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## Guatemalan Sugar Industry: Diversity and Trends

**Abstract.** The scope of the paper is the presentation of sugar production and foreign trade trends in Guatemala. The following research questions were put forward: What is the diversification of sugar production trends in Guatemala? What is the change, in percent, of foreign trade in Guatemala? The studies that were conducted include documentation, statistical, comparative, and dynamics analysis. The results showed that the Guatemalan sugar industry had different tendencies. As much as 75% of the world's sugar supply comes from Guatemala. Guatemala produces more sugar than any other nation in the world per acre of sugar cane. The sugar industry is an important sector from the point of view of the labour market. It should be underlined that export depends on quotas. Overall, the number of exports increased.

**Key words:** Guatemala, sugar industry, trade, production, market

**JEL Classification:** E23, F49, O50, P49

## Introduction

While many nations manufacture sugar, Guatemala's comprehensive and environmentally friendly approach to the industry sets it apart. The sugar industry in Guatemala is one of the most competitive in the world despite its commitment to environmental and social responsibility. This is possible because of the industry's successful synthesis of cutting-edge technology and approaches and its committed, highly trained workforce. Since its founding, the industry's success in achieving this goal has made Guatemala a major economic force, a pioneer in environmentally friendly farming and processing methods, and a vocal supporter of equitable social change. Sustainability and productivity are best shown by Guatemala's sugarcane crop, which can provide renewable energy, pharmaceuticals, ethanol, and even consumer goods from its byproducts. With each harvest, sugarcane has a greater effect on the environment, society, and economy of Guatemala because of ongoing development. Trends show that sugar production in Guatemala is about more than just making sugar; it has required significant investment of time and energy over many years in order to reach its current state. Sugar production in Guatemala has been ongoing since the 16th century (The Tico Times, 2023; Mrozek, 2021).

Sugarcane was grown and harvested in the same conventional manner for generations, but individual sugar mills sought opportunities to collaborate as the sugar business developed. Over the last 500 years, the sugar industry has progressed from rudimentary

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trapiches (production mills) to cutting-edge facilities. After more than 60 years of effort, the industry has established a strong reputation for quality, efficiency, and innovation across the globe. Today, Guatemala is the third most productive country in the world and the sixth biggest exporter of sugar in the world. There are 55,000 direct employment positions and 278,000 indirect jobs in the sugar industry. It produces revenue in excess of a billion dollars annually, making it the country's second-most exported agro-industrial commodity. Sugarcane is more than simply an agricultural crop in Guatemala – renewable energy and alcohol are also created from the sugar industry's by-products (Reportlinker, 2023).

When it comes to producing electricity from biomass, Guatemala is often regarded as a global pioneer. During the 2021-2022 Zafra (harvest), the Guatemalan sugar industry produced 988 GWh of renewable energy to meet 30% of the country's total energy needs and make the mills completely self-sufficient. This has also averted the release of 4 million tons of CO<sub>2</sub> into the atmosphere. As a matter of corporate social responsibility, Guatemala's sugar industry abides by a set of conventions and guild laws designed to provide the highest quality working conditions for all employees. External audits of policy compliance are performed once a year. Since 2008, sugar in some areas of Guatemala has been fortified with iron to combat anemia. Azucar de Guatemala has received worldwide recognition for its role in eradicating juvenile blindness in the country as a result of this fortification. The Guatemalan sugar industry supports initiatives in the areas of health, education, and community building (Pantaleon, 2023).

The aim of the paper is the presentation of sugar production and foreign trade trends in Guatemala. The authors present the following research questions: what is the diversification of sugar production trends in Guatemala and what is the change, in percent, of foreign trade in Guatemala?

## **Materials and method**

The paper presented the Guatemalan sugar industry and the concepts related to the production of sugarcane. The studies were carried out with documentation, statistical, comparative, and dynamic analysis. The paper was prepared based on print, digital, and electronic sources: reports, databases, books, textbooks, academic and trade journals, and scientific papers. The value added of the paper will be the conclusions drawn on the basis of the conducted analyses. There were no verified economic rules. The time scope of the study is 2021-2022, but in some issues that was broadened. The time scope was chosen on the basis of the availability of data. The research results present significant modifications between the research variables in the given analyzed areas. The analysis is carried out within such issues as: a comparative analysis of sugar production in Guatemala for still active sugar mills; average monthly sugar prices at retail in Guatemala; market share of Guatemalan exports; world sugar beet crop production quantities by country; world sugarcane crop production quantities by country. The material sources were selected taking into consideration the aim of the paper and the availability of particular content.

## Literature review

Grinding, purifying, crystallizing, refining, and crushing are just a few steps in transforming sugarcane into white sugar. It follows that factories can transform raw sugarcane into refined white sugar. The fact that a company has the means to crush and grind 66 sugarcane sticks and extract the juice from any kind of sugarcane suggests that its employees are familiar with the process (Boiffin et al., 2004; Van Antwerpen and Meyer, 1996). Sugar is a consumable good and one of the most common sources of energy in the Western diet; it is ubiquitous, and it has negative effects on people and the planet. Despite the negative effects of sugar on human health, its increasing popularity and price on global markets have made it an essential commodity. Mass commercial sugarcane production has been connected to significant losses and contamination of environmental components and biodiversity in several tropical and subtropical regions (Graham et al., 2002; Serageldin, 1995).

Many plants, including cane and beets, are cultivated to produce sugar. In most cases, sugarcane is used in the manufacturing process. It should be emphasized that cane and beets are significant on an international scale. There are several processes involved in sugar manufacturing. These processes vary mostly in terms of the techniques or components involved in the various phases of sugar production. The sugar manufacturing process comprises the agronomic, preparation and milling, purification, concentration, crystallization, and centrifugation phases. Carbohydrate molecules, of which sugars (saccharides) are a subset, are made by photosynthesis from carbon dioxide and water, with the result being oxygen and glucose (Maloa, 2001; Richardson, 2010).

In terms of both population and GDP, Guatemala is Central America's most populous and prosperous nation. In 2021, its population had risen to about 17 million, and its GDP had reached \$86 billion (\$5,025 per inhabitant). Growth has been consistent (averaging 3.5% annually between 2010 and 2019) thanks to the country's responsible handling of its economy's finances. After a significant increase in growth in 2021 (8%), the economy of Guatemala grew by 4% in 2022 on the back of consumer spending, business investment, and government spending. In 2023, GDP growth is predicted to drop to 3.2%. Major growth obstacles persist. Due to the country's huge and underserved population, which is concentrated in rural areas, is mostly indigenous, and works in the informal economy, Guatemala has some of the highest poverty and inequality rates in the Latin American and Caribbean region (LAC). Some of Guatemala's main causes of poverty include the country's small size and inefficiency as a state, the absence of adequate educational and employment possibilities, and the prevalence of natural catastrophes. Based on these projections, around 54% of the population lived in poverty in 2019, which is only slightly lower than the 55.4% estimated in 2014. A fall in labour income (across all education levels) slowed progress toward reducing poverty, notwithstanding the positive effects of the large rise in remittances and sustained economic development seen between 2014 and 2019 (Nazaret, 2023).

In 2020, the poverty rate increased to 59 percent due to the COVID-19 crisis. The government's quick action in widening the safety net to cushion the economic and social blow of the epidemic prevented the increase from becoming much more severe. Inequality is projected to increase even while poverty falls to 55.2% in 2023 and 54.2% in 2024. Although Guatemala's Human Capital Index (HCI) score increased from 0.44 in 2010 to

0.46 in 2018, it is still much behind the LAC average. A child born in Guatemala in 2018 with an HCI of 0.46 is only projected to achieve 46% of their potential if they have access to a full education and good health throughout their lives. Indigenous and Afro-descendant peoples, which made up around 45% of the population in 2018, had poor human capital metrics. The under-five malnutrition rate in Guatemala is 47%, which places the country in the top ten globally (Plaza Publica, 2023).

The stunting rate is notably high, and it might get worse in a setting of food instability and high food costs, despite recent government initiatives to focus on early child treatments. Losses in human capital, infrastructure, agricultural productivity, food security, disease transmission, and basic service supply have all been exacerbated by recent disasters. It has been estimated that the combined damage from hurricanes Eta and Iota in 2020 cost the economy around 0.56% of GDP in terms of infrastructure damage. However, Guatemala has a huge opportunity to boost development and prosperity for all of its citizens. Because of its closeness to the United States, the nation benefits from both tourist and nearshoring prospects, and it is one of the world's megadiverse countries with a culture that spans civilizations. Guatemala has to successfully deliver services like health, education, disaster risk management, and infrastructure in order to tap the potential riches, all while steadily expanding the sources of fiscal income. Increased FDI and improved access to global financial markets will result from the country's efforts to improve its governance, social, and environmental credentials (Food Navigator Latam, 2023; Mrozek, 2022).

## **Results of the research**

The research was carried out within the structural, statistical, comparative, dynamics, and documentation analysis. The time scope of the study was 2021-2022, but in some issues that was broadened. The research results present significant modifications between the research variables in the given analyzed areas. The analysis was carried out within such issues as a comparative analysis of sugar production in Guatemala for active sugar mills; market share of Guatemalan sugar exports; world sugar beet crop production quantities by country; world sugarcane crop production quantities by country. There will likely be 276,000 ha of sugarcane planted in MY 2023/2024, up from the 275,000 ha predicted for MY 2022/2023. Reduced sugarcane area in recent years due to low global prices caused by Indian subsidies and the subsequent epidemic has been reversed because of the availability of more leased land for sugarcane, which may earn two to three times as much as other crops on the South Coast of Guatemala. Sixty-five percent of all sugarcane planted in Guatemala is of a climate-change-resistant variety, thanks in large part to a permanent breeding program run by the Guatemalan Center for Sugarcane Research (CENGICANÑA) to enhance genetics for the sustainability of the sugar business. CENGICANÑA claims that if the wet season doesn't continue into October and compromise the cane's health, the prognosis for sugarcane yields in MY2023/2024 is a small improvement over the previous year's estimate (Knoema, 2023; CIRAD, 2023).

As the rains didn't stop until late November/early December in MY2022/2023, the sugar content suffered, and sugar output fell by 2% as a result. Sustainable sugarcane cultivation in Guatemala keeps going strong. To produce the same amount of sugar, the sugarcane crop method uses just 100 cubic meters of water per ton, while the worldwide

average is 175 cubic meters per ton; this means that only 16% of the production area needs irrigation, while the global average is 27%. With a carbon footprint of 0.33 kg of carbon dioxide equivalent per kilogram of sugar produced, the sugar industry claims it contributes less than 2% of the country's national greenhouse gas emissions and may thus participate in carbon markets. Due to a severe shortage of farm labor during the previous five years, at least 51% of Guatemala's sugarcane was mechanically planted and harvested in MY2022/2023 (Sugarforgood(A), 2023; Our World in Data, 2023).

As the planted area expands, sugar output in MY2023/2024 is predicted to reach 2.58 million MT, up marginally from the projection for MY2022/2023 (2.56 MT). Due to a delayed dry season entrance and prolongation of the rainy season beyond the harvest commencement, production in MY2022/2023 has been revised down by two percent. There are ten operational mills in Guatemala (Fig. 1).

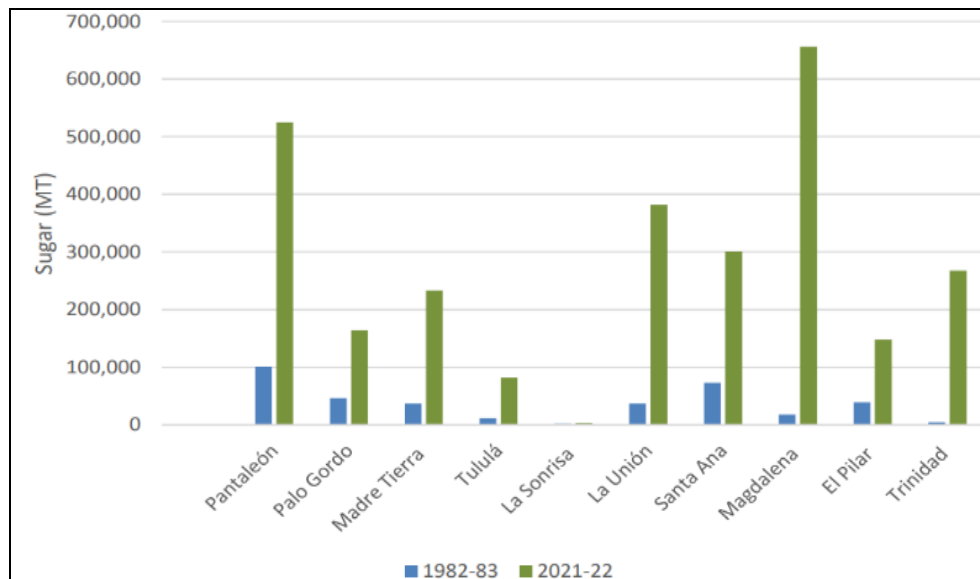


Fig. 1. Comparative analysis of sugar production in Guatemala for active sugar mills (MY1982/1983 vs. MY2021/2022)

Source: Food and Agriculture Organization of the United Nations (FAO), 2023.

The 369,143 MT of sugar that Guatemala produced in MY1982/1983 will have multiplied by 6 to 2.58 million MT by MY2021/2022. Figure 1 does not show the contribution of La Sonrisa sugar mill's output, but it illustrates how sugar production has increased from 18,187 MT in MY1982/1983 to 656,177 MT in MY2021/2023. Twenty years of hard work have paid off, as Guatemala is now the world's fifth-largest exporter of sugar (1.66 metric tons), behind only Brazil, India, Thailand, and Australia (Senninger, 2023; Pbi-Guatemala, 2023; Sugarforgood(B), 2023).

In MY2023/2024, refined sugar consumption is expected to reach 970,000 metric tons of raw value (MTRV), up from the revised consumption estimate of 960,000 MTRV for MY2022/2023 (950,000 MT). Sugar consumption has returned to pre-pandemic levels, and its use in the food and beverage industries as well as the bakery and sugar confectionery

sectors is on the rise. This has led to domestic consumption accounting for 38% of Guatemala's total sugar sales. According to industry guidelines, all domestic sugar consumption must be met before any sugar exports may begin. The projected average annual consumption in MY2023/2024 is 54 kg per person.

In terms of trade, the projection for MY2022/2023 sugar exports of 1.597 million MT indicates a 4 percent increase to 1.66 million MT in MY2023/2024. The earlier prediction for sugar exports in MY2022/2023 has been reduced by 6%. Figures 3 and 4 display the top eleven (and others) markets for sugar exports in MY2021/2022. These markets were Spain, Mauritania, Canada, United States, China, Haiti, Taiwan, Cote d'Ivoire, Chile, Peru, Jamaica, and others (International Trade Administration, 2023).

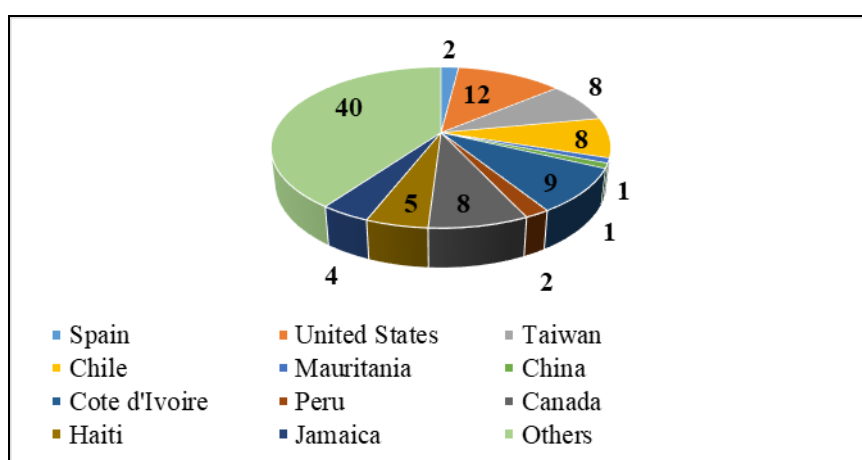


Fig. 2. Structure of the Guatemalan sugar exports in MY2020/2021 (%)

Source: OEC, 2023.

Figure 2 shows the structure of the Guatemalan sugar exports in MY2020/2021. Port Quetzal is Guatemala's primary gateway for international trade. EXPOGRANEL, the exporting terminal for the sugar industry, continues to receive 800 MT of sugar per hour despite the pace at which bulk vessels may be filled reaching 2,164 MT per hour. The port can still carry 58,000 MT of sugar in sacks, and it can fill containers with sacked white or refined sugar at a pace of 10 trucks per hour. The export market share held by refined sugar will rise from 39% in 2008 to 57% in MY2022, an increase of 1% from MY2021. Consequently, rising domestic demand and a return to normalcy after a catastrophic event, stocks are expected to drop to 217,000 MT in MY 2023/2024 (Export, 2023; United Nations, 2023).

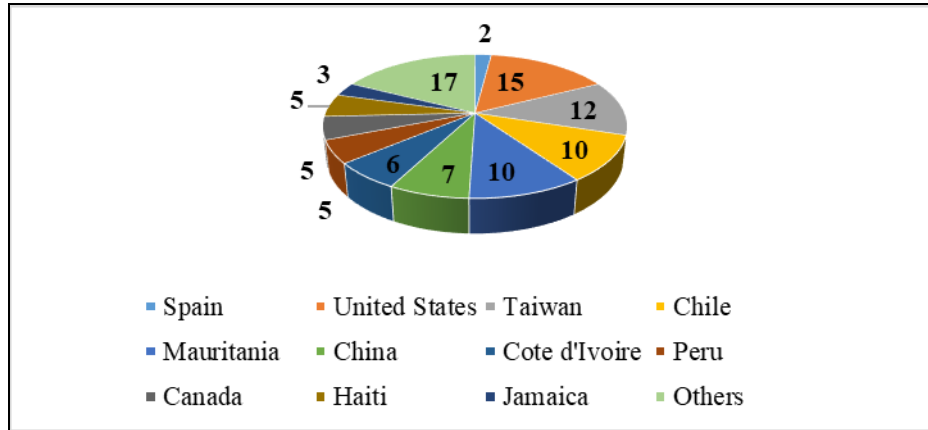


Fig. 3. Structure of the Guatemalan sugar exports in MY2021/2022 and MY2022/2023 (%)

Source: The World Bank, 2023.

Figure 3 illustrates the structure of the Guatemalan sugar exports in MY2021/2022 and MY2022/2023. In terms of trade (policy), sugar exports from Guatemala have expanded into new markets because of the country's several FTAs, the most significant of which is the quota with Taiwan (in terms of volume), followed by the United States, the European Union, the United Kingdom, and Ecuador. The United States will help Guatemala meet its quota for the Marketing Year 2022/23 (MY2022), which is 118,436 MT and is comprised of 50,546 MT from the World Trade Organization (WTO), 1,093 MT from an increase, and 14,157 MT from a reallocation (The Department for Business and Trade, 2023).

Cane grows best in warm, frost-free subtropical conditions in the south, while beets do best in temperatures that are more typical of the north. It is clear that the production of sugar from sugarcane is significant for the economies of the global South, whereas the production of sugar from beets in the global North is considerably less significant, as evidenced by the significantly lower production quantity figures. However, both China and the United States produce significant quantities of sugar from both plants, albeit in varying proportions of their total sugar production. In most cases, the only accessible data on modern sugar production or trade are those published by FAOSTAT, broken down by country criteria (Food Export, 2023; OEC, 2023).

## Conclusions and recommendations

Asazgua, the Guatemalan Sugar Association, is comprised of eleven diverse sugar mills around the country of Guatemala. The sugar industry in Guatemala is responsible for creating or maintaining around 62 thousand direct employment and an additional 310,500 indirect jobs. Guatemala is responsible for producing as much as 75% of the sugar that is consumed worldwide. Sugar is produced in Guatemala's southern region, where sugarcane is grown for cultivation and sugar is refined. It rarely uses more than 3% of Guatemala's arable land in its operations. The months of November through May of each year are traditionally used for the harvesting of sugarcane. Guatemala is home to the top eleven sugar mills, which are dispersed among the departments of Trinidad, Magdalena, La



Sonrisa, Palo Gordo, La Union, El Pilar, Santa Ana, Madre Tierra, Santa Teresa, Pantaleón, and Concepción respectively.

As the planted area expands, sugar output in MY2023/2024 is anticipated to reach 2.58 million MT, up marginally from the projection for MY2022/2023 (2.56 MT). In MY2023/2024, refined sugar consumption is expected to reach 970,000 metric tons of raw value (MTRV), up from the revised consumption estimate of 960,000 MTRV for MY2022/2023 (950,000 MT). January and February 2023 prices were 6% higher than the corresponding months of the previous year (WITS, 2023). In terms of trade, the projection for MY2022/2023 sugar exports of 1.597 million MT indicates a 4 percent increase to 1.66 million MT in MY2023/2024. The export market share held by refined sugar will rise from 39% in 2008 to 57% in MY2022, an increase of 1% from MY2021. The United States will help Guatemala meet its quota for the Marketing Year 2022/23 (MY2022), which is 118,436 MT and is comprised of 50,546 MT from the World Trade Organization (WTO), 1,093 MT from an increase, and 14,157 MT from a reallocation.

The Guatemalan Sugar Association is an umbrella organization for the country's sugar mills, which has produced three subsidiary organizations dedicated to research and development, social welfare, and sugar exports. The sugar sector is taking action to lessen greenhouse gas emissions from production as part of a larger effort to fight climate change and maintain environmental sustainability. As a result, Guatemalan sugar has among the lightest carbon footprints in the industry. According to projections by the Private Institute for Climate Change Research (ICC) for the 2021-2022 harvest, Guatemalan sugar will have a carbon footprint that is towards the bottom of the world sugar sector, at 0.33kg of CO<sub>2</sub>eq per kilogram of sugar produced.

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