


Article

The Relationship Between Agri-Food Production and Macro-Economic Dynamics: A Study on Soybeans in Brazilian South and Chinese Mainland

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Abstract: This research article aims to establish a relationship between regional conditions of agri-food production and their correlations with macroeconomic structures. To this end, soybeans production in Rio Grande do Sul, Brazil, and its trade with Chinese Mainland are observed. The analysis draws on the Food Regimes approach in dialogue with institutionalist theory, especially considering the construction of agricultural production habits and models. The argument takes secondary quantitative data on soybeans production and trade, triangulating them with information gathered from international platforms—primarily FAOSTAT and Trase Platform—and with qualitative data collected during field research—using landscape analysis and interviews conducted with soybean cooperatives (in the Brazilian case). Findings on the formation of the soybean market between Rio Grande do Sul and Chinese Mainland reveal historically constituted elements that shaped trade flows as they are configured contemporarily. A correlation between the Third Food Regime and effects on agricultural practice in the Brazilian region was also observed.

Keywords: markets; soybean; Chinese Mainland; commodities; agrifood system; food chains



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1. Introduction

Approximately 238 million tons of soybeans were produced in Rio Grande do Sul, Brazil, between 2000 and 2020, most of which were destined for export. The grains traveled along highways, railways and waterways towards the main port in the region. A significant part of its shipment was destined for the Asian continent, specifically for Chinese ports. Such logistics involved individuals, corporations and States throughout its stages—processes made possible by a historical framework of practices that underpin contemporary operations.

The pointed historical framework is characterized by a global economy in which public and private actors possess different capacities of socioeconomic power, depending on the path of relations established over the decades. Since the founding of the People's Republic of China, especially since the launch of reform and opening up, this relation was developed through bridges connecting an internal development project to the international capitalist economy. In the rural area, these bridges are highly illustrated by the soy-meat chain (Escher, 2022). Through the import of oilseed, China established contact with international private actors, becoming the country with the largest quantity of imports since 2004. Meanwhile, it provided raw materials to stimulate its internal production of animal protein, mostly pork (Lander et al., 2020). On the other hand, the relation established between Rio Grande do Sul and the international market economy was marked by a dependence of the region (and the Brazilian country as a whole) on the capital stock obtained through the export of commodities (Oliveira, 2016; Wesz Junior, 2014). In the field, however, distinct types of agriculture were developed by producers according to their land and capital availability, generating institutions in dialogue with the pre-existing social bases. Given the intricate nature of this subject, our research delves into the formation of the soybean market between Rio Grande do Sul and China spanning from 1970 to 2020. The crux of our investigation lies in examining the role of influential actors in shaping this market dynamic. Specifically, we place a spotlight on the institutions that were either established anew or underwent transformation, instrumental in enabling the facilitation of these substantial commodity flows.

To this end, our objective here divides into three questions: How does soybean export supply originate and is organized by the state of Rio Grande do Sul? How does China's soybean demand in the international market originate and is organized? What elements permeate trade flows between both regions?

To settle down the scope, three choices require justifications: the markets, the geographical area and the time frame. The first one regards interpretation of "the market" as an outcome of human sociability. General reflections on varieties of capitalism and economic forms add to the debate in Political Economy and to development perspectives, by regarding the various elements that comprise socioeconomic relations. In this research market analysis aims to contribute to the aforementioned debate by observing a transnational commodity chain (Azevedo, 2016; Wesz Junior, 2014). The second delimitation regards the geographical focus on China and Rio Grande do Sul. China was chosen because of its significance in oilseeds worldwide imports in the 21st century, its geopolitical potential and its adopted path of development (Escher, 2016; Jabbour, 2010; Schneider, 2011; Zhang & Zeng, 2021). Rio Grande do Sul, on the other hand, presents an economic path linked to soybean, as well as significant social connections in its structure currently (Benetti, 2004; Escher & Wilkinson, 2019). It should be noted that the focus on a Brazilian state rather than the country stems from the possibility of greater depth by avoiding generalizations that would be required in the analysis of the whole national scenario. The selection of these two regions is also due to the possibility of making a comparative analysis between institutional frameworks and their effects on the socioeconomic development of localities. Finally, the adopted time frame (1970 to 2020) is justified by the dynamism of sociopolitical movements in the period in both territories, which led to local agricultural transformations (Chen, 2019; Delgado, 2013).

Two theoretical pillars underpin the elaboration of this article. The first one, aligned with a global and regulative approach, namely the Food Regimes, suggests that the formation of macroeconomic structures defines the position of countries in international trade (Bernstein, 2016; Friedmann, 2005; McMichael, 2009). A second pillar is related to the cultural and cognitive dimensions. We draw on scholars of Historical and Sociological Institutionalism stream because, despite regulative global compositions, everyday practices are performed by actors in contexts that are demarcated by formal and informal factors (Beckert, 2017; Hodgson, 2006). The institutionalist approach also underpins our interpretation of markets, taking them as social elements (Azevedo, 2016). To connect these spheres, we draw especially on the perspective of embeddedness regarding *structural* and *local* dimensions (Cassol & Schneider, 2022; Dimaggio & Louch, 1998).

The analysis resorted to quantitative and qualitative data and combined theoretical and statistical processes to build macro and meso analytical perspectives of the researched theme. Quantitative data were retrieved from the National Waterway Transport Agency (ANTAQ); the National Bureau of Statistics of China (NBSC); the Municipal Agricultural Production database—Brazilian Institute of Geography and Statistics (PAM/IBGE); the Foreign Trade Statistics/Brazilian Ministry of Economy; the Brazilian National Supply Company (CONAB); the Brazilian Association of Vegetable Oils (ABIOVE); and the platform Trase.earth. As to qualitative data, the research drew on two practices: reading the landscape of the northeastern region of Rio Grande do Sul (RS) and conducting semi-structured interviews with representatives of cooperatives located in RS and engaged in the soybean market.

In response to the three aforementioned guiding questions, the research inferred a social, artificial and politically induced nature of the soybean market formed between Rio Grande do Sul and China. A feat accomplished by means of five factors: the dilution of production costs, in RS' agricultural export model, throughout the social body; correlations between the Third Food Regime's dynamics and the practice located in Rio Grande do Sul; the Chinese development model and its balance between domestic and foreign markets; China's global expansion and the consequent changes in the international economy; and the distinct social relationships—such as trust and personal ties—that define the soy market. This research article makes a contribution by delving deeper into the analysis of market development and structuring. It engages in a critical discourse with paradigms that endorse conventional mainstream economic approaches that often ascribe a natural and self-regulating character to capitalist markets. Instead, this research aligns with perspectives advocating for social-based interpretation of economic relations.

In addition to this introduction, the article follows with three sections that address the research questions. The next section presents the production context in Rio Grande do Sul, the third one discusses the Chinese demand for grains and the fourth examines the commercial relationship between Rio Grande do Sul and China, while identifying observable elements related to the Food Regimes' approach as well as institutional elements. Then, it presents final considerations.

2. Supply of Soybeans by Rio Grande do Sul

The first signs of soybean commercial cultivation in Rio Grande do Sul date back to the 1940s. From then on, the grain's trajectory in the region can be outlined according to three periods: from

1950 to 1970; from 1970 to 1990; and from 1990 to 2020 (Wesz Junior, 2014; Delgado, 2013; Da Ros, 2006; Conçaves, 1984).

Between 1950 and 1970, soy gained ground in food consumption and in animal feeding (Conçaves, 1984). Complementarily with wheat crops, the oleaginous plant expanded territorially—especially fostered by local agricultural cooperatives. Its rapid expansion introduced new processes in the rural environment, such as greater mechanization and chemicalization of production (Da Ros, 2006).

Between the 1970s and the 1990s, soybean cultivation became predominant in the region as a result of four socioeconomic movements: changes in international supply due to reduction in the United States' domestic production (Bertrand et al., 1987); increasing consumption of the grain by European countries for production of animal protein and vegetable oils (Singh & Shivakumar, 2010); government subsidies for technological improvements related to the Green Revolution, which enabled soybean cultivation in new regions (Da Ros, 2006); and the rise in commodity prices that expanded the use of agricultural products as a capital inflow channel (Bertrand et al., 1987).

If the period 1970 to 1990 saw a significant expansion of soybean cultivation in Rio Grande do Sul, it was between 1990 and 2020 that its commercial importance became preponderant. At the beginning of the 21st century, economic destabilization in Asian countries caused international retraction of private credit. To maintain capital inflow, the Brazilian government fostered agricultural exports, with the addition of a new identify: agribusiness. In the Brazilian context, the term referred to the political project promoted and organized by agricultural conglomerates based on private capital and government support, especially fiscal incentives, export credits, infrastructure and the like (Oliveira 2016; Pereira & Alentejano, 2015). The sociopolitical construction was in tune with the enactment, in 1996, of the Kandir Law, which exempted primary products from the tax on products transacted, thus benefiting and encouraging the export of unprocessed raw materials. The law aimed to promote foreign trade to guarantee foreign currency inflow to the country's economy (Lemos et al., 2017). This new tax policy replaced the previous one, which levied a 13% tax on non-processed grains transacted, 11% on bran and 8.5% on processed oils. Such elements, together with the liberalization of the national market, reinforced Brazil's connection with the world economy (Benetti, 2004).

As a consequence, indices registered by CONAB on soybean cultivated area in the state show a substantial change over the last five decades: from 3.49 million hectares in 1976/1977, to 2.97 million in 2000/2001 and reaching 6.05 million hectares in 2020/2021. Regarding production, from 5.6 million tons in 1976/1977, production reached 7.1 million in 2000/2001 (indicating increase in productivity) and 20.78 million in 2020/2021—a 271% growth.

As regards the mode of production, the use of fertilizers is an emerging element throughout the 1990s. According to ANTAQ records, trade flows in the two main port complexes of Rio Grande do Sul—Porto Alegre and Rio Grande—recorded for the years 1979/1980/1981 totaled, altogether, three million tons of imported fertilizers, which corresponds to 35.8% of total imports unloaded in the state. In the period 1999/2000/2001, 4.4 million tons were recorded—7.8% of the total. In the recent period (2018/2019/2020), 15.28 million tons of imported fertilizers were recorded, reaching 40.7% of total imports.

This greater inflow of fertilizers points to the consolidation of a farming system based on external inputs, which becomes dependent on markets to make its production cycle viable (Van der Ploeg, 2018). Such trend occurs concomitantly with the opening of Brazilian national market and privatization of state-owned companies in the sector—especially phosphorus- and potassium-based fertilizers (Benetti, 2004)—corroborating the assertion by McMichael (2009, 2016) that the neoliberal discourse on removal of protections to domestic industries in favor of foreign competition has deepened in the Third Food Regime. In the long term, this process led to the concentration, in 2014, of 86% of Brazilian nitrogen-, phosphorus- and potassium-based fertilizers market in five companies (Bunge, Fertipar, Mosaic, Yara, Heringer) and, for pesticides and seeds, in eight companies that dominate 75% of the market (Syngenta, Bayer, Basf, Monsanto, Dupont, Dow, Makhteshim & FMC) (Wesz Junior, 2014).

The case of authorized cultivars for seed production in RS is also illustrative. According to the National Registry of Cultivars (RNC/MAPA), thirteen authorized companies account for 127 registered cultivars. However, all of them have a genetic load associated to three patent registrations—A5547-127, MON87701 x MON89788, GTS-40-3-2—which are linked to the Bayer Crop-Science / Monsanto Company complex. Therefore, the 127 transgenic cultivars available for cultivation in the state must pay royalties to a company that centralizes ownership of the registered biological material. Such patents began to be regulated in Brazil in 1996, in the wake of international negotiations involving registration of private intellectual property conducted by the World Trade Organization (WTO) (Pereira & Alentejano, 2015). This points to a correlation between macroeconomy and the daily practice of actors, since access to seeds in Rio Grande do Sul is limited by commercial conditions defined by international organizations.

In the stages that follow cultivation, the reconfiguration of soybean processing and refining units in Rio Grande do Sul stands out. ABIOVE data point to an 80% reduction in the number of active soybean oil refining manufacturers between 2002 and 2020, resulting in a 41% decrease in refining capacity in RS in two decades. Such fact relates to the promotion of exports of unprocessed grains, which leads to less value-adding activities in the region (Lemos et al., 2017).

As regards the spatiality of cultivation, in 1975 soybean crops were preponderant in the North-west region of the state, with relative expansion towards Southwest—regions where wheat predominated earlier (Conçalves, 1984). A spatiality that changes massively in contemporary times—as shown in Figure 1, with significant expansion of the area destined to soybean.

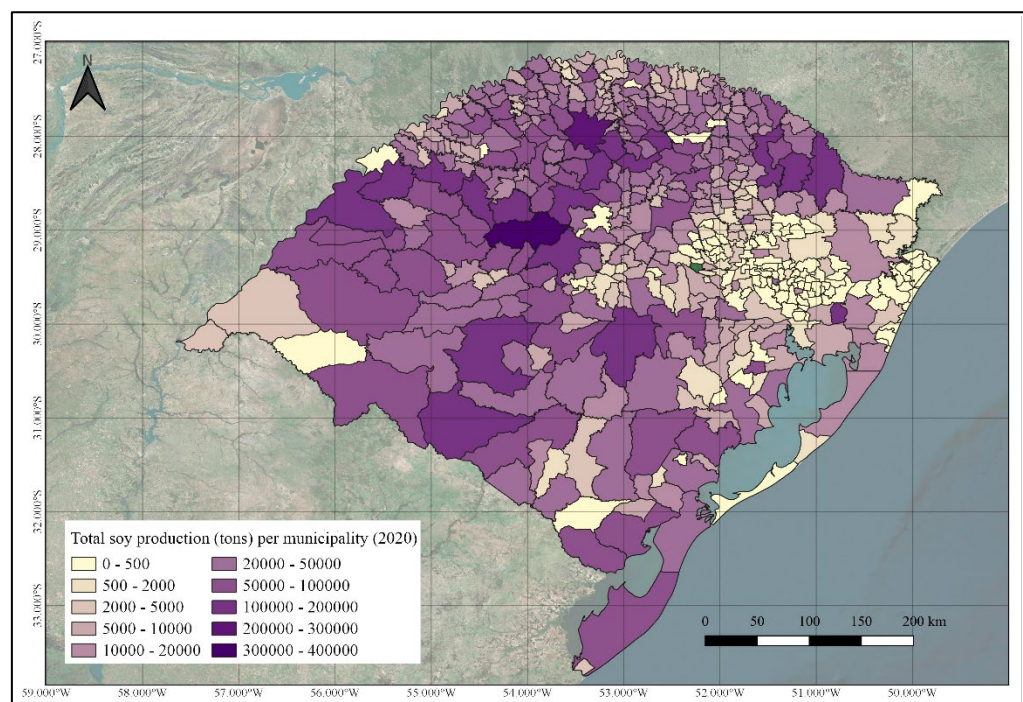


Figure 1. Distribution of soybean crops by municipality in Rio Grande do Sul, 2020. Source: Elaborated by the authors on QGIS using data from Produção Agrícola Municipal (PMA/IBGE).

All regions now have potential sites for soybeans cultivation, with emphasis on its expansion in the pampas region. This expansion took different features according to the local context within the state and to the background of involved actors. On this point, Vennet, Schneider and Dessein (2016) analyzed agricultural units that produced soybeans in southern Brazil and identified three categories of practice: niche farming, colonial farming and farming enterprise.

Niche farming is characterized by diversified production aimed at the sustainability of the farm against pressures exerted by the market economy. These farmers seek specific trade channels, such as organic production, rural tourism and the like. Soybean appears as a single element in a multiple composition, having no primacy in farmers' income. In this category, social integration focused on locality is observed, which establishes community and regional connections as forms of market entry and permanence.

The colonial farming involves agri-food production aimed at the market, while keeping diversified farming for local subsistence. The commercial activities prioritize soybean, corn and wheat crops and pig and poultry farming. This category is characterized by family labor and smallholding properties. Technology is implemented to the extent of availability of capital. Technical assistance, especially from cooperatives, is quite usual in this group, although it varies between properties. Rural succession and the low profitability of small-scale production are elements that put the existence of this group under strain.

Farming enterprise, in turn, focuses on specialized production aimed at the market. It is characterized by extensive use of machinery and chemicals in the farming process. Over the last few decades, it has been marked by continuous technical improvement mainly enabled by academic training of family members, in areas related to agronomy, who implement the acquired knowledge on their properties. Despite the smaller number of farms in this category, the group predominates in soybean production in Rio Grande do Sul.

For a quantitative approximation of the presented categories, data from the Agricultural Census relating access to land and rural category to soybean cultivation are illustrative, as shown in Table 1.

Table 1. Number of soybean growers by farming type and land tenure condition, RS, 2017.

	Total	Family farming		Non-family farming		Others	
		Category total	Category %	Category total	Category %	Category total	Category %
Total	67.268	51.582	100.00%	14.337	100.00%	1.349	100.00%
Owner	59.061	45.518	88.24%	12.422	86.64%	1.121	83.09%
Settler	2.048	1.966	3.81%	82	0.57%	-	-
Tenant	4.556	2.854	5.53%	1.511	10.53%	191	14.19%
Partner	733	543	1.05%	165	1.15%	25	1.85%
Lending Contract	663	522	1.01%	128	0.89%	13	0.96%
Occupant	183	164	0.31%	17	0.11%	2	0.17%
Producer							
Without Land	24	15	0.02%	12	0.08%	-	-

Source: Agricultural Census (IBGE, 2017).

Agricultural units under the category of Family Farming predominate among soybean growers (76.68%), who also are predominantly landowners. In the data utilized, these category points to agricultural units with extension smaller than four fiscal modules, predominance of family labor and profitability mostly linked to farming. They also have annual incomes of up to R\$ 415,000. It is worth highlighting that under the category of family farming, 6.278 properties have an annual income below R\$ 23,000. Regarding producers which are not categorized under family farming, the high number of tenant status stands out (10.53%). In the data utilized, they are composed by properties with a maximum annual income of R\$ 2,4 million. An element that confirms McMichael's (2016) claim that greater integration into the market economy is related to a more distant relationship with the land as a living space.

Elements that dialogue with information obtained in interviews carried out at grain growers' cooperatives in the region, different interviewees pointed out that around 90% of the associated producers were smallholders who grew modest crops and accounted for only 10% of the total production traded by the cooperative, while the other part originated from bigger properties.

The different modes of production and agricultural integration are also related to the ways soybean farmers choose to trade their produce. According to Schneider (2016), agricultural markets can be thought of as proximity markets, local markets, institutional markets or conventional markets. Farmers, especially family farmers, generally access multiple distribution channels. However, colonial farmers and soybean farming enterprises generally adopt conventional markets, understood as those based on trading of commodities. Therefore, we assume here that these categories of farmers will be at the center of operations when considering the relationship between RS' soybean market and the Chinese economy, the focus of the next section.

3. Chinese Demand for Soybeans

Average per capita income per Chinese household grew by 187% between 1978 and 2020, from 171.2 yuan to 32,188.8 yuan, according to data from China Statistical Yearbook (2021). The radical change was the result of institutional reforms initiated in the 1949 revolution and sustained throughout the ruling of the Communist Party of China (CPC; Jabbour, 2010).

China's policies aimed at development of the country have been complementary, enabling both domestic economic growth and expansion in the international capitalist market. This process was concomitant with fragmentation of production chains in the 1980s and expansion of international private conglomerates (McMichael, 2016). In such international context, China emerged as a market with wide labor availability and high consumption potential based on rising average income. Thus, reforms implemented by the Communist Party of China administration recognized the international situation and leveraged elements in dispute to catalyze the national economy, interconnecting the domestic and foreign spheres (Jabbour, 2010).

Regarding the agricultural sector, Chinese internationalization was motivated by limited availability of arable land in the country. In a nation with such a huge population, this required

establishing relationships with other countries for assuring food supply (Escher, 2016). Such need and the interconnection with preponderant actors in the global trade supply chain—food conglomerates—attributed special economic prominence to the grain-meat complex, for two reasons. On the one hand, international agro-industrial conglomerates saw meat as a channel for maintaining and expanding capital, given the possibility of geographic distribution and expansion of the sector (Weis, 2013). On the other hand, the Chinese administration envisaged the possibility of expanding domestic consumption by fostering animal protein consumption, thus promoting domestic channels for generating and accumulating capital. In this context, the grain became central for both direct feeding and processing (Escher & Wilkinson, 2019). This dynamic coincided with the expansion of purchasing power, creating a framework for social modernization. Such elements are again related with CPC's goal of establishing a balance between the benefits of a market economy and the aspired national development (Chen, 2019).

Pork is the predominant category of meat in Chinese food culture, a practice rooted in the country's history, as evidence points to the domestication of suiformes since 10,000 BC and maintained as a habit today (Schneider, 2011). According to NBSC data, pig production is the predominant livestock in the country historically. In 2020, for example, 406 million pigs were produced.

Regarding production characteristics, until 1985, 95% of pig production in China came from producers that did up to five slaughters per year. During the collectivization period, pigs were part of the farmers' supply obligations to the State (Schneider & Sharma, 2014). However, following socioeconomic reforms implemented in the late 1970s, a new paradigm was established seeking integration, specialization and internationalization of rural production processes (Zhang & Donaldson, 2008). As a result, swine production underwent industrialization (Schneider & Sharma, 2014). The exclusivity of small agricultural units ceased with the promotion of two production systems: specialized production units and large conglomerates (Zhang & Zeng, 2022).

Specialized production units are aimed at capital accumulation in rural areas by means of State investment and rural dynamics of differentiation (Zhang & Donaldson, 2008). It involves properties with larger land areas, which obtain high productivity rates that enable their maintenance as independent pig farmers who produce between 50 and 500 pigs per year (Escher & Wilkinson, 2019). This system can be managed by family members, small enterprises or cooperatives, according to local specificities (Zhang & Zeng, 2021).

Large swine conglomerates, in turn, are characterized by large-scale production—between 500 and 50 thousand pigs per year—and high technological investment in the production process, typically through confinement with high density of animals (Schneider, 2011). Stemming from accumulation processes that are exogenous to the rural environment, they mostly comprise properties linked to foreign private entities—consequence of the opening of Chinese markets in the 20th century—or state-owned enterprises (Zhang & Zeng, 2022). From the operational perspective, they are not homogeneous, distinguishing by two different operational modes: large-scale own productions or vertical integration (Schneider & Sharma, 2014).

The first case refers to companies that directly control production on their farms. A private example of these is the WH Group, an international conglomerate based in China and the United States self-proclaimed “the largest pork company in the world”. It conducts research into breed development, feed, animal production, slaughter, meat processing and marketing. In 2021, the company announced revenues of US \$27.293 billion. A state-owned example of these conglomerates is China National Cereals, Oils and Foodstuffs Corporation (COFCO). In 2019, it produced approximately five million hogs. Besides this figure, the high investment in different segments of the production process stands out, turning the conglomerate into owner of most of the technologies that induce changes in the supply chain (Schneider, 2011).

Vertical integration is the production strategy adopted by a considerable part of the “Dragon Head Enterprises” in Chinese territory. In this modality, private enterprises outsource the process to other producers. While the first provide the animals, feed and credit for production improvements, the second group provides the property and labor to manage the animals (Huang, 2011). The producer's loss of autonomy, for becoming dependent on the contracting company, would be compensated by the reduction of economic risks (Zhang & Zeng, 2022).

It is under the control of conglomerates (in both forms of operation) that most Chinese pork production takes place. In 2020, 57.1% of slaughters were carried out in properties with more than 500 animals per year. Nine companies (Muyuan, Zhegang, Wen's, New Hope Liuhe, Tiangbang, COFCO, Aonong, Trs, Haid) accounted for 10.1% of all slaughters, an increase compared to the 6.9% concentration observed in 2018 (Han et al., 2022). Simultaneously with the increase in concentration in large companies, a reduction is observed in small properties: in 1995, about 95% of Chinese agricultural properties farmed at least one pig, a number that dropped to 27% in 2009 (Escher et al., 2017).

Within the framework of those production models, three moments characterize the relationship between pigs farming, China and the international market (Schneider & Sharma, 2014). The

first one follows the beginning of reforms in 1979, when new technologies introduced in China's countryside allowed for commercial farming to supersede the predominant subsistence farming (Schneider, 2011). In the following period, during the turn of the century, China's accession to WTO was allowed under its commitment to apply non-discriminatory economic treatment to imports (Escher, 2016). The last period of changes started in the wake of porcine reproductive and respiratory syndrome (PRRS) outbreak in 2006, which demanded sacrifice of animals in Asia. To reduce the chance of new biological outbreaks, a series of investments addressed to large-scale pigs farming was made, seeking to standardize the production chain (Schneider & Sharma, 2014). As a result, the number of both animals and production regions expanded again (Zhang & Donaldson, 2008). Table 2 shows the distribution of the main production areas in 2020. Sichuan is historically the center for pigs farming and has witnessed, besides the growth in its territory, the expansion of this production to neighboring locations in the Southeast (Schneider, 2011).

The expansion of pigs farming within the Chinese territory gave rise to a situation of nutrition transition in the country. The traditional Chinese diet, composed of eight parts of grains, one part of vegetables and one part of proteins, has progressively been replaced by a western pattern of four parts of grains, three parts of vegetables and three parts of proteins (Huang, 2011). Considering annual proportions, meat consumption in China quadrupled between 1980 and 2010, when it reached an average of 61 kilograms per person in comparison to a world average of 42 kilograms (Escher et al., 2017).

As already mentioned, pigs farming in the country underwent a special change when China joined the WTO. Negotiations linked to its accession led China to give up on increasing taxes on soybeans imports as a food security strategy and to revise the import duty on the oilseed (Yan et al., 2016). Previously to revision, a 13% duty on the value of soybean imports was applied, which was reduced to 3% post-agreements (Jamet & Chaumet, 2016). Furthermore, legislative restrictions on the entry of transgenic grains were loosened, and transgenic soybeans import was authorized, although a ban on domestic cultivation was kept (Yan et al., 2016).

Table 2. Distribution of pork production covering 31 provinces, autonomous regions and municipalities on the Chinese mainland, 2020.

Province	Total Pork Production (million tons.)
Anhui	40.54
Beijing	0.29
Chongqing	10.75
Fujian	4.94
Gansu	11.63
Guangdong	12.41
Guangxi Zhuang	13.32
Guizhou	10.51
Hainan	1.45
Hebei	37.39
Heilongjiang	75.03
Henan	66.95

Table 2. Cont.

Province	Total Pork Production (million tons.)
Hubei	27.25
Hunan	29.75
Inner Mongolia	36.53
Jiangsu	37.06
Jiangxi	21.57
Jilin	38.78
Liaoning	24.3
Ningxia Hui	3.73
Qinghai	1.06
Shaanxi	12.31
Shandong	53.57
Shanghai	0.96
Shanxi	13.62
Sichuan	34.99
Tianjin	2.23
Tibet	1.04
Xinjiang	15.27
Yunnan	18.7
Zhejiang	5.92

Source: Data adapted from the National Bureau of Statistics of China (NBSC).

Nonetheless, duty reduction affected only whole grain imports, evidencing a preference for the entry of unprocessed raw materials to which domestic processing could add value (Escher, 2016). The amount of processed grain bran increased from eight million tons in 1997/1998 to 54 million tons in 2014/2015. The industrial production of feed, which still had no records in the 1980s, reached 200 million tons in 2012—the largest production in the world (Jamet & Chaumet, 2016). This point highlights the importance of animal protein production as a value-adding channel (Weis, 2013).

Regarding characterization of the processing sector, until 2004 most companies were Chinese. In that year, international instabilities in the grain price—due to increased phytosanitary control by China, the country's accession to WTO and the crisis in global supply—affected the sector's profitability (Schneider, 2011). Consequently, several local companies lost market position for failing to pay back foreign loans. In this context, international actors such as ADM, Bunge, Cargill and Louis Dreyfus, as well as Asian groups like Noble, Olam and Wilmar, occupied major positions in processing operations in the country. In 2009, these groups controlled 60% of total soybean crush in China (Escher & Wilkinson, 2019). Afterward, especially because of workers' mobilizations, the State reintroduced incentives for national companies. So, in 2016, local companies such as COFCO, Heilongjiang Oil and Fat, Hopefull Grain and Oil, Chongqing Gran and Shandong Bohai regained economic and social influence, accounting, in that year, for 60% of crush operations (Escher, 2016). Between 2000 and 2018, the total amount of soybeans imported into China grew

by 745.24%, being the fourth product in absolute total amount in annual imports—behind other raw materials such as coal and cotton, according to NBSC data.

These described trade processes took place under different formal and informal institutional layers. Changes in import tariffs required by WTO, diplomacy between different nations and construction of logistical channels are some of the most apparent elements of this construction. Throughout the 20th century, for example, policies were implemented by China's government aimed at establishing diplomatic ties with countries in the global South so that to guarantee supply for its import needs (Furtado & Alves, 2020). It was in this context that trade between Rio Grande do Sul and China developed—a topic addressed in the next section.

4. The Grain-meat Complex, Rio Grande do Sul and China

Since the 1980s, commercial relations between China and Brazil have been progressively closer (Furtado & Alves, 2020). Considering the soybean case, although direct investments have been made in both greenfield and brownfield projects (Escher & Wilkinson, 2019), the main results are found in exports. Taking data of FAOSTAT for the 21st century as reference, soybean exports increased from US \$390 million in 2000 to US \$27 billion in 2018. For comparison, corn crop exports reached a peak of US \$59 million in 2015, a quite small figure as compared to soybeans. It is in this context that trade relations between China and Rio Grande do Sul intensified.

Throughout the 1970s to 1990s the main importers of goods from Rio Grande do Sul were in Europe—Germany standing out. According to ANTAQ data, total exports through the Port of Rio Grande added up less than six million tons per year and were scattered among several countries. As for the characterization of these exports, soybeans already comprised most of them, though in the form of bran. In 1980, considering exports volume, soy bran was the leading exported good, totaling 2.24 million tons, followed by soybeans, with 719 thousand tons. In the Port of Porto Alegre, although total trade flows did not exceed two million tons, soy bran was predominant with 119,000 tons exported.

The characterization of trade flows from Rio Grande do Sul reveals that, in the Second Food Regime, crops initially linked to the central economies spread to the periphery of the economic system (McMichael, 2016). After the second half of the 20th century, especially, such process spread to Latin American countries (Bertrand et al., 1987).

Soybean international market changed in the turn of the century, enabling the entry of Rio Grande do Sul. As Furtado and Alves (2020) point out, in 2004 China's acting president, Hu Jintao, visited Latin America and established diplomatic and commercial agreements that were expanded in the following years. As shown in Figure 2, in 2004 other countries were still the predominant destination of RS' exports—Thailand and Turkey stood out. In the following year, South Korea was the largest importer. After 2006, however, China became the destination of most soybean exports from RS—in 2014, for example, 77% of cargo were destined to China.

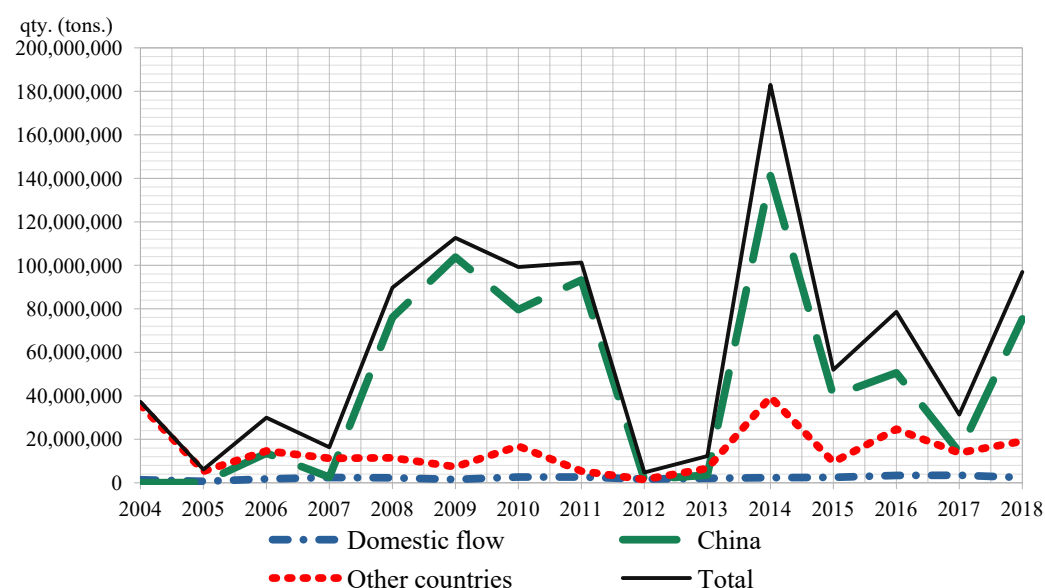


Figure 2. Volume of soybean exported from Rio Grande do Sul by destination, 2004–2018. Source: Elaborated by the authors based on Trase and ComexStat, several years.

Figure 2 also reveals the low participation of soybean domestic consumption, highlighting the agri-export character adopted for the crop. In addition to soybeans quantitative growth, its share in the state's Gross Domestic Product (GDP) is also rising. According to ComexStat data, between 2000 and 2015, while total trade flow for Rio Grande do Sul increased by 29.4%, soybeans trade flow alone grew by 344.88% demonstrating that a significant part of the region's total exports growth was due to soybean expansion. It is worth noting that until 2005 the main soybean products were flour and bran. In the following years, due to both the Kandir Law and the Chinese preference for unprocessed grains, unprocessed soybeans became predominant, with negligible values for soybean oil, sauces and proteins.

It also important to note that, during the 2000s, China strategically shifted its primary source of soybeans from the US to Brazil as part of a deliberate effort to diversify its suppliers and reduce reliance on any single country for this crucial commodity. This transition was driven by China's aim to safeguard its food sovereignty and construct an economic framework less dependent on US dominance in the commodity market. The increasing significance of soybeans for food security and economic stability compelled China to establish a more resilient supply chain. Brazil's emergence as a major soybean producer with ample production capabilities provided a fitting solution to China's strategy. By diversifying its soybean sources and diminishing dependence on the US, China pursued a more balanced and secure trade structure, aligning with its broader economic and geopolitical goals (Furtado & Alves, 2020; McMichael, 2009).

In this context, the correlation between institutional aspects (diplomatic agreements and revision of tariffs on imports) and trade practices (China as main destination and kind of exported products) stands out. These factors reveal the social context of inclusion in this particular market (Azevedo, 2016). Such correlation can also be established by observing the actors in the supply chain. From a global perspective, the grain flow was historically controlled by four transnational corporations: the US ADM and Cargill, the Dutch Bunge and the French Louis Dreyfus (Bertrand et al., 1987; Lemos et al., 2017);. Nowadays, Singaporeans Wilmar and Olam and the Chinese Noble and COFCO show significant international growth (Escher, 2016). The emphasis on these conglomerates' points to international actors with huge social, political and economic influence on the grains market, therefore enjoying primacy over other links in the supply chain, both horizontally and vertically. Understanding existing power disparities is essential for finding out the conditions under which different actors can operate.

Considering the companies involved in soybean trade flow between Rio Grande do Sul and China, Bunge is leading in soybean exports in the South region, according to Trase.earth. Between 2004 and 2018 (period available in the database), the corporation accounted for 36.24% of the total 704 million tons exported. Regarding the other companies that follow Bunge as the main exporters, there are two from the United States, CHS Inc., accounting for 10.60% of soybean exports, and Cargill, with 1.06%. All other companies are originally Brazilian, among which C. Vale (22.10%), Camera (6.89%), Três Tentos (6.33%), Giovelli (0.98%) and José Dinon (2.56%) have their origins in Rio Grande do Sul. Also worth mentioning is Amaggi (1.64%), a Brazilian group with growing presence in the global soybean supply chain.

Similar picture is observed in the composition of China's importers of soybeans from Rio Grande do Sul. Bunge appears again as a central player in the supply chain, with 38.72% of the 704 million tons imported. Among the other companies, the Brazilian Amaggi stands out (5.07%), reaffirming its participation in the international market. The other importers have varied origins: the Japanese Marubeni (18.52%), US CHS (10.58%), Cargill (8.41%) and Engelhart (5.05%), Bulgarian Agrograin (2.89%), Swiss Glencore (1.95%), Chinese COFCO (1.40%) and Portuguese Concordia (0.62%). Therefore, the grain that enters China is processed by actors of different nationalities.

It is worth noting that the Chinese company COFCO has recently started operations in Rio Grande do Sul. The company, that is controlled by the Chinese State, acts as a guide of national policies to guarantee internal soybean prices and pigs' production. Its operations occur in tandem with State interests by acting internationally as a preponderant actor and strategically for the maintenance of the Chinese national economy (Escher & Wilkinson, 2019).

Besides those mentioned companies, throughout the studied period 94 companies exported soybeans from Rio Grande do Sul to China. In China, in turn, there were 63 importing companies. Despite the considerable number of actors, most of the traded grains was traded by the most powerful actors, what brings back the argument on disparate powers between actors, which can be perceived in two operational strands: the control of international logistics and the influence on the established price of the grain.

Regarding destination of goods, when asked about the group's commercial operation in the soybean market, Interviewee 1 replied: "Today we only work with the domestic market. We do not work with foreign markets. It is because of the size of the cooperative... We are unable to complete a ship load [...]. We already worked, a few years ago, within a pool of companies, cooperatives,

non-cooperatives... And then there was a quality problem! We are all together in this process and then, one does everything right, another one doesn't and then, it delays... you can't ship because the quality is not adequate. The ship delays. At that time, it was \$25,000 a day. It delays, and then what? So, what did we do? We gave up group working, because you get into trouble if the other doesn't play its part, right? So, what do we work on today? Most of it goes to the foreign market, but it's through trading, right? One of those international players. That's how we work ... It goes to there." (Interviewee 1)

The interviewee points out that the cost of hiring a vessel makes it unfeasible for the cooperative—with around 5,300 members—to operate privately in exports. Despite the possibility of cooperation among smaller actors, the narrative emphasizes that factors such as trust and commitment affect practices in this direction. Hence, the most powerful actors in the supply chain take control of trade flows.

Such trade flows are also permeated by relationships of trust and security between actors and their practices (Cassol, 2018). Elements that are apparent in the response of Interviewee 2, when asked about the grain acquisition regime: "We work with 92%, 8% would come from third parties. But we work with third parties [...]. When we are able to store, whether we have a space or not... It is how we work. So, the primacy is for associate producers. Of course, we have the problem that cooperatives have a surname—the associate producer, when you go to a cereals wholesaler, nobody says that the wholesaler 'A' went bankrupt there... you know, in the cooperative system many cooperatives ended up going bankrupt, right? Closing here in our region [...] 'I've already lost money with a cooperative, I don't want to!', so there's all that when we go to a new region to gain associates, right? So, it's not that simple, is it? That's why I always talk to the farmer and say, 'Look how many wholesalers have gone bankrupt, have also let them down'. Then he said he no longer would deliver to a cooperative; so, I said, I said in a meeting: 'Sir, and how many cereal wholesalers have already gone bankrupt in the region? But these don't have a surname, right? If you act so, will you have to stop planting because you will have no one to sell your produce.' You must trust someone, you will see that there are cooperatives and cooperatives, there are manufacturers and manufacturers, there are exporters and exporters [...]" (Interviewee 2)

The interviewee's account brings three elements connected with trust. The first is the relationship between associate members and their cooperatives. Beyond a cooperative's interest in associating farmers aiming at its economic viability (Da Ros, 2006), the certainty about adopted farming procedures by members guarantees that the goods will be as required by the export market. The second element relates to the "cooperative surname", which means that the company has a history and responds in the present for historical processes. This symbolic relationship refers, beyond a specific cooperative, to the construction of discourses about the idealized category, which generically permeate actors' perception of risks in negotiation. And third, stemming from the latter, the interviewee highlights how the duality between trust and distrust affects the relationships between the links in the supply chain—whether manufacturers, exporters or producers—indicating a context in which organizations operate within a framework conditioned by the relationships between actors and sometimes waiving profit maximization in the face of uncertainties.

As regards grain prices establishment, financialization plays a central role by means of two mechanisms. The first is the relation between grain pricing and the dollar standard as a fiduciary currency, reaffirming US primacy over the international structure initiated during the Second Food Regime (McMichael, 2016). The second regards the establishment of prices by financial platforms that project pricing based on the Chicago Board of Trade (CBOT), a board of trade located in the United States that intermediates the different indices of values and transactions—therefore, again related to financialization (Ávila, 2015). In this context, Brazilian producers face price variations directly affected by international fluctuations in currency and grain prices.

Exchange rates and price fluctuations through financialization are anchored in the temporal logic promoted by capitalism. According to Beckert (2017), the current economic system produces a relation between actors and the environment that is based on monetary gains on available items and on the constant projection of the future as linked to the expansion of material availability. This opens up the possibility that different actors relate to agricultural commodities aiming exclusively at speculative gain. According to Clapp (2014), the financial element gets disconnected from the material element on which it is based. As a result, price volatility, unequal distribution and environmental damage become secondary factors in the rationality shaped by the expectation of future gain.

In soybean supply chain, this practice is noticeable when companies concentrating a large part of transactions (ABCD) are in the ascendant in the financial market. All of them have branches dedicated exclusively to shares acquisition and transaction. Besides direct speculation on the grain's value and possibilities for future contracts, they also operate in different food segments, benefiting from informational advantages on production, processing and distribution sectors (Clapp, 2014).

According to an interviewee, costs related to logistics, storage and taxes add to international pricing. Therefore, price received by growers in Rio Grande do Sul is affected by both international dynamics of grain price fluctuation and regional dynamics of logistics costs (Ávila, 2015). Domestic market flow is affected by the international pricing, since the export price will determine the better profitability in directing the goods either inside or outside the country. This factor also affects the market of processed products—such as soy oil—since it implies the opportunity cost linked to the raw material.

Regarding actors' possibilities of influencing international price, when referring to China's economic power in the market, the same interviewee stated: "When it wants something, it eases off, slows down, right?" (Interviewee 3). Thus, changes in prices are not only determined by dynamics related to balance between supply and demand, but also by the agency of central actors in promoting or withdrawing trade at certain times.

The quoted statement underlines that the economic maintenance of soybean farmers in Rio Grande do Sul becomes dependent on international elements based on financialized fluctuation. That is, the production structure depends on means under control of preponderant actors in the international sphere. Therefore, the formation of the institutional environment is an outcome of macroeconomic dynamics operated by transnational conditions combined with processes linked to the locality—such as relationships of trust. These elements show the correlation between institutions and the trajectory of constitution of the places under analysis (Hodgson, 2008). It is observed that components linked to both structural and local dimensions limit operational possibilities related to the trade flow while immersed in different dimensions of social practices (Cassol, 2018). Consequently, actors in Rio Grande do Sul (producers, traders and public administration) operate within margins imposed by economic dynamics to which they acquiesce.

Building on this, the developed argument regarding the soybean trade between Rio Grande do Sul and China illustrates the food regimes approach (McMichael, 2016; Friedmann, 2005). Soybean production in southern Brazil emerged in a period when agriculture became fundamental for accumulating capital and guaranteeing exchange rate stability—the so-called second food regime (McMichael, 2016). In this context, animal protein was fostered as a food source for western populations, with soybeans playing a crucial role in this production. Intensive animal production boosted feed manufacturing, creating a continuous market for soybeans and corn. As a result, meat, eggs and milk processing, packaging and transporting companies grew rapidly (Friedman & McMichael, 1989).

In the 1970s, the oil crisis increased the costs of international logistics and boosted the search for alternative use of grains, such as biodiesel, causing a rise in commodity prices. Countries indebtedness related to US technological packages significantly increased and other players emerged in the international grain market, such as Brazil, Argentina and the Soviet Union (Bernstein, 2016).

During this period, the system was restructured following two interconnected changes. The first was the end of exchange rates based on the gold convertibility of the dollar, replaced by flexible exchange rates. The second was the furthering of the General Agreement on Tariffs and Trade (GATT), which, together with the promotion of neoliberalism by other entities, allowed large conglomerates to act internationally without depending on state power. This occurred because tariffs, legislation and incentives began to be considered by multilateral organizations (McMichael, 2016). Thus, throughout the 1980s, a new phase of agri-food circulation emerged, marked by decrease in the power of States and expansion of corporate dominance—the Third Food Regime (Bernstein, 2016).

In the context here analyzed, Brazilian revision of duties on unprocessed raw materials—through Kandir Law—and adoption by China of internationally standardized prices for soybeans are examples of those changes. As is the predominance of international conglomerates in agricultural trade flow between Rio Grande do Sul and China. Although this finding does not deny the relevance of the role of States, it highlights that most disputes occur under coordination of private capital actors. The case of the Chinese company COFCO exemplifies this situation: the company, with state support, compete with other international conglomerates for export markets and, simultaneously, support policies designed by the Chinese State.

The various international influences—transnational conglomerates, States and multilateral bodies—have created environments within which particular formal and informal norms circumscribe the possibilities of economic practices (Hodgson, 2006), thus corroborating the postulation of markets as a result of historically rooted institutional processes, with contemporary correlations of operationalization, surrounded by values, laws and culture (Azevedo, 2016) and conditioned by their historical and geographic dimensions (Hodgson, 2008). Hence, we can infer that the studied market only occurs in the form observed because it is the result of processes characteristic of RS (and, indirectly, of Brazil) and of specific and characteristic Chinese processes—dynamics that, in turn, characterize and condition the actors' way of acting and positioning themselves. However,

these practices also interact with relationships of trust and synergy between the elements. Therefore, two layers, sometimes complementary and sometimes contrasting, characterize the economic positions of different actors: one structural and the other local (Cassol & Schneider, 2022; DiMaggio & Louch, 1998). Both dimensions exist in a dialectical regime of influence and coordination of collective actions.

In summary, the soybean trade between Rio Grande do Sul and China is marked by institutions comprising formal layers (laws, policies, international agreements) and informal layers (culture, habit, trust) that define the environment where individuals operate, circumscribing their actions. Such institutions, in turn, originate from the historical dialectics of power relations in both geographic contexts and between them. Processes that were illustrated making use of the food regimes approach, by characterizing global agrifood flows over the last century. In this environment, the analyzed market emerges as an amalgam of formal and informal institutions, immersed in both local and structural dynamics in their different dimensions.

5. Final Remarks

Based on the presented data, we bring the three guiding questions back, seeking possible inferences: How does soybean export supply originate and is organized by the state of Rio Grande do Sul? How does China's soybean demand in the international market originate and is organized? What elements permeate trade flows between both regions?

Regarding the first question, Rio Grande do Sul appears as being historically characterized as an economy aligned with an agri-export model and having a strong relationship—albeit not exclusive—with the soybean market. A factor reinforced throughout the state's history and maintained in contemporary times by action of local actors (for instance, cooperatives inciting farmers to grow wheat and replace it with soybeans), through international reverberations (fluctuation in grain prices and the corresponding economic advantage) and through State support (lines of agricultural credits, technological financing packages and integration into market). Rio Grande do Sul supplies the foreign market with unprocessed grains (boosted by Kandir Law) and its trade flow is centered in the Port of Rio Grande. Such dynamics are related to an identity associated with agribusiness, similarly to the country, and to public costs incurred, especially in infrastructure, resulting from the expansion of cargo transports and the reduced fiscal contribution of the sector to the state.

As to the second question, we noted that the Chinese demand for soybeans stem from two related dynamics. On the one hand, China's development plan exploited the international economy as a factor aligned with domestic strategies, especially by using foreign trade to guarantee food security. On the other hand, international trade flows are guided by cooperation between the Chinese State and conglomerates linked to the grain-meat complex, seeking mutual gains. As a result, China facilitated soybean imports to fulfil terms of accession to the WTO. Such imports were used as a source for domestic capital accumulation through promoting consumption of animal protein—especially pigs—a market in which large transactional corporations found a lucrative operating space.

The third question relates to mass production of commodities throughout the 21st century, based on the possibility of externalizing phenomena linked to the production cycle—which brings social and, mainly, environmental consequences. Soybean production and distribution rely on public investment—maintenance of local infrastructure and credit channels, for example. Something also promoted by international conglomerates linked to the grain-meat complex. It is through the agency of international private capital that certain consumption practices were developed throughout the 20th century, resulting in contemporary trade channels linked to soybeans. For example, in trade flow between Rio Grande do Sul and China, particularly, one of the identified conglomerates was responsible for a third of the total volume traded. Circumstances that also lead to financialization, turning soybeans into a prospect of both real and fictitious profit. Such elements give rise to the social character of the soybean market, since its existence is subject to structural arrangements—such as the guarantee of financialized operations based on floating exchange rates and international pricing—and local ones—as trust between actors in the supply chain and in construction of identities.

This article warns of the urgency of considering production sectors as immersed in their contexts and linked to local dynamics. Therefore, it points to the need for economic flows to be considered as social processes and, so, for public policies and civil society actions to devise economic integration alternatives based on the premise that all practices are exclusively based on human sociability.

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