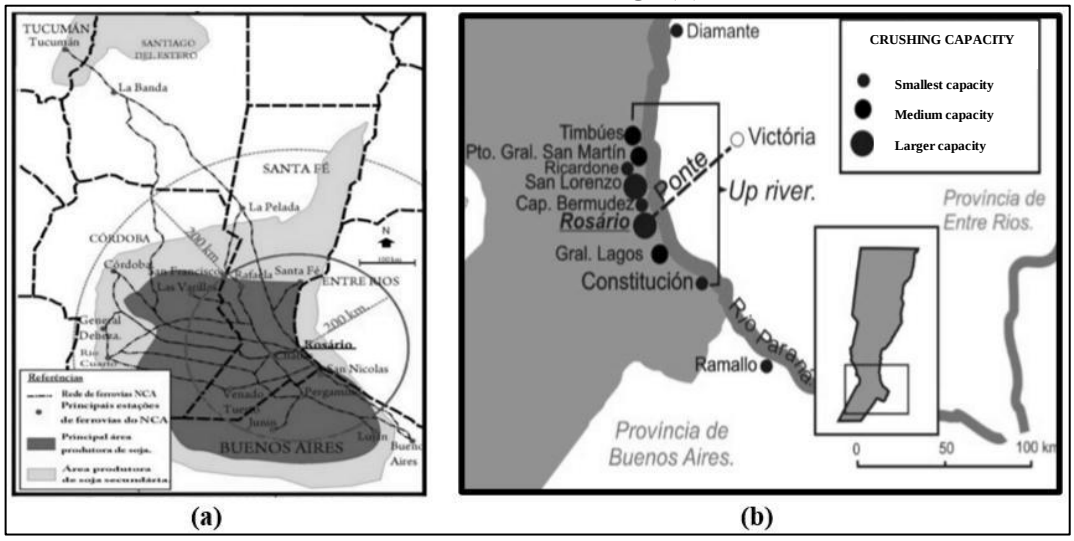
Figure 2. Location of the main soybean growing areas, Nuevo Central Argentino railway and distance from Rosário's agro-industries (a); location of the Argentine agro-industrial and soybean export hub in the south of Santa fé (up river) and Rosário-Victória bridge (b).



Source: Bender (2017). *(a) page 6 and (b) page 7.

4.1.6 Analysis of the analytical category: future concerns

This subsection is classified into four analytical subcategories: Power shifts, Difficulty in operating with derivatives, Negotiations and Quality standards.

4.1.6.1 Power shifts

Among the variables considered in this node is the analytical subcategory “power shifts”, which presented a percentage frequency of 9.69% of the total interview with source 5, as shown in Table 1. This result demonstrates that shifts in power within the industry or the agribusiness representatives can have an impact in the long term.

During the interview, when asked about the impact of the power shifts in Argentina, the interviewee explained that, in the last presidential election, there was a shift from industries to the agribusiness caucus. This is a common event, parallel to the change of president of the republic. Therefore, as much as this change may impact Argentina's economic trajectories, this would be a medium or long-term impact.

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4.1.6.2 Difficulty in operating with derivatives

Another variable that may impact the current scenario is the “Difficulty of operating with derivatives”. This analytical subcategory presented a frequency of 10.62% of the total interview with source 3, as shown in Table 1. This result demonstrates that this variable could influence the current Brazilian context, resulting in a greater intensification of grain exports, due to the difficulty that agro-processors have in operating with derivatives.

One of the interviewees portrayed that one of the variables that could influence the current scenario is the difficulty of working with grains. According to the analysis, current logistics operators in Brazil have greater acceptance of working with grain exports, due to their higher utilization capacity, turnover capacity and grain density. On the other hand, the possibility of losses is lower and, therefore, Brazil tends to export more grains than derivatives.

4.1.6.3 Negotiations

The “future negotiations” node presented a percentage frequency of 3.68% of the total interview with source company 4; 4.04% of the total interview with source 5; 5.27% with source 3; finally, 14.39% with source 1, as shown in Table 1. This result shows that one of the factors that may influence the expansion of derivatives exports from Brazil and Argentina to China is the need and search by both countries for negotiations with the Asian giant.

According to the respondents, Brazil should not use taxes on soybeans to promote exports of derivatives, but should conduct diplomatic negotiations with China and intensify trade relations between the two countries so that Brazil can meet part of China's demand for derivatives. As part of the negotiations, Brazilian representatives should seek to license export units, export factories, and alternatives aimed at expanding Brazilian domestic processing without imposing tariffs or taxes on grain exports. For Campeão et al. (2020), Brazilian competitiveness is outstanding and sustainable, even if other markets participate more actively in this trade.

4.1.6.4 Quality standards

The node "quality standards" had a percentage frequency of 5.80% of the total in the interview with source 3, as shown in Table 1. This result demonstrates that one of the factors that have hampered exports of derivatives in Brazil is the imposition of quality standards on soybean meal.

According to the interview, a variable that has had an influence on exports of derivatives in the current scenario is the adequacy of soybean meal to the quality standards

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required by the consumer. The decline in protein per ton in Brazil and Argentina in recent years has led to the search for blending with soy from other regions. For example, Rio Grande do Sul has sought soybeans from Mato Grosso, and Argentina has imported soybeans from Paraguay to blend and achieve the required quality.

Conclusion

In order to expand our knowledge about the factors that explain the intensification of exports of soybean meal and oil by Argentina and of soybeans by Brazil, primary data was collected through semi-structured interviews applied to professionals connected to soybean complex exports, using the method of content analysis. As a result, the factors influencing the export of the soy complex by Brazil and Argentina have been identified; however, it is important to note that the impact cannot be stated in a discriminatory or statistical manner.

The results demonstrate that, in recent years, Brazil has significantly increased its soybean exports, while those of meal and oil have grown relatively little. This is due the presence of specific factors that prevent the expansion of exports of products with higher added value such as soybean meal and oil.

Consequently, the Brazilian soy complex has intensified its grain exports, primarily due to Chinese demand for grains, the imposition of trade barriers by China on the import of derivatives, and tax incentives arising from the Kandir Law. Furthermore, the considerable distances between production facilities and ports in Brazil, coupled with infrastructure and logistics constraints, are impeding the competitiveness of soybean meal and oil exports. There is also less willingness on the part of logistics operators in Brazilian ports to operate loads of meal and oil, given that soybeans have greater liquidity and easier to load.

In contrast, exports of soybean meal and oil have increased in Argentina, primarily due to locational advantages stemming from the concentration of production within a radius of approximately 400 km. This concentration of production is situated in close proximity to crushing industries and industrial plants with high processing capacities (20,000 tons per day). Additionally, the availability of river and sea transport facilitates logistics, which has resulted in gains in scale and a reduction in costs. Furthermore, the implementation of strategic policies has facilitated the development of logistics infrastructure and waterways within the region where soybean production and processing occur. This has enabled Argentina to establish itself as a prominent exporter of soybean meal.

The restricted domestic demand in the neighboring country also provides an incentive for the export of soybean meal and oil. Additionally, the issues associated with the collection of royalties for the use of Monsanto's RR technology have prompted Argentine processing industries to prioritize the export of meal and oil over the non-shipment of products. This is due to the legal enforceability of the collection of royalties in the European Union during a certain period.

Consequently, the export of Brazilian meal and oil is contingent upon a number of factors beyond the country's control. The primary challenge is to surmount the obstacles posed by the considerable distances involved, the lack of investment in infrastructure and logistics, and, most importantly, the necessity for trade negotiations to facilitate the increased export of products with greater added value. Finally, the discussions in this paper serve as input for the promotion of new public policies at both national and international levels.

Regarding the limitations of this study, there is the need for greater representation of interviewees from Argentina. However, due to the difficulty of contacting guests, it was decided to use secondary data and theoretical review of the content to validate and enrich the results. In regard to suggestions for future work, it was identified that comparative analyses could be conducted with the inclusion of the United States, thereby broadening the understanding of the phenomenon under study.

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