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■ Research Note

Analysis of the Market Positioning of Pakistan's Sugar Industry Products

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Abstract:

This research analyzes the position and trade potential of Pakistan's sugar industry products in international trade. As the second-largest agro-based industry in Pakistan, the sugar industry contributes significantly toward the national economy and the country's rural development. This study employs the market positioning matrix (MPM)-an empirical analysis model applied by Lall and Weiss (2004), and utilizes International Trade Center's Trade Map data from 2013 to 2022 to evaluate the competitiveness of Pakistan's sugar industry. The findings indicate that Pakistan's sugar confectionery and other sugars fall into the "*Champions*" category of the MPM, signifying international market growth for these products, along with country's robust export performance. However, the country's exports of ethyl alcohol, a chemical compound derived from molasses and sugar, is categorized as "*Underachievers*." This reflects that the product market is growing, but Pakistan's performance within the given product underperforms relative to global growth. Meanwhile, table sugar and molasses are classified into the "*Declining sector*" category in the MPM. This demonstrates the shrinking of the product market and declining of Pakistan's performance. The study concludes that while value-added sugar products are performing well, ethyl alcohol's export potential requires additional effort. Both sugar products and value-added versions hold potential for industrial development and foreign exchange generation for Pakistan, given the country's heavy reliance on the textile sector for exports.

Keywords: Market Positioning Matrix, Pakistan's sugar industry, Competitiveness

I. Introduction

The global sugar industry plays a critical role as a major agro-based industry, providing essential sweeteners for people and serving as basic materials for various global industries, including confectionery, beverages, pharmaceuticals. Among 110 sugar-producing nations, only eight utilize both sugarcane and sugar beets for sugar production (ISO, 2022). In 2022, the global sugar trade totaled USD 71.6 billion, representing 0.29% of global merchandise exports[1)].

Globally, only 36% of sugar produced is exported after meeting domestic consumption, figure projected to reach 38% by 2032 (OECD, 2023). Per capita sweetener consumption is declining in many high-income countries mainly because of health concerns and measures to discourage sugar use. Regardless, sugar demand, especially for sugar confectioneries and soft drinks, is anticipated to surge in Asian and African countries, driven by population growth,

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urbanization, and rising incomes (OECD, 2022). Given the changing dynamics of the international demand and human behavior for sugar intake, numerous sugar-producing countries are striving to position their sugar industries beside value-added industries, such as sugar confectionery, beverage, and ethyl alcohol production.

Globally, Pakistan ranks as the sixth and fifth largest sugar and cane sugar producing country (PSMA, 2023). Pakistan's sugar industry is the second-largest agro-based industry, contributing toward national economy and socioeconomic development. Its sugar sector is categorized as a large-scale manufacturing industry (Govt. of Pakistan, 2023), contributing 0.7% to agricultural gross domestic product, 3.2% of agricultural income (Ahmad et al., 2023), and around 4.2% of the manufacturing sector of the country (Habib,2020). Many skilled, semiskilled and unskilled laborers, both male and female, are directly or indirectly dependent on the sugar industry for their livelihood (Ahmad et al., 2023). Unlike many manufacturing industries that face the problem of energy input in Pakistan, the sugar industry is unique because of its ability to co-generate electricity from the bagasse and contribute additional power to the national grid as well. Export earnings by the sugar industry can help dollar-deficient Pakistan to earn foreign exchange for the country.

Notably, from 2013 to 2022, Pakistan's sugar sector has grown below the global average growth of the sector. During this period, world trade has grown by 3% on average, with the global sugar products market growing by 2.17% on average, but Pakistan's sugar industry products declined by −1.73% [2)]. This growth rate decline of Pakistan's sugar sector poses several questions on this traditional agro-industry's performance and competitiveness, as it may compromise the sector's competitiveness and true capacity. Therefore, a detailed product-wise performance evaluation is needed to guide policy interventions to make the sugar sector more competitive and rewarding for the country.

Previous studies on Pakistan's sugar sector have primarily addressed supply-side factors such as production efficiencies when analyzing competitiveness. This study attempts to analyze the product-wise competitiveness and performance of Pakistan's sugar sector using export data and comparisons with the country's top exported products. Moreover, this study compares the product-wise positioning of Pakistan's sugar sector with four largest cane sugar producing countries in the world using export data from the International Trade Center (ITC)'s Trade Map database and applying the market positioning matrix (MPM), an empirical model developed by Lall and Weiss (2004). Our analysis helps gauge the current competitiveness of Pakistan's sugar products and the global market dynamics of the sector, identifying the growth potential and directions for export diversification policies.

This paper is organized into different sections. Section 1 discusses the background and current position of Pakistan's sugar sector. This is followed by a literature review on the competitiveness of Pakistan's sugar industry and the importance of understanding its competitiveness through international trade data. Section 2 explains the methodology and its application in Pakistan's sugar industry. Finally, this study concludes with the results and policy recommendations.

II. Background and current position of Pakistan's sugar industry

Since its independence in 1947, Pakistan's sugar industry has evolved from modest beginnings, with only two sugar mills producing 10,000 metric tons of sugar per year (Kamil et al.,1989). By 1960, Pakistan had six mills which further reached 17 sugar mills (production capacity of 232,000 metric ton) in the first 20 years after the country's independence (Kamil et al., 1989). By 1990, the country had 48 operational sugar mills that could produce enough sugar to cater to the country's domestic requirements (PSMA, 1990). Because of the increase in demand and profitability, sugar mills continued increasing in the country and adapted modern technology to enhance efficiency. By 2000, the country had 69 sugar mills, further increasing to 83 by 2010. As of 2023, Pakistan has 90 sugar mills, producing around 7.9 and 3.6 million tons of sugar and molasses, respectively, per annum (PSMA, 2023). In times of insufficient sugar production, imported sugar— which used to cost huge foreign exchange to the country along with massive price fluctuations—fills the demand–supply gap. The first major export of table sugar began in 1994 and 1995; however, this was short lived as the country had to import sugar again (FAO, n. d.). Such inconsistent exports of table sugar continued till time under the quota mechanism. However, some products (e.g., ethyl alcohol and molasses) or value-added products (e.g., sugar confectionery and beverages) have continued under the unrestricted export policy in Pakistan.

The sugar industry's primary products are refined sugar, molasses, bagasse, and filter cake. These products generate several commercially important by-products. The country's major traded sugar industry products include HS 1701 (cane or beet sugar and chemically pure sucrose, in solid form (table sugar)), HS 1702 (other sugars, including chemically pure lactose, maltose, glucose and fructose, in solid form (other sugars)), HS1703 (molasses from the extraction or refining of sugar (molasses)), HS 1704 (sugar confectionery not containing cocoa, including white chocolate (sugar confectionery), and HS 2207 (undenatured ethyl alcohol of an alcoholic strength of >= 80%, ethyl alcohol, and other spirits (ethyl alcohol)). Figure 1 shows Pakistan's exports of sugar industry products from 2013 to 2022 based on the Harmonized System (HS) four-digit data from International Trade Center (ITC)'s Trade Map database for the mentioned HS

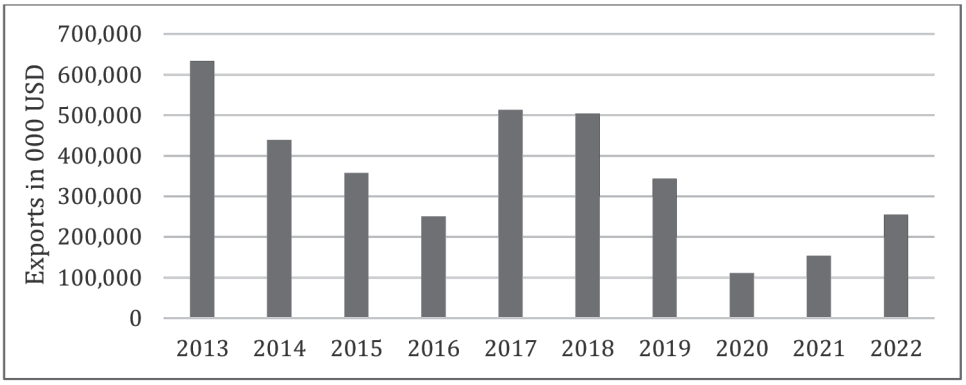


Figure 1. Exports of Pakistan's sugar industry products

Source: Authors' calculation based on export figures of HS 1701, 1702, 1703, 1704, and 2207 from the ITC Trade Map

codes.

Presently, Pakistan is the sixth-largest producer and seventh-largest consumer of sugar worldwide (PSMA, 2023). However, Pakistan's sugar industry struggles to compete with the sector's global growth rates. This necessitates extensive examination and assessment of Pakistan's competitiveness in the global market and an analysis of its sugar sector's standing in international trade.

III. Literature Review

Most research on Pakistan's sugar industry focuses on supply push factors, highlighting that production inefficiencies serve as stumbling blocks in the industry's production output. Khushk et al. (2011) analyzed the sugar industry's competitiveness in two of Pakistan's sugar-producing provinces (i.e., Punjab and Sindh) by calculating production costs. They identified high transportation cost, outdated production technologies and lack of government initiatives for exports as reasons for the low productivity of sugarcane, the main input for sugar production. Ali and Khan. (2012) observed that sets of agricultural and macroeconomic policies do not align with the comparative advantage of Pakistan's sugarcane production. The country maintains clear comparative advantages and disadvantages in sugarcane production during the import substitution and export promotion regimes, respectively. Kamil et al. (1988), while providing a historical background of the evolution of the sugar industry in Pakistan and policy goals for the industry from 1947 to 1988, found that government protectionist policies have helped in the sugar industry's growth and production output in Pakistan. Using the stochastic production frontier approach, Mahmood et al. (2006) studied Pakistan's large-scale manufacturing sector efficiency in 1995–1996 and 2000–2001. They found that magnitude of improvement in efficiency for the large-scale manufacturing sector is limited. This is attributed to several factors, which include the trade policy environment shielding the industry from external competition. Raheman et al. (2009) calculated the firm-level efficiency and total factor productivity growth of 20 firms and found that Pakistan's sugar industry is facing serious productivity growth problems. During 1998 to 2007 there is no total factor productivity of the industry, technological improvement is offset by negative managerial efficiency. Furthermore, Pakistan's export product portfolio reveals that the country's exports are heavily concentrated on the textile and food sectors. Out of five top exported products in the year 2022, four are from textiles and one is from food. Combined exports of these five products account for 38% of Pakistan's exports in the year 2022, which shows the country's high reliance on these products[3)].

The mentioned studies focus on production level factors to assess competitiveness, but they ignore demand-driven factors that influence the industry's productivity growth. The demand-pull factors contribute critically toward efficiency and competitiveness owing to economies of scale. Coelli et al. (2005) maintain that productivity growth can be divided into three components: technical change, scale effects, and technical efficiency change. Čekmeová (2016) defines national competitiveness as a country's ability to establish itself in foreign markets through price

or other factors. Cellini and Soci (2002) consider a country as competitive if "as a result of cost-and-price-developments of other factors, its ability to sell in foreign and domestic markets has improved or deteriorated."

As competitiveness based on export performance indicates the strength of a country's product in the global market within the applied tariff, this study assesses the competitiveness of Pakistan's sugar industry products in the world market through export data. Moreover, this study attempts to understand the dynamics and position of the global sugar industry in world trade. The study then examines the performance of Pakistan's sugar industry products along with the top five exported products of the country and vis a vis top exporters of sugar in the world. This study would help in the policy direction for the sugar sector of Pakistan. Unlike earlier studies that focused on production efficiencies and supply-side factors to judge the competitiveness of the sugar industry, this study is unique in examining the competitiveness of Pakistan's sugar industry from the demand side.

Furthermore, the sugar consumption pattern suggests that 75% of the sugar produced in Pakistan is used by industrial consumers, whereas only 25% is used for household consumption (PSMA,2021). While 60% of the sugar produced in Pakistan is used alone for confectionery, bakery, beverages etc (USDA,2023), which are presently the main sources of sweetener intake. Therefore, the major and continuous exports under HS 1704-Sugar Confectionery[4] have also been taken as value-added products of the sugar industry, which makes this study unique.

IV. Methodology

This study uses the MPM applied by Lall and Weiss (2004). The MPM explains the relationship between the growth rates of the total export value of a product in international trade and the change in the country's share of that product's total exports. The mathematical expression of the MPM is given as follows:

$$\mathbf{MPM_{ij}} = \left\{ \frac{X_{ij\,t+\Delta}}{X_{wj\,t+\Delta}} - \frac{X_{ijt}}{X_{wjt}}, \left(\frac{X_{wj\,t+\Delta}}{X_{wjt}} \right)^{1/\Delta} - 1 \right\}$$

Changes in a country's j share in world j's exports

Annual growth rate of j's exports in world trade

where MPM_{ij} denotes the MPM of country i in commodity j, X_{ij} denotes the export of commodity j by country i, X_{wj} denotes the world exports of commodity j, with t representing time and Δ representing time difference. The left-hand side of the bracket denotes the changes in the country's j share in world j export from i to $t + \Delta$, and the right-hand side denotes the annual growth rate of j's export in world trade from t to $t + \Delta$[5].

MPM broadly categorizes a product into two parts by the export growth of the product,

i.e., dynamic and stagnant, and also by the share of the country's exports in the world trade, i.e., competitive and noncompetitive. Resulting combinations create four categories of market positioning called "*Champions*," "*Achievers in Adversity*," "*Underachievers*" and "*Declining Sectors*" as given in Table 1.

Table 1. Market positioning matrix

	Annual Growth of Product in World Trade	
Changes in the share of the product in the country's exports	Rising (Dynamic)	Falling (Stagnant)
Rising (Competitive)	Optimal (Champions)	Vulnerable (Achievers in Adversity)
Falling (Noncompetitive)	Weakness (Underachievers)	Restructuring (Declining Sectors)

Source: Adapted from Lall and Weiss (2004)

If country's share of a product in global trade increases and the product's average annual export growth surpasses the average annual growth of global trade, the country's export performance is deemed "optimal." In this case, the product would be categorized under "*Champions*." Conversely, if a product's share in the global market rises (positive) but its average annual growth lags behind average annual global trade growth, the country's export performance for the product *j* is considered "vulnerable." This refers to the sector's low growth in international trade, despite the country's satisfactory performance in that product. These products would be categorized as "*Achievers in Adversity*."

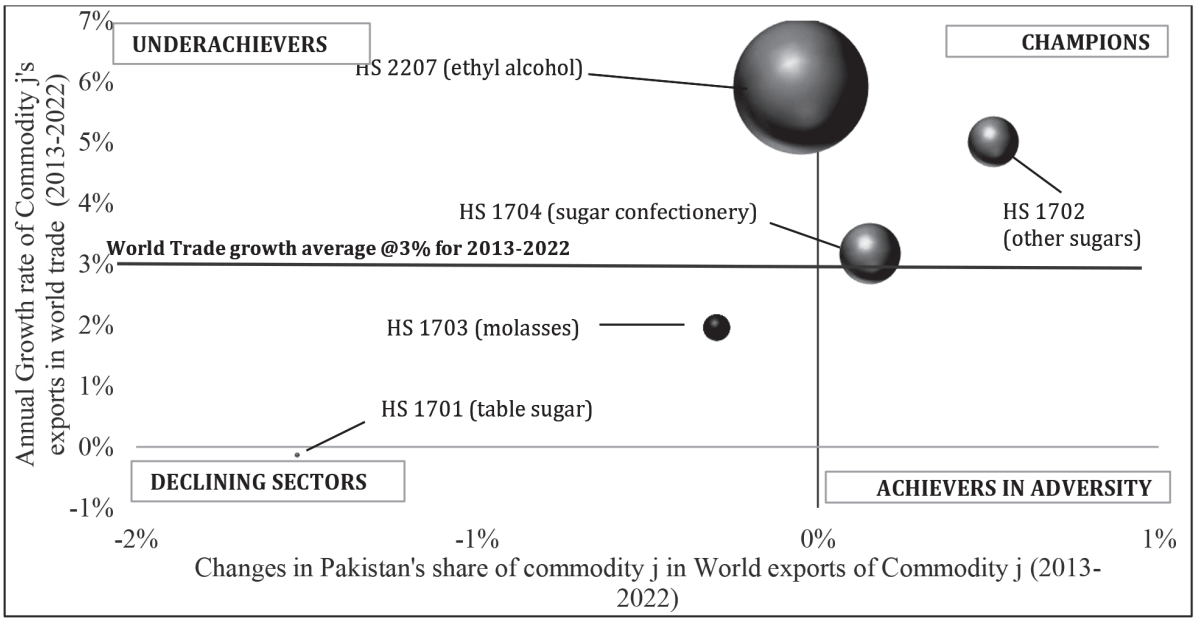
If a product's share in the global market declines while its average annual growth exceeds the average annual growth of global trade, the country's export would be classified as "Weak." This indicates that although the product sector is growing globally, the country's performance in that sector is subpar. Such products fall into the "*Underachievers*" category. Finally, if both the product's share in the global market and average annual growth are below the average of global trade growth, the country's exports of that product are undergoing "*Restructuring*." This indicates that both the product sector and the country's performance are subpar, and such products are part of "*Declining sectors*." Based on changes in its share in global trade, a product is declared either competitive or noncompetitive. If the share rises, the product is considered competitive, and if it falls, the product is termed as noncompetitive. Simultaneously, if a product's export growth rate outpaces the growth rate of global trade, it is termed dynamic; otherwise, it is considered stagnant.

The MPM helps analyze a country's position in a product's global market, along with its standing in world trade. This indicates whether the product is improving or losing its global export basket share. Furthermore, the MPM provides an understanding of the global market position of the product whether the product's market is growing or shrinking globally. Hence, using the export data, this study uses the MPM to identify the competitiveness of Pakistan's sugar industry products in the global market from 2013 to 2022. The study further applies the MPM of sugar products along the Pakistan's top five exported products in the year 2022 and then largest

cane sugar producing countries in the world.

V. Results and discussion

In this section, we analyze the performance, position, and trade potential of Pakistan's sugar industry products based on MPM analysis results. Figure 2 shows Pakistan's performance in the sugar sector using MPM.



Note: The 3% average growth rate of the world trade is the authors' calculation based on ITC, trade map data. The bubble size indicates the $US value of exports in 2022 on the basis of the three-year moving average.

Figure 2. Market positioning matrix of Pakistan's sugar industry products

Figure 2 shows three variables that determine the country's product position in international trade. The Y-axis of the matrix indicates the growth rates of commodity *j*'s exports within global trade. Meanwhile, the X-axis indicates changes in the country's share of the world's commodity *j*'s exports; the bubble size denotes the export values of commodity *j*. The chart is partitioned vertically by positive and negative changes in the share of the country's commodity *j* within global trade and horizontally by the average annual growth of global trade. This analysis categorizes different sugar industry products from 2013 to 2022. Notably, three out of five sugar products are classified within the dynamic (rising) categories of MPM. Conversely, two products fall within the stagnant (falling) categories. From 2013–2012, the export growth of HS 1702 (other sugars), HS 1704 (sugar confectionery) and HS 2207 (ethyl alcohol) was faster from 2013 to 2022 than the average growth of global commodities export while the growth of exports of HS 1701 (table sugar) and HS 1703 (molasses) was slower than the average growth of global commodities export. Notably, the export growth of HS 1701 (table sugar) was negative during the period, and this pattern was also observed in major sugar-producing countries. This reflects the tendency that the main sugar-producing countries are increasingly focusing on exporting value-

added sugar products compared to basic sugar products (Appendix I).

The MPM analysis at the product level reveals that Pakistan's HS 1704 (sugar confectionery) and HS 1702 (other sugars) are in the "*Champions*" category. Their market shares are rising, demonstrating the international competitiveness of these products in globally expanding markets. This infers that Pakistan's HS 1704 (sugar confectionery) and HS 1702 (other sugars) are well positioned to capitalize on the growing demand for these products in the international market and earn foreign exchange for the country. In contrast, Pakistan's HS 2207 (ethyl alcohol) is considered an "*Underachiever*" in MPM. This indicates that this product category has not fully leveraged its growth potential in international trade. This underlines the necessity for enhanced competitiveness and export performance of ethyl alcohol to better exploit market opportunities.

Moreover, the export shares of Pakistan's HS 1701 (table sugar) and HS 1703 (molasses) declined from 2013 to 2022, placing them in the "*Declining Sectors*" category. A market share decline in table sugar is common among major sugar-producing countries (Appendix I). This can be attributed to increased global competition for table sugar exports. However, this may be a good move for Pakistan, and for other leading sugar-producing countries. This could be considered a shift from exporting raw sugar—a low value-added product with a non-expanding market—to value-added products such as HS 1704 (sugar confectionery) and HS 2207 (ethyl alcohol).

Pakistan's export portfolio shows a heavy concentration in the textile and food sectors. In 2022, four out of the top five exported products were from the textile sector, and one was from the food sector. Their exports account for 38% of the country's total merchandise exports. These products are characterized by low value addition and high international competition. Furthermore, MPM analysis shows that global markets for traditional products such as linens and garments were stagnant from 2013 to 2022 (Appendix II). Hence, they are unable to obtain greater foreign exchange for Pakistan, especially as the country faces a huge trade deficit. The situation underscores the urgent need for export diversification, which could be achieved through sugar industry products such as HS 1704 (sugar confectionery), HS 1702 (other sugars), and HS 2207 (ethyl alcohol) because the international markets for these products are expanding.

VI. Conclusion

This study demonstrated the competitiveness of Pakistan's sugar industry products in international export markets from 2013 to 2022 using MPM. Pakistan's exports, especially HS 1704 (sugar confectionery) and HS 1702 (other sugars), are well positioned in global trade. However, exports of HS 2207 (ethyl alcohol) require improvement to enhance its potential in the international market.

Four out of Pakistan's five top exported products show stagnant growth in the international market, highlighting the need for export diversification. In contrast, three out of five sugar-related products exhibit increasing growth potential, suggesting parallel export diversification opportunities for the country. When compared to the world's leading sugar

producers, Pakistan's sugar products demonstrate slightly better competitiveness, particularly in HS 1702 (other sugars) and HS 1704 (sugar confectionery). This underscores the strength of these products and their ability to compete with major sugar-producing countries in the world.

Addressing demand-side barriers through market liberalization and fostering stronger connections between the sugar industry and exporters of value-added sugar products, such as HS 1704 (sugar confectionery) and HS 2207 (ethyl alcohol), could further enhance sugar product exports and boost foreign exchange for Pakistan.

[Notes]

1) Figures are calculated by the authors based on ITC's Trade Map data
2) Figures are calculated by the authors based on ITC's Trade Map data
3) Figures are calculated by the authors based on ITC's Trade Map data
4) HS 1704 is a sugar confectionery, which is a value-added product using sugar produced from the sugar industry. More than 50% of the sugar produced in Pakistan is used for sugar confectionery, bakery and beverages (USDA, 2023). Therefore, HS 1704 has been taken as a sugar industry product and its exports are taken as exports of sugar industry products.
5) Adopted from Ashadullah, (2021)

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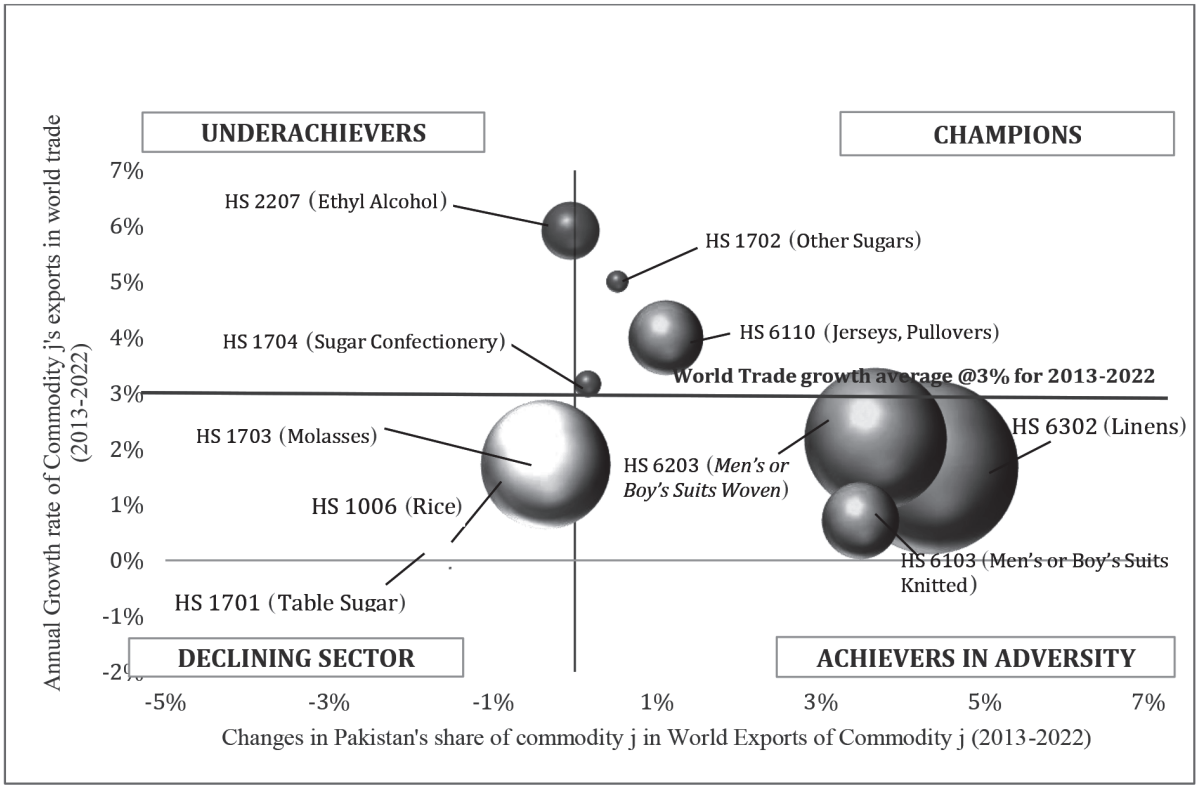
Appendix I-Market positioning of sugar products of Pakistan viz a viz major sugar-producing countries (2013 to 2022)

Country	Particulars	HS 1701	HS 1702	HS 1703	HS 1704	HS 2207
Brazil	Changes in Brazil's Share in World Trade	−16.27%	0.18%	0.003%	0%	−9.59%
	Average Annual Growth	−0.13%	5.01%	1.964%	3%	5.91%
	Export Values (USD in Million)	9,644.808	20.228	0.061	169.049	1,336.882
	MPM Category	Declining Sector	Champions	Achievers in Adversity	Underachiever	Underachiever
India	Changes in India's Share in World Trade	−0.08%	0.14%	18.25%	0.48%	−1.59%
	Average Annual Growth	−0.13%	5.01%	1.96%	3.17%	5.91%
	Export Values (USD in Million)	4,016.57	109.83	195.66	145.03	91.00
	MPM Category	Declining Sector	Champions	Achievers in Adversity	Champions	Underachiever
Thailand	Changes in Thailand's Share in World Trade	−0.72%	4.05%	−3.70%	−0.38%	−0.80%
	Average Annual Growth	−0.13%	5.01%	1.96%	3.17%	5.91%
	Export Values (USD in Million)	2,109.54	345.02	32.98	164.58	9.35
	MPM Category	Declining Sector	Champions	Declining Sector	Underachiever	Underachiever
China	Changes in China's Share in World Trade	0.19%	0.40%	−1.13%	2.76%	−0.39%
	Average Annual Growth	−0.13%	5.01%	1.96%	3.17%	5.91%
	Export Values (USD in Million)	84.85	869.85	0.12	1,109.86	94.37
	MPM Category	Declining Sector	Champions	Declining Sector	Champions	Underachiever
Pakistan	Changes in Pakistan's Share in World Trade	−1.53%	0.52%	−0.30%	0.15%	−0.05%
	Average Annual Growth	−0.13%	5.01%	1.96%	3.17%	5.91%
	Export Values (USD in Million)	0.53	63.21	17.44	92.01	446.08
	MPM Category	Declining Sector	Champions	Declining Sector	Champions	Underachiever

Source: Authors' calculations based on export data obtained at 4-digit HS code from the ITC Trade Map Database

Notes: Brazil, India, Thailand, China and Pakistan are the five largest cane sugar producing countries globally (PSMA, 2023). The market positioning of the sugar sector of these countries from 2013 to 2022 indicates that all five countries are in the "*Declining sector*" category of MPM for HS 1701 (table sugar) and in the "*Champions*" category of MPM for HS 1702 (other sugars). Hence, international trade in HS 1701 (table sugar) is shrinking, while international trade in HS 1702 (other sugars) is expanding. Moreover, major sugar players are correctly focusing on low exports such as HS 1701 (table sugar) and more exports such as HS 1702 (other sugars). The global market for HS 1703 (molasses) is also shrinking in the world for the 2013–2023 in three countries (i.e., Thailand, China, and Pakistan), which have low trade growth in this sector. Conversely, China and India have high trade in this sector. However, two categories, HS 1704 (sugar confectionery) and HS 2207 (ethyl alcohol), show a growing pattern in the international market, but countries have varying responses to them. India, China, and Pakistan are in the "*Champions*" category for HS 1704 while Brazil and Thailand are in "*Underachievers*" category. Finally, for HS 2207 (ethyl alcohol), all major exporters are in "*Underachievers*" category. Therefore, they have less value addition in this category of product as compared to other sugar-producing countries that produce sugar from sugar beet.

Appendix II-MPM of Pakistan's sugar products besides Pakistan's top five exported products during 2022



Note: The 3% growth rate of the global trade average is the authors' calculation based on ITC, trade map data. The bubble size indicates the US$ value of exports in 2022 based on the three-year moving average. Pakistan's top five exported products in 2022 were HS 6302, bedlinen, table linen, toilet linen, and kitchen linen of all types of textile materials…. (*Linens*); HS 6203, men's or boys' suits, ensembles, jackets, blazers, trousers, bib and brace overalls, breeches; (*Men's or Boy's woven Suits*); HS 1006, rice; HS 6103, men's or boys' suits, ensembles, jackets, blazers, trousers, bib and brace overalls, breeches; (*Men's or Boy's Knitted Suits*); and HS 6110, jerseys, pullovers, cardigans, waistcoats, and similar articles, knitted or crocheted excluded (*Jerseys, Pullovers*). Four out of five products are in the stagnant category of MPM, whereas three out of five products of the sugar category are in the growing category of MPM, thereby offering an alternate opportunity for export diversification by Pakistan.