

Sugarcane and its derivatives in Brazil

A sectoral mapping¹

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Abstract – The objective of this paper was to identify the main producers, sellers and buyers of Brazilian sugarcane and its derivatives disaggregated by market segment size and product. This analysis focused on all supply-side actors and included mills, refineries, distributors, and traders. This research was of the descriptive type and the documental research technique was adopted as a methodological procedure. The analysis and interpretation of the results was organized in two parts, in which the first presents the main producers and sellers of Brazilian sugarcane and its derivatives. The second presents the main buyers of Brazilian sugarcane and its derivatives, disaggregated into sugar, ethanol (biofuel) and ethanol for other purposes. On the production perspective, due to climate and soil conditions, Midwest Region has been gaining prominence, although the state of São Paulo remains as the main producing region. From the sugarcane buyer point of view, the market behavior is related to the purpose for which this raw material will be used, as well as sugar, ethanol (biofuel) or ethanol for other uses. There is still the geographical concentration of the buyers, reinforcing the role of logistics.

Keywords: biofuel, ethanol, mill, sugar.

Cana-de-açúcar e seus derivados no Brasil: um mapeamento setorial

Resumo – O objetivo deste trabalho foi identificar os principais produtores, vendedores e compradores da cana-de-açúcar brasileira e seus derivados, desagregados por segmento de mercado e produto. A análise, que se concentrou em todos os atores do lado da oferta e incluiu usinas, refinarias, distribuidores e comerciantes, é do tipo descritiva e adotou como procedimento metodológico a técnica de pesquisa documental. A análise e interpretação dos resultados foi organizada em duas partes, em que a primeira apresenta os principais produtores e vendedores da cana-de-açúcar brasileira e seus derivados. A segunda mostra os principais compradores da cana-de-açúcar brasileira e seus derivados, desagregados em açúcar, etanol (biocombustível) e etanol para outros fins. Do ponto de vista da produção, dadas as condições de clima e solo, a região Centro-Oeste vem ganhando destaque, embora o Estado de São Paulo se mantenha como o principal produtor. Do ponto de vista do comprador de cana-de-açúcar, o comportamento do mercado está relacionado à finalidade dessa matéria-prima, bem como para

¹ Original recebido em 18/4/2023 e aprovado em 4/6/2023.

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o açúcar, o etanol (biocombustível) ou o etanol para outros usos. Há também a concentração geográfica dos compradores, reforçando o papel da logística.

Palavras-chave: biocombustível, etanol, usina, açúcar.

Introduction

Sugarcane as a raw material for industrial processing can be understood as being composed of total recoverable sugar (TRS) and fibers. While TRS is what gives origin to sugar and ethanol – as well as rum –, fibers can be used in electricity co-generation and the production of second-generation ethanol. Also, during ethanol production, a large amount of vinasse is generated, being the most relevant industrial wastewater in the sugar-energy sector (Lemos et al., 2019).

Currently, the most common use of vinasse is the fertirrigation of sugarcane fields, however, more recently there has been a trend in favor of using the vinasse in biodigesters to produce biogas which can be decomposed in methane (known as “biomethane”) and carbon dioxide (that can be purified and sold to various industries). Biomethane can be sold as substitute for natural gas, used as fuel in agricultural vehicles, or burned as fuel for electricity production and for producing nitrogen-based fertilizers (Parsaee et al., 2019; Almeida & Rizzatto, 2022).

The main point of the discussion is that there is a high efficiency when utilizing sugarcane as a raw material, creating many different supply chains in the Brazilian economy. Government policies play a crucial role in driving the development of the sugarcane sector by promoting increased competitiveness and the adoption of more productive technologies.

It is important to note that the production flowing in different supply chains is still affected by the decision of producing more sugar or more ethanol (Palacios-Bereche et al., 2022). For example, a mill that decides to maximize its production of sugar will have a lower production of vinasse, therefore, the potential for producing biomethane is reduced. Also, how diversified

the portfolio is of a specific mill is related to local market demand for non-traditional products as well the opportunity cost related to these investments.

Currently, changes in production mix are driven by two main economic variables, being exchange rate and oil price. Higher oil price increases the price of gasoline in the Brazilian market, enabling ethanol to be sold at higher prices as well, which create incentives for allocating additional raw material in the production of biofuel, but reducing the production of sugar (Carpio, 2019; Palazzi et al., 2022). On the other hand, if the Brazilian currency is devalued, the received price of sugar and ethanol also rises, although with stronger impact in the former, resulting in higher sugar production. Of course, if the global supply of sugar is reduced due to other exogenous factors (such as climate in producing countries), the increase in sugar price also favors the allocation of raw material in sugar production.

Thus, the following questions are asked: How are the sugarcane producers, sellers and buyers segregated by geography and sector in Brazil? How much do they buy? From where? To where? The search for answers to these questions is what motivates this study.

Hence, the objective of this paper is to identify the main producers, sellers and buyers of Brazilian sugarcane and its derivatives disaggregated by market segment size and product. This analysis should focus on all supply-side actors and include mills, refineries, distributors, and traders.

Material and method

For answering the question shown in the previous section and meeting the proposed objective, this research was of the descriptive type,

as it is related to the process of characterization and in-depth study of a phenomenon. In addition, the documental research technique was adopted as a methodological procedure. The choice of these research characteristics was inspired by the definitions suggested by Gil (2022).

This research was carried out in six steps, which can be better understood with the support of Figure 1.

Documents and official databases of the Brazilian Ministry of Agriculture and Livestock, Brazilian Ministry of Finance, National Agency of Petroleum, Natural Gas and Biofuels (ANP), Council of Sugarcane, Sugar, and Alcohol Producers of the State of São Paulo (CONSECANA-SP) were used as data sources.

In addition, data from four sugarcane mills was used to identify common patterns in their sales of white sugar and non-fuel ethanol. Unlike fuel ethanol, the market for these two products is very pulverized and the information about buyer less available. Combining this data with information from Econodata (2023) – an online service for profiling Brazilian companies – it was possible to create an overview regarding i) location (state); ii) estimated revenue; iii) number of employees; and iv) economic activity.

Results and discussion

The analysis and interpretation of the results was organized in two parts, in which the first presents the main producers and sellers of Brazilian sugarcane and its derivatives. The second presents the main buyers of Brazilian sugarcane and its derivatives, disaggregated into sugar, ethanol (biofuel) and ethanol for other purposes.

Main producers and sellers of Brazilian sugarcane and its derivatives

Due to climate and soil conditions, the sugarcane production is concentrated in the Center-South region, especially in São Paulo State. Figure 2 shows the geographical dispersion of mills and distilleries in this region. Despite being very traditional, the production of sugarcane in the Northeast region, it represents only a small fraction of total Brazilian production, and its mills are also shown on Figure 2.

In the last decades, the relevance of the states of Mato Grosso, Mato Grosso do Sul, and Goiás have been growing more, making the geographical distribution of sugar and ethanol production more diverse.

Main buyers of Brazilian sugarcane and its derivatives

Sugar

Since colonial times, sugar produced in Brazil is mainly sold in foreign markets (Ferlini, 2019), which is still true in modern times (Kocánová, 2022). Figure 3 shows the evolution of production and exports of sugar in the two sugarcane regions: Center-South (CS) and North-Northeast (NNE). As can be seen more than half of the production is aimed at foreign markets.

It should be noted though that while CS exports are usually to developing countries, the NNE is favored by its geographical location and import quotas, having more access to developed markets, especially the United States. Beyond quota regime, international trade of sugar is frequently distorted by local policies on subsidies, especially from the Indian Government.

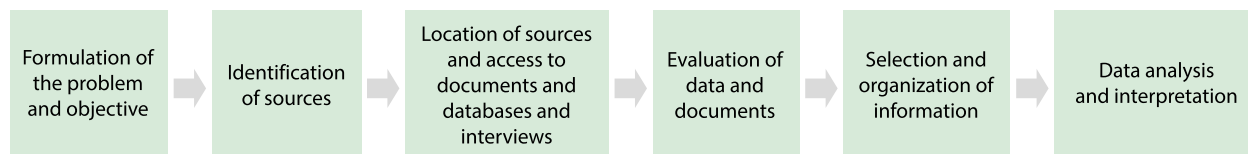


Figure 1. Research steps.

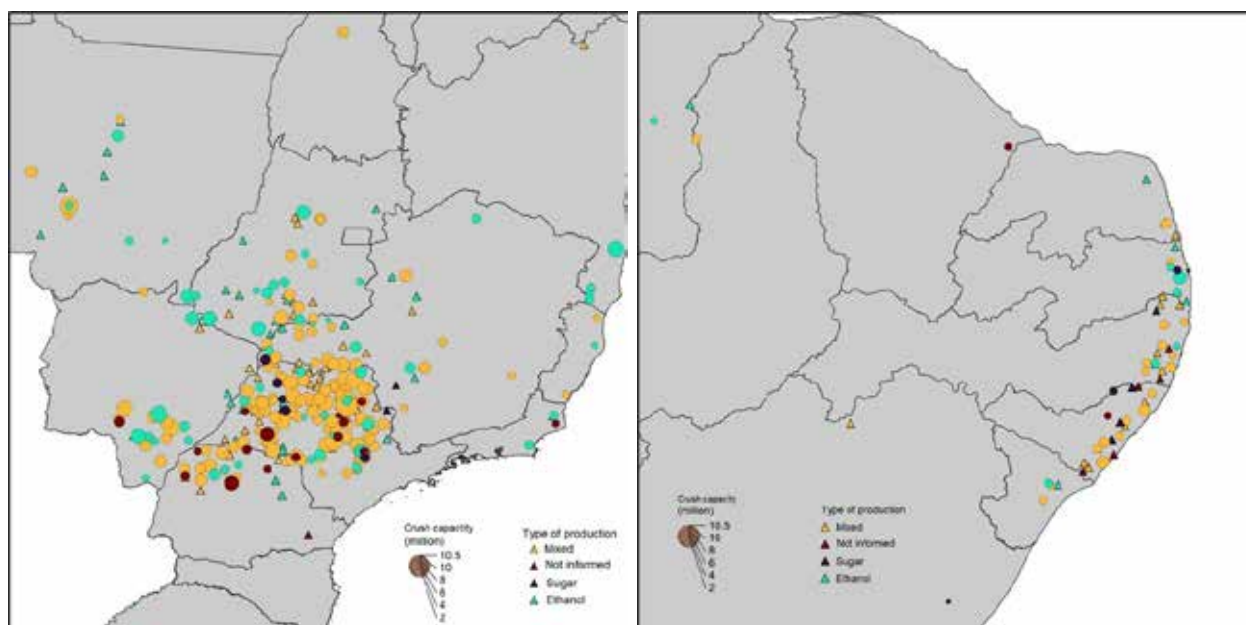


Figure 2. Geographical dispersion of sugar-energy mills and distilleries in Brazilian Center-South region (left) and in Northeast region (right).

Note: the circles represent mills that have known crush capacities while triangles represent mills with non-identified crush capacities.

Source: Brasil (2023a) and NovaCana (2023).

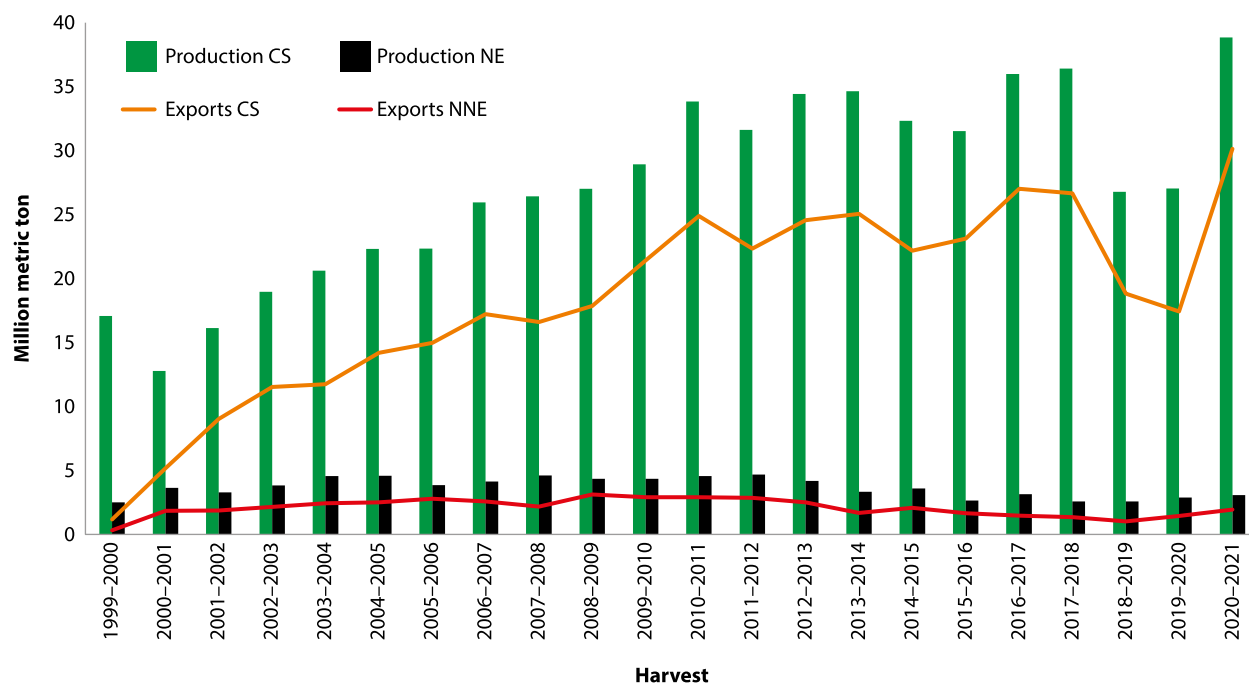


Figure 3. Production and exports of sugar in Brazilian Center-South and North-Northeast regions.

Source: elaborate with data from Brasil (2023a).

The importance of exports for sugar production in Brazil is also evidenced in national account data, where more than half of the total value of sugar production is exported, with the remainder sold in the domestic market. In this regard, Table 1 shows the destination of sugar produced in Brazil, including exports and household consumption, according to national accounting data.

The table above uses national accounting terminology; therefore, the data corresponds to the monetary value of the product “sugar” used by different sectors of the economy, including the sugar production and refining itself. In this sense, one mill could sell sugar for another mill to further refine it or simply sell it and this transaction would be included in the corresponding row in the table (sugar production and refining). Furthermore, for the purposes of national accountability, a company could be represented in more than one sector if it produces more than one product, as is the case for mills that produce sugar and ethanol. In this relevant case, part of the mill’s activity would be represented in “sugar production and refining” while the remaining would be in “biofuel production”.

Household consumption does not include sugar added to other products – as in soft drinks,

cookies, etc. In most cases, this direct consumption of sugar would be in the form of sugar bags or sachets. This form of sugar consumption is the second most common use of sugar in Brazil and corresponds to 18.6% of sugar destination between 2010 and 2018, only behind exports which represented more than 56%. The remaining 25.4% of the sugar produced in Brazil, in monetary value, is used in the manufacturing and services sectors, according to national accounting data.

Unfortunately, the disaggregation of national accounts is not enough to identify the precise use of the sugar, mainly because many food processing industries are allocated in the generic category “other food products”. However, microdata from sugarcane mills supports some specific activities which are major sugar users, including:

- Dairy production (yogurt, ice cream and other milk-based products);
- Biscuits, wafers, and similar products;
- Chocolate and chocolate-based products;
- Ready-made sauces (especially tomato sauce);
- Soft drinks.

Table 1. Destination of sugar produced in Brazil, by year, according to percentage of product value.

Sector	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg
Meat, fish, and dairy products	0.88	1.00	0.91	0.92	1.03	1.02	0.91	0.80	0.85	0.92
Sugar production and refining	5.23	4.89	5.04	4.45	4.34	3.40	3.59	3.16	2.69	4.09
Other food products	10.31	11.32	13.52	12.96	13.72	12.65	11.51	10.07	11.50	11.95
Beverage production	2.71	2.63	2.67	2.55	2.93	2.76	2.27	2.13	2.38	2.56
Biofuel production	1.60	1.33	1.14	1.43	1.60	1.81	1.64	1.47	1.76	1.53
Pesticides, disinfectants, paints and various chemicals	1.38	1.40	1.21	1.22	1.20	1.18	1.15	0.88	1.10	1.19
Food services	1.74	2.05	2.33	2.32	2.48	2.31	2.10	2.32	2.74	2.27
Household consumption	17.52	18.10	18.48	17.76	19.67	18.79	19.23	18.70	18.97	18.58
Exports	57.77	56.43	53.91	55.59	52.08	55.20	56.84	59.72	56.91	56.05
Other destinations	0.86	0.85	0.78	0.80	0.95	0.87	0.76	0.75	1.10	0.86

Source: elaborate with data from Nereus (2023).

Sugar can also be found in the chemical sector even though is not possible to infer which product is derived from it. In the services sector, as would be expected, food service is a relevant destination for sugar through restaurants, fast-foods, cafeterias, and similar establishments.

According to data compiled by the Brazilian Ministry of Finance (Brasil, 2023b), in 2021, around 53 thousand metric tons of sugar and molasses were imported into Brazil (Figure 4). This value is insignificant when compared to total Brazilian exports of sugar in 2021 which reached more than 27 million metric tons according to the same source.

Almost 60% of these imports originated from United States, Netherlands, Germany, China, and Denmark (Figure 5), countries with less tradition in sugarcane production. This aspect can be associated with the demand for niche products in the Brazilian market, such as beet and maple sugar.

In 2010, using an alternative methodology, the Center for Advanced Studies on Applied

Economics (CEPEA) from University of São Paulo (USP) made a study for mapping the uses of sugar in Brazil. The results presented by Burnsquist (2021) can be summarized as in Figure 6.

In 2010, from all sugar traded by Brazilian mills, only 10.36 million metric tons were sold in the domestic market, with the remaining exported. Of these 10.36 million metric tons, the share of manufacturing in total acquisitions is similar to that found in national accounting data (around half of the sales). While acquisition by the retail sector is oriented towards final consumers, wholesale companies operate as intermediates between small businesses (in retail and manufacturing sectors) and the mills. Regarding the type of sugar sold domestically, 99.67% was white sugar (crystal or refined) with very small markets for liquid and VHP (Very High Polarized) sugar.

There are also similarities between national accounting data and microdata from mills in Brazil collected for this study. Table 2, Table 3 and Table 4 show the top 10 buyers of three different

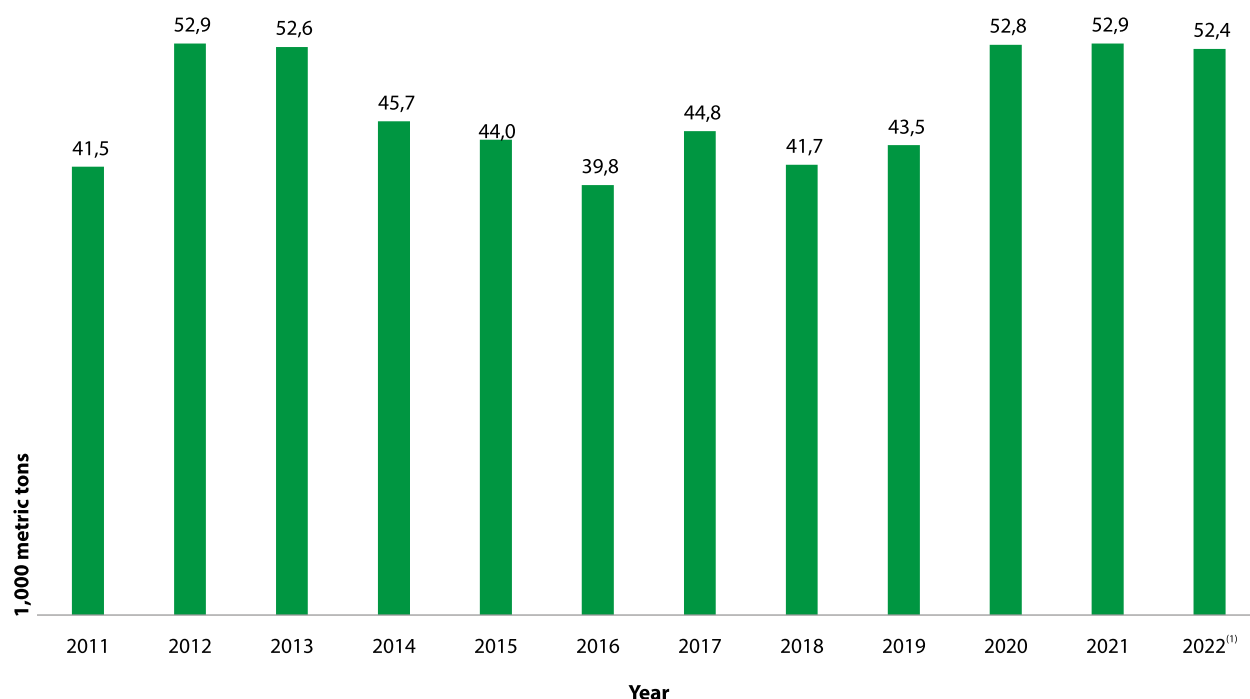


Figure 4. Evolution of Brazilian imports of sugar and molasses, 2011-2022.

⁽¹⁾ For 2022, data refers to months from January through November.

Source: Brasil (2023b).



Figure 5. Percentage distribution of Brazilian imports of sugar and molasses in 2021.

Source: Brasil (2023b).

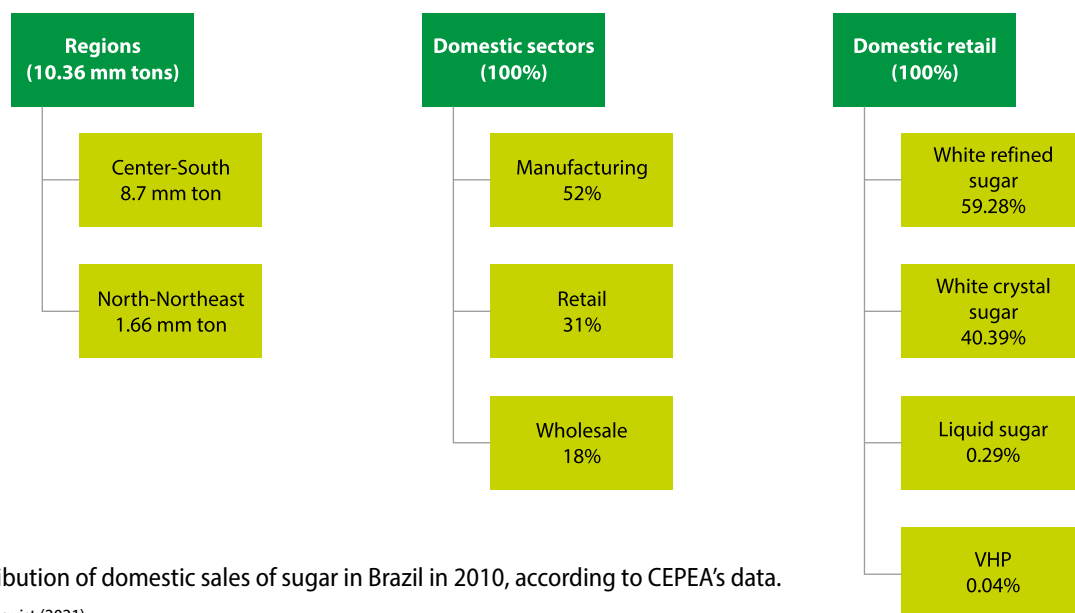


Figure 6. Distribution of domestic sales of sugar in Brazil in 2010, according to CEPEA's data.

Source: adapted Burnsquist (2021).

mills in Brazil, detailing location (state), estimated revenue, number of employees and economic activity.

The names of the companies were suppressed in order to keep them anonymous. In all three cases, the top 10 bulk buyers of sugar

represented more than 90% of the total, therefore, providing a general figure of the characteristics of their clients. Like the national accounting data, a large fraction of sugar sold in the domestic market is destined for soda, milk-based products and other food processing.

Table 2. Top 10 buyers of white sugar from Company “A”, 2021’22.

Ranking	%	Location	Revenue (BRL MM per year)	Size	No. of employees	Economic sector
1	34.80	SP	1,000.00	Large	1,001-5,000	Dry pasta
2	25.10	SP	387.1	Large	301-500	Sugar refining
3	15.20	SP	41.9	Medium	21-50	Sugar wholesale
4	9.10	SP	136.7	Medium	151-200	Dairy
5	4.10	SP	280	Large	301-500	Sugar refining
6	4.00	SP	384.5	Large	301-500	Dairy
7	3.80	SP	2.2	Small	1-10	General food wholesale
8	3.10	SP	1,600.00	Large	1,001-5,000	Spices, sauces, seasonings and condiments
9	0.80	SP	150.7	Medium	151-200	Cocoa-based products and chocolates
10	0.00	SP	396.1	Medium	101-150	Other food products

Source: Mill's data and Econodata (2023).

Table 3. Top 10 buyers of white sugar from Company “B”, 2020’21.

Ranking	%	Location	Revenue (BRL MM per year)	Size	No. of employees	Economic sector
1	29.60	CE, AL, BA, PE	5,400,0.	Large	1,001-5,000	Soda
2	23.80	MG	807	Large	501-1,000	Soda
3	13.70	GO	451	Large	501-1,000	Rice processing
4	8.60	CE, PE, BA	7,500.00	Large	501-1,000	Wheat milling and derivatives production
5	3.70	AL	2,700.00	Large	1,001-5,000	Biscuit
6	3.30	AL, SE, MA, PE, PI	127	Medium	201-300	Animal feeding
7	2.50	PE, AL	22.5	Medium	21-50	Animal food
8	2.40	SE, SP	34.7	Medium	51-100	Other food products
9	1.70	RS, SE, AL, BA, PE	66.1	Medium	151-200	Wheat milling and derivatives production
10	1.40	CE	2.7	Small	1-10	Processed cereals and vegetables, flours and starch fractioning, packaging and wholesale

Source: Mill's data and Econodata (2023).

Another important aspect is the presence of companies in the sector of rice, sugar and grain processing and packaging. These companies sell (or even produce) other common foods in the Brazilian diet and, since they share the same type of packaging (differing only in the art used

and other basic information), it makes it easier to expand their portfolio by acquiring bulk sugar from mills and selling it under their own brands.

Geographically, data suggests a strong preference of buyers for local suppliers, as can be seen in the similar locations present in the tables

Table 4. Top 10 buyers of white sugar from Company “C”, 2021’22.

Ranking	%	Location	Revenue (BRL MM per year)	Size	No. of employees	Economic sector
1	39.10	BA, MG, GO, SP	104.2	Medium	151-200	Sugar, grains and their derivatives
2	19.60	SP, MG, PA, AM, PE	118	Large	201-300	Ice-cream and other cold deserts
3	9.70	BA	5.7	Medium	21-50	Milling and processing of other food
4	6.90	SP, PR	0.7	Small	1-10	Food wholesale
5	6.50	MG	76	Medium	101-150	Soda
6	6.20	MG	24.1	Medium	21-50	Dairy
7	1.70	MG, GO, ES, RJ	1,700.00	Large	1,001-5,000	Mining
8	1.60	MG, SP	33.4	Medium	21-50	Ice-cream and other cold deserts
9	1.20	MG	5.7	Medium	1-10	Wine
10	0.60	MG	4.2	Small	21-50	Dairy

Source: Mill’s data and Econodata (2023).

above, i.e., a specific mill tends to sell to buyers located near each other.

Ethanol (biofuel)

The large majority of ethanol produced in Brazil is sold in the domestic market. According to data from National Agency of Petroleum, Natural Gas and Biofuels (ANP, 2023), from 2016 to 2021, the exports of ethanol in Brazil were equivalent to 6.0% of total production.

Within Brazil, identifying the main buyers of ethanol used as fuel can be done using data from ANP. The anhydrous ethanol market-share is expected to be identical to that of gasoline C since it is a fixed proportion of volume.

Starting with hydrous ethanol, Raízen fuel distribution is the most important player in Brazil reflecting its relevance to the sugar-energy sector as whole. Having privileged access to a large share of hydrous ethanol production within the country, it sells about 1/5 of all hydrous ethanol in Brazil (Table 5). Also, Raízen fuel distribution sells its fuels under the Shell brand which represents an important factor for Brazilian consumers due to its association with high quality products.

Ipiranga and Vibra (former BR Distribuidora) are, respectively, the second and third largest fuel distributors in Brazil, but, unlike Raízen, do not have any participation in ethanol production. These two distributors buy ethanol from mills and ethanol distilleries and, in principle, could even acquire ethanol from Raízen’s mills. Alongside Raízen fuel distribution, they represent more than half of the total market of hydrous ethanol in Brazil. Any attempt of certifying ethanol in Brazil would inevitably require the involvement of these players.

Market-share in anhydrous ethanol is identical to that of gasoline C and is consequently shown in Table 6.

The relevance of the distributors when selling gasoline C (therefore anhydrous ethanol) is different from that of hydrous ethanol, reflecting their geographical focuses on Brazilian territory. While hydrous ethanol is economically viable for consumers mainly in the Center-South region, anhydrous ethanol is sold throughout Brazil because its addition to pure gasoline is mandatory. For this reason, Raízen is only the third major player in anhydrous ethanol, behind Vibra and Ipiranga.

Table 5. Hydrous ethanol market-share of the top 20 fuel distributors in 2021.

Distributor	2017	2018	2019	2020	2021
Raízen (fuel distributor)	19.51	19.54	19.37	18.82	20.18
Ipiranga	16.97	17.32	17.13	16.83	17.48
Vibra	17.70	17.30	16.65	16.91	17.31
Petroquality	0.00	0.57	1.98	6.21	5.91
Alpes	1.14	1.90	1.55	2.20	3.63
Duval				0.36	2.98
Gol	0.07	0.07	2.16	3.37	2.82
Noroeste		1.24	5.88	4.31	2.45
All Distribuidora				1.96	1.99
Alesat	2.06	1.80	1.73	2.03	1.91
Petroball	1.61	3.13	1.56	1.55	1.66
Paranapanema	0.15	0.07	0.82	0.89	1.28
Saara	0.03	0.16	0.18	0.04	1.05
TDC Distribuidora		0.82	1.45	1.26	1.03
Gran Petro	3.25	2.65	1.86	1.24	0.98
Petrozil		0.00			0.92
Araguaia	0.53	1.08	1.04	0.92	0.86
Tabocao	0.09	0.06	0.28	0.72	0.82
Everest				0.03	0.78
Sada				0.36	0.72

Source: ANP (2023).

The lower relevance of the Northeast region in ethanol consumption has historical and economic reasons. First of all, the region was the first to produce sugarcane in Brazil during colonial times, when the production of ethanol was irrelevant. This created a tradition of producing sugar rather than ethanol. At the same time, due to climate and other geographical limitations, the region represents about 10% of national sugarcane crushing while concentrating around 30% of the Brazilian population, creating an imbalance between supply and demand. The easier access to North American sugar market because of lower logistical costs and import quotas also makes ethanol less attractive for mills to produce, which also pushes the prices up.

The low consumption of hydrous ethanol in the region – despite its large population – is reflected in sales data, shown in Figure 7. On the

other hand, São Paulo alone represented half of total sales of hydrous ethanol, having produced about 40.7% of hydrous ethanol during the 2021'22 harvest season, resulting from the combination of a large population, higher income level and a large number of mills producing ethanol – allowing for more competitive prices than the Northeast.

Other relevant states in hydrous ethanol sales are Minas Gerais and Goiás, which are also important producing regions, as shown in Figure 8. Anhydrous ethanol sales are more widespread in Brazil since it is proportional to gasoline C sales (27% volume of gasoline C is estimated to be anhydrous ethanol). In this case, there is no direct correlation between production of anhydrous ethanol and its sales since, even if hydrous ethanol is not economically viable for consumers, they will buy gasoline C and, therefore, anhydrous

Table 6. Gasoline C/anhydrous ethanol market-share of the top 20 fuel distributors in 2021.

Distributor	2017	2018	2019	2020	2021
Vibra	24.26	24.09	23.42	23.70	24.91
Ipiranga	19.82	19.59	19.34	17.91	17.93
Raizen	17.78	16.74	16.86	15.98	17.18
Alesat	4.33	4.44	4.20	4.25	3.12
Sabba	1.68	2.09	2.21	2.28	2.12
Larco	0.68	0.84	1.06	1.40	1.54
Aster	0.64	0.57	0.60	0.77	1.53
Rodoil	1.43	1.68	1.62	1.55	1.40
TDC Distribuidora		2.16	2.13	2.05	1.39
Raizen Mime	1.19		1.43	1.36	1.38
Fera	0.83	1.33	1.43	1.76	1.28
Ciapietro	1.63	1.75	1.65	1.50	1.23
SP	0.96	1.11	1.03	1.26	1.13
Royal Fic	0.86	0.95	1.14	1.00	1.12
Petrobahia	0.45	0.62	0.74	0.89	1.08
Potencial	1.15	1.09	1.10	1.15	1.06
Sim Distribuidora		0.09	0.45	0.86	0.97
Atem's	0.74	0.93	0.97	0.97	0.97
76 Oil	0.56	0.66	0.79	0.91	0.85
Equador	0.55	0.58	0.64	0.82	0.84
Tobras	0.86	0.75	0.79	0.84	0.83
Petrox	0.62	0.64	0.72	0.77	0.81
Temape	0.64	0.70	0.72	0.75	0.69
Dislub	0.45	0.57	0.66	0.48	0.68
Total Brazil			0.06	0.83	0.67

Source: ANP (2023).

ethanol. Obviously, São Paulo is the largest buyer of anhydrous ethanol since it is the most populous state as well the richest one in Brazil.

Ethanol for other uses

The information regarding sales of ethanol for uses different from fuel are scarce in Brazil. It is not possible to determine how much of hydrous and anhydrous ethanol production are sold to other industries other than to distributors, however, some insights can be drawn from national accounting data. Table 7 shows the percentage of total ethanol production (in monetary values)

sold to selected sectors that are different from those directly related to sugar-energy activities as well fuel type use.

The selected sectors are strongly associated with uses of ethanol as input for production of other goods such as beverages and chemicals. In general, the ethanol used in these activities has a high degree of purity (in terms of containing only molecules of ethanol and water). Nonetheless, they represent, on average, less than 5% of total sales of ethanol in Brazil.

This small share of total ethanol consumption is corroborated by data from the Council of

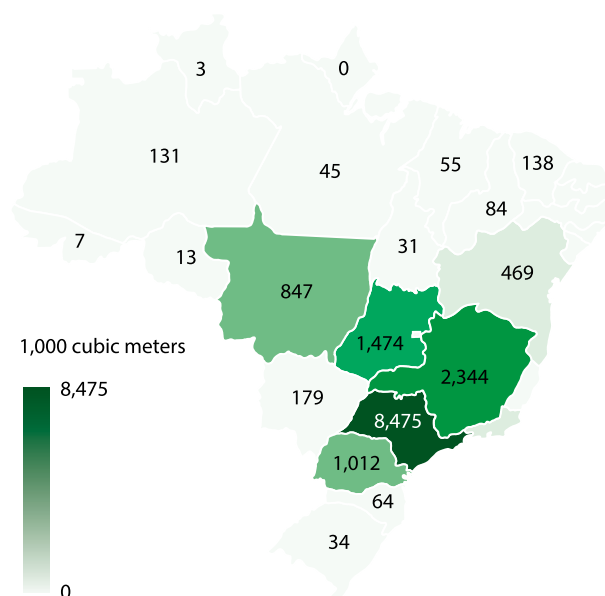


Figure 7. Distribution of hydrous ethanol sales (from distributors) in Brazil in 2021.

Source: ANP (2023).

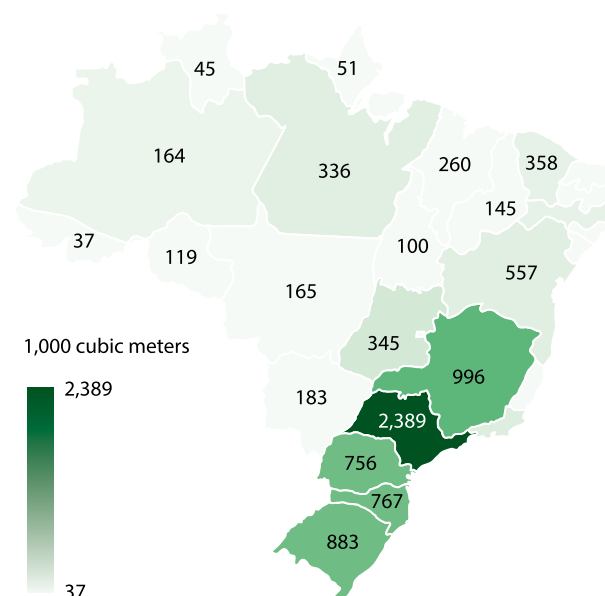


Figure 8. Distribution of anhydrous ethanol sales (from distributors) in Brazil in 2021.

Note: volume estimated as 27% of that of gasoline C.

Source: ANP (2023).

Table 7. Percentage share of selected sectors in total purchases of ethanol in Brazil (2010-2018).

Sector	2010	2011	2012	2013	2014	2015	2016	2017	2018	Avg.
Other food products	0.08	0.10	0.11	0.11	0.11	0.11	0.09	0.09	0.14	0.10
Beverages	0.04	0.05	0.05	0.05	0.05	0.06	0.04	0.04	0.07	0.05
Organic and inorganic chemicals, resins and elastomers	0.44	0.55	0.56	0.56	0.57	0.54	0.55	0.52	0.57	0.54
Pesticides, disinfectants, paints and various chemicals	0.57	0.60	0.65	0.57	0.49	0.47	0.44	0.39	0.47	0.52
Cleaning products, cosmetics/perfumery and personal hygiene	1.76	2.12	2.28	2.46	2.42	2.30	2.24	2.28	2.59	2.27
Pharmaceuticals and pharmaceuticals	1.05	1.39	1.41	1.46	1.40	1.46	1.37	1.32	1.50	1.37
Total	3.93	4.81	5.07	5.23	5.03	4.95	4.72	4.65	5.35	4.86

Source: Nereus (2023).

Sugarcane, Sugar and Alcohol Producers of the State of São Paulo (Consecana-SP, 2023), in which, in terms of destination of raw material, non-fuel and non-export ethanol represented 4.4% of the production of ethanol in São Paulo State in the 2018/19 harvest season. It should be noted, however, that since the COVID-19 pandemic, the production and selling of ethanol for sanitation has grown substantially, so that the same number

from CONSECANA-SP for the 2021/22 harvest season has grown to 7.0%.

The rise in sales of non-fuel ethanol after the COVID-19 pandemic were largely made possible by the permission given to mills to produce themselves the products to be sold in retail. Prior to that, mills could only sell non-fuel ethanol to other companies (mainly for cleaning products and cosmetic sectors) who, then, would convert it

into gel form as well package the product. Data from two different mills that sell non-fuel ethanol shows this change (Table 8 and Table 9), since all top 10 buyers are in retail or wholesale sectors instead of being companies in the manufacturing sector.

Differently from the bulk sales of sugar, the top 10 buyers of these two mills represents a

smaller fraction of their total sales, which means a more dispersed demand and focus on the retail sector. It is important to note that the data collected shows only non-fuel ethanol sold to retail or wholesale, i.e., products that are ready to be sold to final consumer, not to be processed by other industries.

Table 8. Top 10 buyers of non-fuel ethanol from Company “C”, 2021’22.

Ranking	%	Location	Revenue (BRL MM per year)	Size	Number of Employees	Economic sector
1	41.70	MG	34.4	Micro	1-10	Mini-markets, grocery stores and warehouses
2	5.60	MG	2.2	Small	1-10	Supermarkets
3	5.60	MG	28.1	Large	51-100	Supermarkets
4	4.20	MG	0.2	Micro	1-10	Supermarkets
5	4.20	MG	1.7	Small	1-10	Supermarkets
6	4.20	MG	0.6	Small	1-10	Supermarkets
7	4.20	MG	0.10	Micro	1-10	Supermarkets
8	2.80	MG	0.1	Micro	1-10	Mini-markets, grocery stores and warehouses
9	2.80	MG	0	Micro	1-10	Mini-markets, grocery stores and warehouses
10	2.80	MG	0.4	Small	1-10	Drugstores

Table 9. Top 10 buyers of non-carburant ethanol from Company “D”, 2021’22.

Ranking	%	Location	Revenue (BRL MM per year)	Size	Number of Employees	Economic sector
1	19.30	AC, AP, MT, PA, RO	74,900	Large	1,001-5,000	Hypermarkets
2	1.30	PA	246.9	Large	301-500	Wholesale of food products in general
3	3.40	MT	781.1	Large	501-1,000	Supermarkets
4	3.50	MT	564.8	Large	501-1,000	Supermarkets
5	2.10	PA	346.1	Large	301-500	Wholesale of food products in general
6	4.00	MT	292.4	Large	151-200	General wholesale. with predominance of food products
7	4.50	PA	0.50	Small	101-150	Wholesale of food products in general
8	2.00	AC	157.7	Large	201-300	Wholesale of food products in general
9	3.30	MT, RO	89.3	Large	51-100	Wholesale of medicines and drugs for human use
10	6.40	MT	6,400	Large	1,001-5,000	General wholesale. with predominance of food products

Final considerations

The objective of this paper was to identify the main producers, sellers and buyers of Brazilian sugarcane and its derivatives disaggregated by market segment size and product. In general, the sugar-energy sector in Brazil presents different behaviors when analyzing the perspectives of sugarcane producers and buyers of this raw material.

The sugarcane and energy sector has been experiencing continuous growth since the beginning of the 21st century, driven primarily by public policies related to production and product utilization. The progress of this sector has benefited from the increasing importance of environmental issues and the problem of fossil fuel depletion. Market expansion and the adoption of new technologies have led to significant advancements in Brazil, due to the implementation of innovative technologies and favorable geographical factors. Government policies have played a fundamental role in this progress, paving the way for overcoming current challenges and seeking greater competitiveness and the adoption of more productive technologies (Milanez et al., 2017).

On the production perspective, the country experienced two distinct flows of expansion of sugarcane activity. Although the production of sugarcane in the Northeast has historically dictated the Brazilian economy and politics in colonial times, the gain in productivity meant that the emphasis was transferred to the Center-South, especially to the state of São Paulo, this being the first flow. The second flow is what the country has experienced in recent decades, in which the Midwest Region has been gaining prominence, related to climate and soil conditions.

From the sugarcane buyer point of view, the market behavior is related to the purpose for which this raw material will be used, as well as sugar, ethanol (biofuel) or ethanol for other uses. In the case of sugar, exports continue to occupy an important place in the economy of this production chain, in which the Center-South has

been gaining prominence as an exporting region. More than half of the sugar produced in Brazil was exported in the last decade, with the United States being the main destination for these exports.

On the other hand, the domestic market is responsible for most of the ethanol produced in Brazil, with emphasis on the consumer market in the state of São Paulo. Ethanol is also associated as an input to produce other goods, such as beverages and chemical products, although there is no clear information on buyers in this chain, as in the case of sugar and biofuel. It worth mentioning that there is still the geographical concentration of the buyers, reinforcing the role of logistics, even for a product that is more sophisticated.

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