Colegio de Postgraduados

Competitiveness indicators of Mexican bananas in the international market

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ABSTRACT

Objective: To analyze the variables and indicators of banana trade in the international market.

Design/Methodology/Approach: The revealed comparative advantage index of exports (RCAIE), the revealed comparative advantage index (RCAI), and the normalized revealed comparative advantage index (NRCAI) were used to analyze the competitiveness of Mexican bananas from 1994 to 2021.

Results: Mexico is one of the main banana exporters worldwide. Its main export destinations are the USA and Japan which consumed 84% and 15% of the Mexican production, respectively. The RCAI recorded positive values, showing that Mexican banana exports are competitive in the international market. This product is competitive in the American and Japanese markets and is more stable in the former. The >0 RCAIE confirmed that Mexico is a competitive country and one of the main banana exporters of the world.

Study Limitations/Implications: Competitiveness was analyzed based on a databases query from international organizations. These export databases have a delay of up to 2-3 years and part of the data showed significant differences.

Findings/Conclusions: Mexico is a competitive banana exporter worldwide. Based on the RCAI and NRCAI, the American and Japanese markets are the most competitive. However, Mexico exports a lower banana volume to Japan than to the USA.

Keywords: Exports, revealed comparative advantage index of exports, revealed comparative advantage index, normalized revealed comparative advantage index.

Citation: Ramírez-Padrón, L. C., Caamal-Cauich, I., & Pat-Fernández, V. G. (2025). Competitiveness indicators of Mexican bananas in the international market. *Agro Productividad*. https://doi.org/10.32854/wgh1nj22

Academic Editor: Jorge Cadena Iñiguez
Associate Editor: Dra. Lucero del Mar Ruiz Posadas
Guest Editor: Daniel Alejandro Cadena Zamudio

Received: July 05, 2024.
Accepted: March 12, 2025.
Published on-line: April XX, 2025.

Agro Productividad, 18(3). March. 2025. pp: 183-189.

INTRODUCTION

Bananas are grown in almost all the tropical regions of the world. More than 1,000 banana varieties are produced and consumed worldwide (Redagrícola, 2021). They are mainly produced in developing countries, where they are considered as a strategic crop for food security. They are the most exported and consumed fruit in the globalized world and are a source of employment and income in rural areas (Martínez and Rey, 2021).

Bananas are highly valued as a result of their pleasant flavor and high nutritional value. They are a source of potassium, iron, and vitamins A, B6, K, C, and D, benefiting human bones and muscles. In addition, bananas are available all year round (García *et al.*, 2013; Blasco and Gómez, 2014).

In 2021, the worldwide banana production reached 124,978,578 t. Nineteen-sixty-seven percent was exported, while the rest was used for self-consumption. India, China, Indonesia, Brazil, and Ecuador are the main banana producers and account for >50% of the worldwide production. Mexico is the twelfth banana producer worldwide and its production reached 2,405,891.33 t (FAOSTAT, 2024). Latin America and the Caribbean are the main regional exporters (15.9 million t) of the world (FAO, 2022). In 2021, Mexico was the tenth banana exporter (489,522.34 t), accounting for 1.99% of the total worldwide volume (FAOSTAT, 2024).

The competitiveness of a country, industry, or company is linked to the productivity increase, resulting from the technological development that allows them to reduce costs, to obtain higher profit, and to increase their share in both the domestic and international markets (Zamora and Ortiz, 2021). The implementation of technology, infrastructure, and sustained development should promote the economy of a country vis-à-vis other regions (Daza, 2014). In the agrifood chain, competitivity should be made clear by a strengthened production of assets and services aimed to constantly maintain, increase, and improve its share in the international market (Luquez *et al.*, 2022). In turn, it should specialize in the production and commercialization of the said asset, reducing production costs (Zavala *et al.*, 2023).

A statistical analysis about the banana commercialization should establish the advantages of the product in the international market. This analysis should include total exports, in order to determine the international share of the said country or product. Therefore, the objective of this study was to analyze the competitiveness of Mexican bananas from 1994 to 2021. After the North American Free Trade Agreement (NAFTA) came into force in 1994, Mexico became a platform for the exportation of several products to international markets. To establish the competitiveness performance of Mexican bananas in the main import markets, the revealed comparative advantage index (RCAI), the revealed comparative advantage index of exports (RCAIE), and the normalized revealed comparative advantage index (NRCAI) were determined.

MATERIALS AND METHODS

The statistical data used in this study for the 1994-2021 period were collected from the international databases of the Food and Agriculture Organization Statistics (FAOSTAT) and the Foreign Agricultural Service of the United States Department of Agriculture (FAS-USDA). The following variables about the commercialization of Mexican bananas were analyzed: value of the Mexican banana exports in the international markets; total agricultural exports from Mexico to the international markets; value of the Mexican banana exports to the USA; total agricultural exports from Mexico to the USA; value of the Mexican banana exports to Japan; and total agricultural exports from Mexico to Japan. Subsequently, the revealed comparative advantage index of exports (RCAIE), the revealed comparative advantage index (RCAI), and the normalized revealed comparative advantage index (NRCAI) of the Mexican bananas in the American and Japanese markets were calculated. The objective was to establish the competitiveness of Mexican bananas in the main import markets worldwide.

Calculation method

The revealed comparative advantage (RCA) indicates the advantages of the total exports of a given country and its share in the rest of the world. In addition, the value of the index shows the existence of a comparative or specialized advantage in the exports of a certain product (Ávila and González, 2012). The calculation method was:

$$RCAIE = \left(\left(X_a^i / X_n^i\right) / \left(X_a^r / X_n^r\right)\right)$$

Where: *RCAIE*=revealed comparative advantage index of exports of product *a* in the country; X_a^i =value of the exports of product *a* in the country; X_n^i =value of total exports without product *a* in the country; X_a^r = value of the exports of product *a* in the international market (without country *i*); X_n^r =value of the total exports (without the product) in the international markets (without country *i*). $A>1$ or positive *RCAIE* indicates a revealed comparative advantage.

The revealed comparative advantage index (RCAI) developed by Balassa analyzes the comparative advantages or disadvantages of a country, regarding the commercial exchange with its partners. It not only measures the importance of a given product as part of the exportations from one market to another, but it also indicates its competitiveness in the main import markets (Durán and Álvarez, 2008). The following formula is used to calculate RCAI:

$$RCAI_{ij}^k = \left(X_{ij}^k / XT_{ij}\right) / \left(X_{iw}^k / XT_{iw}\right)$$

Where: $RCAI_{ij}^k$ =revealed comparative advantage index of product *k* from country *i* to country *j*; X_{ij}^k =exports of product *k* from country *i* to country *j*; XT_{ij} =total exports from country *i* to country *j*; X_{iw}^k =exports of product *k* from country *i* to the world (*w*); XT_{iw} =total exports from country *i* to the world (*w*). $A>0$ *RCAI* indicates a comparative advantage of the country or product, showing that the country is competitive in international markets. $A<0$ indicates a comparative disadvantage of the country or the product, showing that the product is not competitive in international markets (Caamal *et al.*, 2017).

The normalized revealed comparative advantage index (NRCAI) improves the analysis of the RCAI. The index is normalized to a maximum of 1 and a minimum of −1, using the following formula:

$$NRCAI = RCAI - 1 / RCAI + 1 \quad \text{(Durán and Álvarez, 2008)}$$

Where: *NRCAI*=normalized revealed comparative advantage index and *RCAI*=revealed comparative advantage index. Results between +0.33 and +1 show a comparative advantage of the country and a favorable balance of trade regarding the analyzed country. Results

between −0.33 and −1 show a comparative disadvantage of the country. Values between −0.33 and +0.33 show a trend to exchange products within the same technological group (intra-industry trade).

RESULTS AND DISCUSSION

The value of Mexican banana exports during the 1994-2021 period showed a growing trend, increasing from US$80,418,000 in 1994 to US$242,792,000 in 2021. During the same period, the volume of exports increased by 135.42%. In 2021, exports accounted for 20.34% of the total domestic production, reaching a share of 1.9% in the international market (FAOSTAT, 2024).

The >0 RCAIE of Mexico during the 1994-2021 period indicated a revealed comparative advantage, showing the competitiveness of Mexico in the banana global market. Although the RCAI values recorded a slight decrease (from 0.2168 in 1994 to 0.1165 in 2021), they remained above 0 (Table 1). Consequently, the competitive advantage of Mexican banana exports was stable during the analyzed period.

The USA was the main destination of the Mexican exports (412,193.58 t) in 2021, followed by Japan (73,533.41 t) (FAOSTAT 2024). Mexico also exported bananas to the United Kingdom, the Netherlands, Canada, and Germany. Approximately 84% of the Mexican banana exports are sold to the USA. The production of this country (4,635,392.21 t in 2021) is not enough to supply its domestic market; consequently, the USA imports that volume of bananas from Mexico to meet its customer demand. Mexico exports 15% of its banana production to Japan and the remaining 1% is sold to the United Kingdom, the Netherlands, Canada, and Germany.

The USA and Japan markets are the main destinations of Mexican bananas and, consequently, they were analyzed using different total agricultural and banana exports data to determine RCAI and NRCAI (Table 1).

The USA is the main worldwide importer of bananas, which makes it an excellent market for the Mexican production. The RCAIE of Balassa for Mexican bananas sold in the American market during the 1994-2021 period recorded a constant performance,

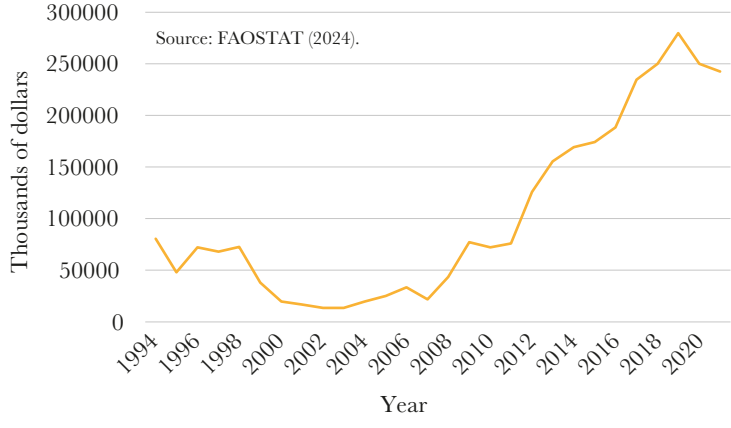

Figure 1. Performance of Mexican exports (1994-2021).

Table 1. Competitiveness indicators of bananas (Mexico to the world and Mexico and its main import markets - 1994-2021).

Year	VRE Mexico-World	IVCR Mexico-USA	IVCRN Mexico-USA	IVCR Mexico-Japan	IVCRN Mexico-Japan
1994	0.2168	0.9912	−0.0044	0.2413	−0.6112
1995	0.1804	0.7556	−0.1392	0.4270	−0.4015
1996	0.1699	0.8129	−0.1032	0.0000	−1.0000
1997	0.1528	0.5925	−0.2559	0.4939	−0.3388
1998	0.1251	0.4440	−0.3850	1.1743	0.0802
1999	0.0677	0.5054	−0.3286	0.0209	−0.9591
2000	0.0362	0.8127	−0.1033	0.0000	−1.0000
2001	0.0270	1.0632	0.0306	0.0000	−1.0000
2002	0.0211	1.1668	0.0770	1.8320	0.2938
2003	0.0198	1.0508	0.0247	2.8327	0.4782
2004	0.0256	0.7603	−0.1362	0.0307	−0.9404
2005	0.0268	0.5813	−0.2648	1.3978	0.1659
2006	0.0334	0.6879	−0.1849	1.7381	0.2696
2007	0.0210	1.0750	0.0361	3.5116	0.5567
2008	0.0372	1.1604	0.0743	1.7569	0.2746
2009	0.0650	0.8925	−0.0568	0.9075	−0.0485
2010	0.0642	1.0264	0.0130	0.5994	−0.2505
2011	0.0578	1.0957	0.0456	0.5127	−0.3221
2012	0.0992	1.0220	0.0109	0.2591	−0.5885
2013	0.1171	0.8289	−0.0935	0.2110	−0.6515
2014	0.1118	0.8638	−0.0731	0.2216	−0.6372
2015	0.1248	1.1481	0.0689	0.2854	−0.5559
2016	0.1235	0.8930	−0.0565	1.0468	0.0229
2017	0.1371	0.8466	−0.0831	2.2171	0.3783
2018	0.1396	0.9152	−0.0443	1.8692	0.3029
2019	0.1409	0.9250	−0.0390	3.9537	0.5963
2020	0.1405	0.8308	−0.0924	6.3661	0.7285
2021	0.1165	1.1029	0.0489	6.5519	0.7352

Source: FAOSTAT (2024); FAS-USDA (2024).

positive value, and few changes. The RCAI reached 0.9912 and 1.1029 in 1994 and 2021, respectively, showing a comparative advantage for Mexican banana exports to the USA. Therefore, this is the most stable market for this Mexican product. The highest RCAI values were recorded in 2002, 2008, and 2015, reaching 1.1668, 1.1604, and 1.1481, respectively (Table 1). The mean RCAI value during the analyzed period was 0.8875. Consequently, Mexican bananas are competitive and have a remarkable comparative advantage regarding the exports to the American market, reaching an export value of US$204,359,000 (FAOSTAT, 2024).

The NRCAI values of the Mexican bananas exported to the USA recorded −0.33 and +0.33. Therefore, this market showed an intra-industry trade or product exchange within the same technological group (Table 1).

The RCAI of Mexican bananas exported to Japan recorded variations throughout the studied period: 0.2413 in 1994 and 6.5519 in 2021 (Table 1). Mexican bananas have increased their share in this competitive market. Nevertheless, the export volume of this market is lower than the export volume of the USA. Nevertheless, Japan is one of the main destinations of Mexican banana exports and has comparative advantages, as a consequence of the increased exports from 2018 to 2021. Therefore, the Japanese market is increasingly attractive to Mexican banana exports. The NRCAI of bananas exported to the Japanese market recorded ups and downs throughout the studied period: it reached values ≈−1 in 1996, 2000, 2001, and 2004. Consequently, this market had a comparative disadvantage. In addition, it recorded values between −0.33 and +0.33 for most of the studied period, indicating an intra-industry trade (Durán and Álvarez, 2008). From 2019 to 2021, the NRCAI values increased from 0.59 to 0.73, suggesting a revealed comparative advantage for banana exports from 2019 (Table 1).

The data obtained showed that Mexico has the potential to be a competitive producer and exporters of bananas. However, Mexico is strongly dependent on the American market, because the USA is the main destination of its exports. Therefore, promoting the search for new market niches of this product is recommended.

CONCLUSIONS

The positive and growing values of the RCAIE and the RCAI of Mexican bananas showed that Mexico is competitive in the international market. Consequently, Mexico is one of the main worldwide exporters of bananas. Banana exports recorded a higher comparative advantage in both the American and Japanese markets. Furthermore, banana exports are competitive and increasing. The USA is a more stable market for the product, where Mexican banana exports are more competitive.

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