



An Assessment of the Adaptability of Iran's Pistachio and Dates Exports to Global Demand Patterns

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Article Info	ABSTRACT
Article type: Research Article	Pistachios and dates are valuable commodities in Iran's non-oil trade and play a crucial role in achieving sustainable development. Therefore, analyzing the export performance of these products is essential for enhancing Iran's competitiveness in global markets. This study employs the Constant Market Share (CMS) model and decomposes changes in export volumes into scale, competitiveness, and second-order effects, assessing Iran's capacity to adjust its export structure of pistachios and dates in response to changes in global demand patterns. Export data were extracted from the International Trade Centre (ITC) for the period 2013–2022. The results show that Iran's pistachio exports experienced a significant decline in global market share (from 39% in 2013 to 17% in 2022), accompanied by a negative competitiveness effect. In contrast, dates exports exhibited an upward trend with stable and growing market shares (from 14% to 18%). The CMS decomposition further revealed that the second-order effect was generally positive, reflecting Iran's relative ability to adapt to shifts in global demand. The findings underscore that improving product quality, international branding, and the utilization of trade agreements are key strategies for improving competitiveness and alignment with demand dynamics. Consequently, reinforcing competitive policies and targeted marketing for pistachio exports, along with continued investment in competitiveness and adaptability for dates exports, can contribute to improve Iran's overall export performance.
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Introduction

International trade, particularly the export of goods and services, is widely recognized as a major driver of economic development and growth. For developing economies, including Iran, the expansion of non-oil exports has become increasingly important due to the limitations and volatility of oil revenues, as well as the need for sustainable long-term economic development (Hosseini et al., 2014). Within this context, agricultural exports account for approximately 7% of Iran's non-oil exports and contribute significantly to food security and foreign exchange earnings (Wang & Liu, 2023). Despite the overall growth of Iran's agricultural exports in recent years, instability in export composition and fluctuations in international market shares have created challenges for foreign exchange stability and the sustainable development of the agricultural sector (Abdelhadi et al., 2019).

Export instability constitutes a significant obstacle to economic development because it can reduce foreign exchange earnings and weaken economic growth prospects (Abdelhadi et al., 2019). Previous studies have identified several factors affecting export stability, including political relations between trading partners (Du et al., 2017), sanctions and trade barriers (Fetzer & Schwartz, 2021), and fluctuations in agricultural commodity prices (Carter & Steinbach, 2020; Cowley, 2020).

Furthermore, diversification of export destinations and participation in trade agreements have been shown to enhance export sustainability, whereas limited diversification increases vulnerability to external shocks (Zhou & Fen, 2023). Product-specific characteristics such as perishability, together with institutional quality and export infrastructure, also influence the continuity of trade relationships (Beestermöller et al., 2018; Peterson et al., 2018; Phiri et al., 2021; Qian et al., 2021). In addition, Zhou and Fen (2023) highlight the importance of dynamic trade analyses for identifying the determinants of export persistence. Consequently, research on agricultural trade and marketing is essential for assessing the export potential and international competitiveness of agricultural commodities (Mehrparvar et al., 2013). In this regard, pistachios and dates accounted for 17.6% and 4.3% of the total value of Iran's agricultural exports in 2022, ranking first and third among agricultural export commodities, respectively (United Nations, 2025).

Growing concerns regarding excessive sugar consumption and its implications for public health have encouraged policy initiatives aimed at reducing the use of artificial sweeteners. As a result, demand for natural and plant-based sweetening alternatives has increased in many food markets. Date-derived products, including date syrup and date powder, have emerged as promising alternatives and have attracted growing commercial interest (Mesbahi et al., 2016). Concurrently, increasing investment in this segment suggests that plant-based sweeteners are becoming integrated into mainstream food and beverage markets rather than remaining confined to niche health-oriented products. This trend is particularly evident in the Middle East, one of the largest consumer markets for date-based products. Such developments may create export opportunities for countries with a comparative advantage in date production, including Iran, which is geographically close to major regional markets such as the United Arab Emirates (Mordor Intelligence, 2025; Hajalibaklo et al., 2025). Notably, the UAE imports approximately 160000 tons of dates annually and ranks as the world's second-largest importer of dates (United Nations, 2025).

Similarly, increasing health awareness and changing dietary preferences have stimulated demand for plant-based protein sources. Pistachios have gained attention owing to their protein content, antioxidant properties, and suitability for incorporation into value-added food products (Mateos et al., 2022). In addition to their nutritional characteristics, pistachios possess sensory attributes, including a distinctive flavor and natural green color, that have enhanced their use in innovative food products. Their growing application in products such as energy bars, oat-based yogurts, and ready-to-drink beverages reflects expanding commercial demand and increasing integration into the plant-based food industry. From a market perspective, the growth of plant-based protein consumption in Asian economies, particularly China and India, may create additional opportunities for pistachio-exporting countries (Mordor Intelligence, 2025). Consequently, the expansion of global demand for

both pistachios and dates may provide opportunities for Iran to strengthen its position in international markets if its export structure adapts effectively to evolving demand conditions.

The central research question of this study is whether Iran, as a major producer and exporter in global pistachio and date markets (World Bank, 2022), has successfully aligned its export structure with changing patterns of international demand. To address this question, the study analyzes the export performance of Iranian pistachios and dates, with particular emphasis on market-share dynamics and the factors underlying changes in international competitiveness during the period 2013–2022 using the Constant Market Share (CMS) model. This issue represents an important gap in the existing literature, as limited evidence is available on the extent to which Iran's export structure has adapted to evolving global demand conditions for these two strategically important agricultural commodities.

In 2022, Iran produced approximately 1,596,790 tons of dates on 249,580 hectares of cultivated land (Ministry of Agricultural Jihad, 2024), but exported only 339,569 tons (United Nations, 2025), leaving a difference of approximately 1,257,221 tons between production and exports. By comparison, Saudi Arabia, one of Iran's principal competitors, produced 1,610,731 tons of dates (FAO, 2022) and exported 1,868,297 tons (United Nations, 2025), resulting in a substantially smaller difference of 257,566 tons. This comparison suggests stronger export orientation and greater capacity to convert production into export revenues. Differences are also evident in consumption patterns. Saudi Arabia records the highest per capita date consumption globally at 34.86 kg, whereas Iran ranks sixth with 12.03 kg per capita (FAO, 2022). Although both countries accounting for a similar share of the global date market—approximately 18% for Saudi Arabia and 17% for Iran—significant disparities exist in key destination markets. In the UAE, the world's second-largest date importer, Saudi Arabia holds a market share of 53%, compared with only 14% for Iran (United Nations, 2025).

A similar pattern can be observed in the pistachio sector. Although Iran cultivated 559,749 hectares of pistachio orchards (Ministry of Agricultural Jihad, 2024) and produced 287,339 tons in 2022, only 52,612 tons were exported (United Nations, 2025), accounting for approximately 16% of global pistachio exports. In contrast, the United States, the world's leading pistachio producer and exporter, accounted for approximately 65% of global exports and exported 217,233 tons from a production volume of 400,070 tons (FAO, 2025; United Nations, 2025). Differences in market penetration are also apparent. In China, the largest pistachio-importing market, the United States controls approximately 75% of imports, whereas Iran accounts for about 22% (United Nations, 2025). These observations raise an important question: why does Iran maintain a relatively limited share of global pistachio and date markets despite its extensive cultivated area, substantial production capacity, and comparatively modest domestic consumption levels?

Fig. 1 presents the export trends of Iranian pistachios and dates during 2013–2022. According to Fig. 1-a, pistachio export value peaked approximately USD 1.129 billion in 2020, followed by a declining and volatile trend. As shown in Fig. 1-b, export volume also decreased substantially after peaking at 181,000 tons in 2020, while export prices remained comparatively stable, fluctuating between approximately USD 8,000 per ton in 2013 and USD 6,000 per ton in 2020. Fig. 1-e further indicates that China, accounting for 12% of total exports, was the largest destination market for Iranian pistachios during the study period.

By contrast, Fig. 1-c and 1-d indicate that date exports followed a generally upward trajectory. Export value increased from USD 192 million in 2013 to USD 290 million in 2022, largely driven by growth in export volume from 146 thousand tons to 339,000 tons. During the same period, however, the average export price declined from USD 1,312 per ton to USD 852 per ton. The highest export value, approximately USD 338 million, was recorded in 2018, coinciding with temporary increases in both export volume and export prices. According to Fig. 1-f, India accounted for 16% of Iranian date exports and represented the largest destination market.

Overall, the export patterns observed for both commodities suggest weaknesses in export

marketing and pricing strategies. If these trends persist in the coming years without Iran effectively leveraging its considerable production potential, the country may gradually lose its prominent position in global pistachio and date markets.

To obtain a more comprehensive understanding of the research conducted on dates and pistachios in Iran, previous studies are briefly reviewed in Table 1 (Appendix).

Since its introduction by Tyszynski (1951) and subsequent refinements by Leamer and Stern (1970) and Richardson (1971), the Constant Market Share (CMS) model has become one of the most widely used frameworks for analyzing export dynamics and changes in international competitiveness. The CMS approach enables the decomposition of export growth into several components, thereby providing insights into the extent to which export performance is driven by global market expansion, export competitiveness, or structural changes in market distribution. Subsequent studies, including Banerji (1974), Brakman and Jepma (1987) and Lohrmann (2000), further developed and applied the model to both developed and developing economies, highlighting the importance of commodity composition, regional specialization, and competitiveness in shaping export performance.

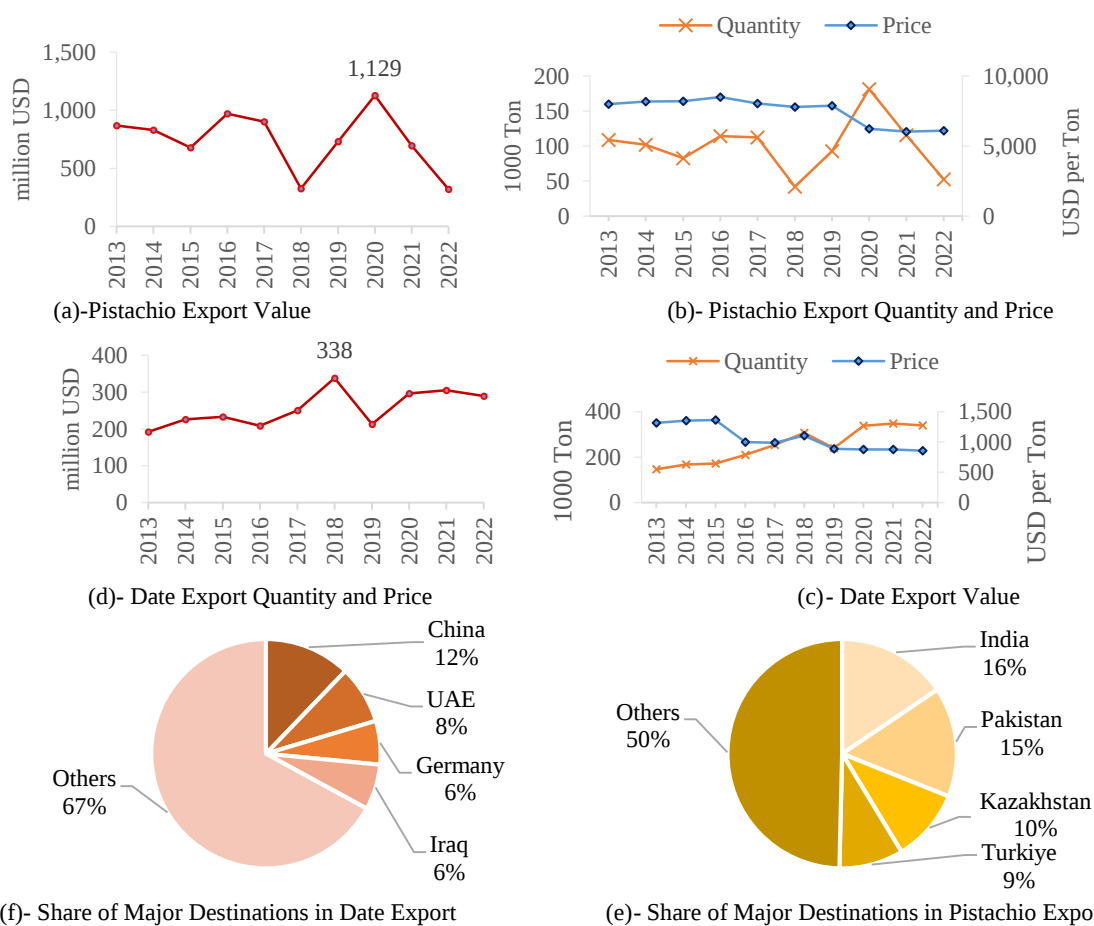


Fig. 1- Export Value, Quantity and Price of Iran's Pistachios and Dates, and the Average Market Share in Target Markets (2013–2022)

(Source: Author's own elaboration based on ITC data, 2025)

More recently, the CMS framework has been extensively employed to evaluate trade performance across a wide range of countries and sectors, including China (Wang et al., 2017; Sun & Zhang, 2021; Fu & Tang, 2024; Kong et al., 2025), European countries (Capobianco-Oriat, 2021; Zdrahal et al., 2023), and Iran (Feizabadi et al., 2009). Collectively, these studies demonstrate that the scale effect,

competitiveness effect, and second-order effect play critical roles in determining export performance and international market positioning. Unlike gravity models and comparative advantage indicators, which primarily identify determinants of trade flows or export specialization, the CMS framework provides a dynamic decomposition of export growth and offers a more direct assessment of whether export performance is aligned with changes in global demand patterns and market structures. Despite its widespread application, most CMS-based studies have focused primarily on aggregate export performance and competitiveness-related factors, while paying relatively limited attention to the extent to which export structures adapt to evolving demand conditions across destination markets. This gap is particularly relevant for agricultural commodities such as pistachios and dates, for which Iran is among the world's leading producers and exporters.

Similarly, previous studies on pistachio and date exports have largely concentrated on comparative advantage assessments, competitiveness indicators, export determinants and marketing strategies using approaches such as gravity models, ARDL models, Delphi techniques, SWOT and AHP. Although these studies provide valuable insights into the factors influencing export performance, they offer limited evidence on the dynamic evolution of export structures and the degree to which exports are aligned with changing patterns of international demand across destination markets. Furthermore, many existing studies evaluate export development through aggregate indicators without decomposing export performance into its underlying sources or examining the extent to which exporters have successfully adapted to shifts in global market conditions. Consequently, there remains a significant research gap regarding the mechanisms through which market growth, competitiveness, and structural adaptation contribute to the export performance of Iranian pistachios and dates. Addressing this gap is particularly important given the strategic role of these commodities in Iran's agricultural exports and the rapid transformation of consumer preferences and demand structures in international food markets. Therefore, by applying the CMS framework to pistachio and date exports during the period 2013–2022, this study seeks to provide a comprehensive assessment of export performance and to identify the underlying sources of market-share changes in global markets.

Materials and Methods

This study adopts a conceptual framework (Fig. 2) that links key factors identified in the literature—including product quality, branding, consumer preferences for natural and organic food products, non-tariff barriers and trade agreements—to the three principal components of the CMS model. Although these factors are not directly incorporated into the empirical CMS estimation, previous studies suggest that they may influence export outcomes that are subsequently reflected in the model's scale effect (SE), competitiveness effect (CE) and second-order effect (SOE). Within this framework, the expansion of global demand and the growing consumer preference for natural and organic food products may contribute to changes in the scale effect by influencing overall market growth. Likewise, product quality, branding, and trade agreements may enhance exporters' competitive positions and thereby be reflected in the competitiveness effect. The ability of exporters to satisfy destination-market requirements, comply with quality standards, and respond to changing consumer preferences may also influence the second-order effect, which captures the interaction between competitiveness and structural market changes.

Previous studies have emphasized the importance of product quality in strengthening export performance (Pishbahar *et al.*, 2013; Salmani *et al.*, 2021; Soleymanipour *et al.*, 2023). Similarly, branding has been identified as an important mechanism for enhancing product differentiation, strengthening market presence, and improving exporters' responsiveness to changing consumer preferences (Kazemiyeh *et al.*, 2025). Trade agreements and preferential trade arrangements have also been shown to facilitate market access and support export expansion (Karacan & Ceylan, 2020; Rafiee *et al.*, 2021). Conversely, non-tariff barriers may constrain exporters' ability to respond

effectively to evolving market requirements and reduce their competitiveness in destination markets (Pishbahar et al., 2013; Khodaverdizadeh et al., 2025). Ultimately, the combined influence of these factors may be reflected in the magnitude and direction of the three CMS components, which collectively determine export performance and market-share changes (Wang et al., 2017). Accordingly, strategies aimed at improving product quality, strengthening branding activities, expanding trade agreements, reducing trade barriers and aligning exports with the growing global demand for natural and healthy food products may contribute to stronger export performance. Through their influence on competitiveness, market adaptation, and responsiveness to evolving demand conditions, these factors may help strengthen the international market position of Iranian pistachio and date exports.

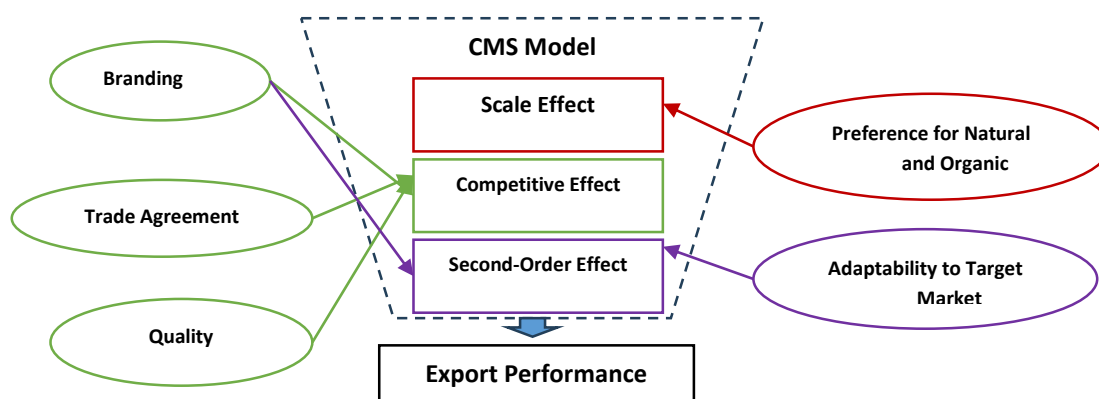


Fig. 2- Factors Influencing Each Component of Export Changes to Target Markets

CMS Model

The Constant Market Share (CMS) model is a standard analytical framework in international trade used to decompose changes in export performance into the effects of global market expansion and competitiveness. The central premise of the model is to disentangle whether variations in exports are driven by changes in world import demand or by shifts in a country's market share (Tyszynski, 1951). Accordingly, export changes are attributed either to the scale effect (global demand expansion) or to the competitiveness effect (changes in market share) (Ahmadi-Esfahani, 2006). In this study, the CMS framework is applied to selected agricultural exports under the assumption of constant market shares. The model decomposes export growth into economically interpretable components, thereby identifying the structural sources of export performance (Tyszynski, 1951).

A key advantage of CMS is its identity-based structure, which avoids specification bias commonly associated with econometric models. Unlike regression-based approaches that rely on selected explanatory variables, CMS provides a comprehensive decomposition using only trade flow data (Wang et al., 2017).

Compared with gravity models, which primarily estimate determinants of trade flows, CMS focuses on decomposing export growth into scale and competitiveness components (Abdul Kamal et al., 2021). In contrast to survival analysis, which examines trade duration, CMS explains variation in export structure and market-share dynamics (Othman et al., 2022).

Importantly, export fluctuations are not equivalent to competitiveness, as they merely reflect changes in export volumes over time. CMS therefore provides a more structurally meaningful decomposition of export performance (Wang et al., 2017).

Following the second-level decomposition approach of Wang et al. (building on Jepma, 1986), Iranian pistachio and date exports are analyzed over successive two-year intervals. This allows decomposition into scale, competitiveness and structural adaptation effects.

The CMS framework decomposes export changes into three components including Scale Effect (SE), Competitiveness Effect (CE), and Second-Order Effect (SOE) (Wang et al., 2017). The scale effect captures the portion of export growth attributable solely to changes in world import demand, holding market share constant. It reflects the impact of global market expansion on export performance.

The competitiveness effect measures changes in a country's market share across destination markets, reflecting shifts in relative competitive performance. A declining market share indicates weakening competitiveness, even under expanding global demand.

The second-order effect captures the interaction between changes in market size and market share, reflecting the exporter's ability to adjust to heterogeneous demand growth across destination markets (Fagerberg & Sollie, 1987). A negative SOE indicates gains in slow-growing markets and losses in fast-growing markets (Ahmadi-Esfahani, 2006), while a positive SOE reflects effective adaptation to dynamic demand conditions.

The CMS model is formally specified as (Wang et al., 2017):

$$q = \sum_i q_j = \sum_i S_j Q_j \quad (1)$$

where q is total exports, S_j is exporter market share in destination j , and Q_j represents total imports of destination j .

Market share of destination j is defined as:

$$S_j = \frac{q_j}{Q_j} \quad (2)$$

Furthermore, based on Equation (3), which represents the export function q , total export volume is reformulated as a function of two independent variables, namely the export market share S_j and the total imports of the destination country from the world Q_j . This formulation constitutes the theoretical foundation for decomposing export changes into the scale effect, competitiveness effect, and second-order effect, and serves as the basis for empirical studies employing the CMS framework (Wang et al., 2017; Lee et al., 2023):

$$q = f(S_j, Q_j) \quad (3)$$

By applying differential analysis, the export function (q) is evaluated in the vicinity of the point S_j, Q_j , assuming that $(S_j + \Delta S_j, Q_j + \Delta Q_j)$ also remains within the same local neighborhood. Accordingly, changes in exports (Δq) between period t and the base period (0) are decomposed as shown in Equations (4)-(6) (Wang et al., 2017).

$$\Delta q = q^t - q^0 = f(S_j + \Delta S_j, Q_j + \Delta Q_j) - f(S_j, Q_j) \quad (4)$$

$$\Delta q = \sum_i (S_j + \Delta S_j)(Q_j + \Delta Q_j) - \sum_i S_j Q_j \quad (5)$$

$$\Delta q = \sum_i S_j \Delta Q_j + \sum_i \Delta S_j Q_j + \sum_i \Delta S_j \Delta Q_j = \sum_i SE_j + \sum_i CE_j + \sum_i SOE_j \quad (6)$$

In its final form, Equation (6), representing the improved CMS specification, demonstrates that changes in export volume can be decomposed into variations in market size and changes in the importing country's total imports from the world.

Equation (7) is identical to Equation (6), reformulated by incorporating time subscripts (Wang et al., 2017).

$$\Delta q = \sum_i S_j^0 \Delta Q_j + \sum_i \Delta S_j Q_j^0 + \sum_i \Delta S_j \Delta Q_j = \sum_i SE_j + \sum_i CE_j + \sum_i SOE_j \quad (7)$$

In this formulation, Δq denotes the change in the export volume of the exporting country. S_j^0 represents the exporter's initial market share in destination market j in the base year ($t = 0$), while ΔQ_j indicates the change in total imports of destination j . ΔS_j refers to the change in the exporter's market share in market j , and Q_j^0 represents the initial level of imports of destination j in the base year ($t = 0$).

The term $\sum_j S_j^0 \Delta Q_j$ corresponds to the scale effect, $\sum_j \Delta S_j Q_j^0$ represents the competitiveness effect and $\sum_j \Delta S_j \Delta Q_j$ captures the second-order effect. The subscript j denotes destination markets, while the superscript 0 indicates base-year values.

The dataset includes export quantity, value, and price for pistachios in shell (HS 080251) and dates (HS 080410), obtained from the ITC database (2025). Destination markets are aggregated and computations are performed using Microsoft Excel 2018.

Results and discussion

Tables 2 and 3 report global exports, Iranian exports, and Iran's market shares for pistachios and dates, together with CMS decomposition results for 2013–2022. Fig. 3 and 4 present export changes (Δq) and their decomposition into scale, competitiveness, and second-order effects across two-year intervals.

For pistachios, global exports increased from 276,141 tons in 2013 to 302,227 tons in 2022, whereas Iran's exports declined from 108,620 to 52,612 tons, reducing its global market share from 39% to 17%. Despite this long-term decline, Iran reached a peak market share of 57% in 2020, indicating substantial but volatile competitive capacity. However, the overall decline in market share to 17% in 2022 reveals the vulnerability and instability of this position in the face of competitive pressures. Export changes were negative in six years, with the largest contraction in 2018 (–70,260 tons relative to 2017), and the smallest expansion in 2016 (+31,370 tons). CMS results indicate that the competitiveness effect was predominantly negative over the period, suggesting persistent erosion of market share. By contrast, the second-order effect was positive in six years, reflecting partial adaptability to global demand dynamics. Structural breaks occurred in 2018 and 2020. In 2018, export contraction was driven by a negative competitiveness effect and a 23% decline in market share. In 2020, exports increased sharply (+88,789 tons), primarily due to a temporary improvement in competitiveness. Overall, the results indicate a lack of a stable competitive strategy. The decline in pistachio exports is mainly driven by persistent negative competitiveness effects, although positive SOE values suggest latent adaptive capacity. The observed volatility in market shares is likely associated with weaknesses in branding, export marketing, quality upgrading and international certification. These constraints have limited Iran's ability to fully benefit from expanding global demand, particularly in premium segments such as organic pistachios. Strengthening coordinated competitiveness strategies is therefore essential for translating production potential into sustained export performance.

As shown in Table 3 and Fig. 4, global date exports exhibited a pronounced upward trend over the period 2013–2022, increasing from approximately 1.04 million tons to 1.84 million tons. Iranian date exports followed a broadly similar pattern, demonstrating steady and continuous growth from

146,614 tons to 339,569 tons over the same period. As a result, Iran's share of the global date market increased from 14% to 18%, reflecting an overall strengthening and relatively stable position in international markets. The highest market share was recorded in 2020, when Iran accounted for 23% of global date exports, indicating substantial potential for further expansion in global markets.

Table 2 – Global and Iranian Total Exports and Iran's Share in Global Pistachio Exports to Major Destinations, and CMS Model Results (2013–2022)

Year	World Exports	Iran's Export	Iran's Global Market Share	Interannual Changes in Iran's Exports (Δq)	Interannual Changes in Iran's Export Share (ΔS)	Scale Effect		Competitive Effect		Second-Order Effect	
	(Ton)	(Ton)	(%)	(Ton)	(%)	(Ton)	Share (%)	(Ton)	Share (%)	(Ton)	Share (%)
2013	276141	108620	39	-	-	-	-	-	-	-	-
2014	272126	101657	37	-6963	-2	-1579	-22.68	-5463	-78.46	79	1.14
2015	230525	82718	36	-18939	-1	-15541	-82.06	-4012	-21.18	613	3.24
2016	268864	114088	42	31370	7	13757	43.85	15101	48.14	2512	8.01
2017	309620	112092	36	-1996	-6	17294	866.44	-16751	-839.22	-2539	-127.21
2018	312652	41832	13	-70260	-23	1098	1.56	-70666	-100.58	-692	-0.98
2019	384410	92516	24	50684	11	9601	18.94	33414	65.93	7669	15.13
2020	317297	181305	57	88789	33	-16152	-18.19	127138	143.19	-22197	-25.00
2021	382854	115557	30	-65748	-27	37460	56.97	-85535	-130.10	-17672	-26.88
2022	302227	52612	17	-62945	-13	-24336	-38.66	-48909	-77.70	10300	16.36

(Source: Author's own elaboration based on ITC data, 2025)

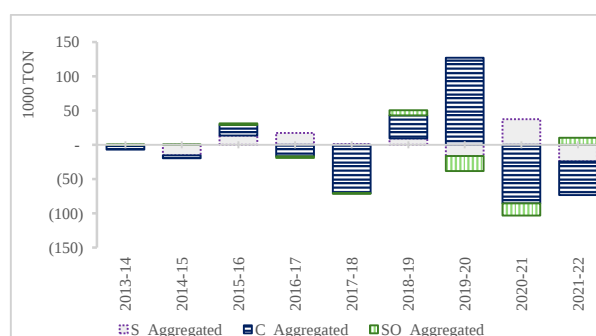


Fig. 3- Magnitudes of the Three CMS Effects on Changes in Iran's Pistachio Export Quantity (Δq) (2013–2022)

(Source: Author's own elaboration based on ITC data, 2025)

The CMS decomposition indicates that Iran's competitiveness performance, captured by the competitiveness effect, was positive in seven out of the ten examined years and constituted the primary driver of export expansion. Similarly, the second-order effect, reflecting the country's responsiveness to structural changes in global demand, was also positive in seven years, suggesting a relatively strong and timely adjustment to evolving market conditions. The two exceptions-export contractions in 2019 and 2022-were mainly driven by temporary negative competitiveness effects. In 2020, which recorded the largest absolute increase in exports, growth was explained by the simultaneous positive contribution of all three CMS components. In contrast, 2015, despite registering the lowest export growth, still reflected relatively strong competitive performance that partially offset the adverse impact of declining global demand. Overall, Iran's date export performance reveals a pattern of relative stability combined with improving competitiveness. The observed gains appear to be largely driven by effective marketing strategies and an increasing capacity to adjust to changes in global demand conditions. However, intermittent declines in competitiveness highlight the fragility of this performance. The simultaneous strengthening and long-

term consolidation of the scale, competitiveness and adaptation (second-order) effects, particularly through the sustained enhancement of competitive advantages, will be essential for achieving resilient, high-quality and low-risk export growth in the years ahead.

Table 3- Global and Iranian Exports, Iran's Market Share in Global Dates Exports to Major Destinations, and CMS Results (2013–2022)

Year	World Exports	Iran's Export	Iran's Global Market Share	Interannual Changes in Iran's Exports (Δq)	Interannual Changes in Iran's Export Share (ΔS)	Scale Effect		Competitive Effect		Second-Order Effect	
	(Ton)	(Ton)	(%)	(Ton)	(%)	(Ton)	Share(%)	(Ton)	Share(%)	(Ton)	Share(%)
2013	1040085	146614	14	-	-	-	-	-	-	-	-
2014	1139538	167323	15	20709	1	14019	67.70	6106	29.48	584	2.82
2015	1116012	170991	15	3668	0	-3454	-94.18	7273	198.27	-150	-4.09
2016	1175971	209461	18	38470	3	9187	23.88	27790	72.24	1493	3.88
2017	1242535	253516	20	44055	2	11856	26.91	30474	69.17	1725	3.92
2018	1430344	306291	21	52775	1	38319	72.61	12558	23.80	1898	3.60
2019	1344790	239306	18	-66985	-4	-18320	-27.35	-51761	-77.27	3096	4.62
2020	1486529	338406	23	99100	5	25223	25.45	66833	67.44	7044	7.11
2021	1814025	348324	19	9918	-4	74554	751.70	-52967	-534.05	-11669	-117.66
2022	1840199	339569	18	-8755	-1	5026	57.41	-13585	-155.17	-196	-2.24

(Source: Author's own elaboration based on ITC data, 2025)

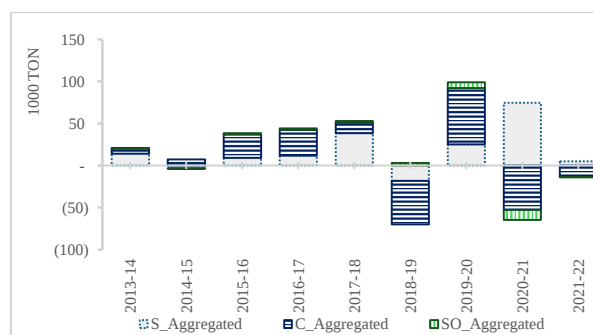


Fig. 4- Magnitudes of the Three CMS Effects on Changes in Iran's Dates Export Quantity (Δq) (2013–2022)

(Source: Author's own elaboration based on ITC data, 2025)

Discussion

The CMS-based analysis of pistachio and date exports over the period 2013–2022 reveals a clear duality in Iran's agricultural trade performance. For pistachios, exports moved in the opposite direction of the global upward trend, declining substantially and reducing Iran's global market share from 39% to 17%. This deterioration is primarily driven by a persistently negative competitiveness effect, indicating a weakness in Iran's competitive position relative to major rivals such as the United States. This result aligns with the literature emphasizing the critical role of quality upgrading, branding, and trade agreements in sustaining export competitiveness (Salmani et al., 2021; Rafiee et al., 2021; Khodaverdizadeh et al., 2025). At the same time, the generally positive second-order effect across most years suggests a degree of responsiveness to structural shifts in global demand (Kazemiyeh et al., 2025). However, the limited ability to translate global market expansion into export gains—reflected in weak scale effects—highlights the importance of reducing non-tariff barriers and strengthening trade agreements (Karacan & Ceylan, 2020).

In contrast, the date sector exhibits a more stable and comparatively successful export trajectory. Iranian date exports increased in line with the rapid expansion of global demand, with market share rising from 14% to 18% over the study period. This performance is underpinned by the joint contribution of positive competitiveness and second-order effects, indicating both relatively strong

competitive positioning and effective adaptation to evolving demand conditions. These findings are consistent with the study's theoretical framework, which emphasizes the role of quality enhancement and branding in strengthening both competitiveness and adaptability (Salmani *et al.*, 2021; Pishbahar *et al.*, 2013). Moreover, the relative stability of dates compared to the pronounced volatility in pistachios suggests that targeted marketing strategies and adaptive export structures can support more sustainable market positions. Accordingly, the export performance of dates provides a relevant benchmark for designing policy interventions aimed at revitalizing pistachio exports.

Conclusion and recommendations

This study employed the CMS model to assess Iran's export adaptability in two strategic agricultural commodities—pistachios and dates—within the context of global demand dynamics over the period 2013–2022. The results indicate marked heterogeneity in export performance across the two commodities. While date exports successfully increased Iran's global market share in line with expanding international demand, pistachio exports experienced a substantial contraction in market share. The CMS decomposition further shows that the decline in pistachio exports is primarily driven by a persistent negative competitiveness effect. In contrast, the positive second-order effect observed in both commodities indicates Iran's partial ability to adjust to changes in global demand conditions. Nevertheless, dates benefited simultaneously from both competitiveness and second-order effects, resulting in an overall increase in market share and demonstrating higher adaptability relative to pistachios. Given the central role of competitiveness losses in the decline of pistachio exports, export policy should prioritize quality upgrading, international branding, and compliance with globally recognized standards, including organic and sanitary certifications. These measures are essential for restoring competitiveness and aligning export performance with evolving global demand. In addition, capturing gains from global market expansion requires reducing non-tariff barriers and strengthening trade agreements to improve the scale effect. For dates, sustaining the current positive trajectory requires continued investment in targeted marketing strategies, diversification of export destinations, and reinforcement of trade diplomacy through institutions such as the Iran Trade Promotion Organization (TPO) and the Iran Chamber of Commerce, Industries, Mines and Agriculture (ICCIMA). Overall, future policy efforts should prioritize restoring the competitiveness of Iranian pistachio exports through improvements in quality, international branding, and trade facilitation measures, while concurrently reinforcing the market position of dates by promoting targeted marketing initiatives and strengthening trade diplomacy.

Objectives

Pistachio and dates are two strategic and high-value commodities in Iran's non-oil trade, contributing substantially to foreign exchange earnings, employment generation, food security, and sustainable development objectives. Beyond their economic significance, these products play a crucial role in enhancing Iran's position in global agricultural markets and in maintaining the country's competitive edge among major international exporters. Considering the continuously evolving structure of global demand for agricultural products, the central objective of this study is to evaluate whether Iran, as a major exporter, has successfully aligned its pistachio and dates export patterns with changes and shifts in global demand structures over the period 2013–2022. The study specifically aims to identify the underlying sources of export fluctuations and to assess the relative contributions of competitiveness, structural adaptation, and global market growth in shaping Iran's overall export performance in these two key commodities. By understanding these dynamics, the research provides a foundation for formulating evidence-based trade and marketing policies which can enhance the stability of Iran's market share.

Methods

To achieve these objectives, the study applied the Constant Market Share (CMS) model, which decomposes changes in export volumes into three distinct components:

1. Scale effect: capturing the impact of overall global import growth on Iran's exports,
2. Competitive effect: reflecting gains or losses arising from differences in export competitiveness relative to other exporters
3. Second-order effect: indicating the extent to which Iran's exports adapt to structural shifts in global demand patterns.

Export data for pistachios and dates were systematically extracted from the International Trade Centre (ITC) database, ensuring high consistency and comparability with global trade statistics. This methodological framework allows a detailed analysis of the relative contributions of global market expansion, competitiveness, and structural adaptability to observed changes in Iran's export performance.

Results

The findings reveal contrasting trajectories between pistachio and dates exports. Dates exports showed a steady increase in alignment with global demand growth, with Iran's market share rising from 14% in 2013 to 18% in 2022. CMS decomposition indicates that both the competitive and second-order effects were predominantly positive, highlighting Iran's capacity to adapt its dates exports effectively to evolving global demand structures. In contrast, pistachio exports experienced a significant decline, with Iran's market share contracting sharply from 39% to 17% during the same period. The analysis identifies the negative competitive effect as the primary driver of this decline, reflecting persistent weaknesses in product quality, international branding, and compliance with global certification standards. Nevertheless, the consistently positive second-order effect in most years suggests that pistachio exports retain latent potential to respond and adjust to structural shifts in global demand if adequate policy measures are implemented.

Conclusion

The study demonstrates that Iran's main challenge in pistachio exports lies in declining competitiveness, whereas dates exports have been relatively successful in aligning with shifts in global demand. Accordingly, trade policies should focus on the following measures: (1) strengthening pistachio competitiveness through quality enhancement, international branding, and the negotiation of preferential trade agreements, and (2) consolidating the positive trajectory of dates exports via targeted marketing innovation, diversification of export destinations, and strengthened trade diplomacy. Implementing these differentiated strategies would significantly enhance Iran's agricultural trade performance and its integration into international markets.

Author Contributions

Conceptualization, R. Allahverdi, H. Rafiee, E. Pishbahar, S. Yazdani, M. Pendar, and A. Liaghat; methodology, R. Allahverdi and E. Pishbahar; software" R. Allahverdi and E. Pishbahar; validation, R. Allahverdi and E. Pishbahar; formal analysis, R. Allahverdi and E. Pishbahar; investigation, R. Allahverdi and E. Pishbahar; resources, R. Allahverdi and E. Pishbahar; data curation, R. Allahverdi and E. Pishbahar; writing—original draft preparation, R. Allahverdi; writing—review and editing, E. Pishbahar; visualization, E. Pishbahar; supervision, H. Rafiee; project administration, H. Rafiee;. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data that support the findings of this study are openly available at www.Trademap.org

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Ethical considerations

The study was approved by the Ethics Committee of the University of ABCD (Ethical code: IR.UT.RES.2024.500). The authors avoided data fabrication, falsification, plagiarism, and misconduct.

Conflict of interest

The author declares no conflict of interest.

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Appendix

Table 1- Studies Conducted on Pistachios and Dates

Study Scope	Authors	Year	Method	Key findings
International	Karacan & Ceylan	2020	Gravity Model	The study identified trade agreements and stronger regional trade relations as the main drivers of Türkiye's pistachio exports, while trading partners' income and population were the key determinants of U.S. exports. However, export performance was assessed solely in terms of export revenues.
Internal	Biria	2021	Comparative Advantage Analysis	The study found that pistachio production and exports in Damghan possessed a strong comparative advantage, as confirmed by the Domestic Resource Cost (DRC), Social Net Profit (SNP), Revealed Comparative Advantage (RCA), and Revealed Symmetric Comparative Advantage (RSCA) indices. Despite challenges such as water scarcity, low productivity, and traditional production systems, the authors recommended mechanization, orchard renovation, adoption of resistant cultivars, and improved production and export management. However, the analysis was limited to comparative advantage at the micro-regional level.
International	Hoque et al.	2021	Review Study	The study proposed a conceptual framework linking dynamic marketing capabilities to export performance through market orientation, customer relationship management, brand management, and new product development. Although the framework contributes to understanding export performance, it did not empirically measure export outcomes.
International	Mizik, T.	2021	Review Study	The study identified the Balassa index and its modified versions, together with export- and import-based indicators, as the most common measures of international agricultural competitiveness and highlighted supportive policies, value-added production, and production efficiency as its main drivers. However, the study did not perform empirical competitiveness measurements.
International	Rabadan & Triguero	2021	Gravity Model	The study found that stricter aflatoxin-related food safety standards promoted pistachio exports in both Iran and the United States, although geographical distance adversely affected only Iranian exports. Producer associations and quality perceptions were also identified as important determinants of trade performance. The study focused primarily on exports to a specific destination market.
Internal	Rafiee et al.	2021	Numerical Taxonomy Approach	The study found that Iran's export patterns varied considerably across date varieties and identified different priority destination markets for Zahedi, Estamaran, Mozafati, and Kabkab dates. The authors suggested that preferential and bilateral trade agreements could support export diversification and the development of an optimal export structure. Nevertheless, the study concentrated solely on destination prioritization and did not provide a comprehensive assessment of global export patterns.
Internal	Salmani et al.	2021	Strengths, Weaknesses, Opportunities, and Threats (SWOT) / Analytic Hierarchy Process (AHP)	The study prioritized operational strategies for Iran's date exports using SWOT and AHP analyses. Product and promotion strategies were identified as the highest priorities, with product quality, packaging, and market awareness recognized as key factors for export development. However, the study did not decompose export performance into scale, competitiveness, and second-order effects.
Internal	Sedaqat, N. & Sanaei, F.	2021	-	The study highlighted the role of modern packaging techniques in preserving date quality, extending shelf life, and enhancing commercial value in export markets. Nonetheless, the study was descriptive in nature and focused only on competitiveness-related factors.
Internal	Tavakoli Dastjerdi et al.	2021	Autoregressive Distributed Lag (ARDL) Model	The study found that economic growth, exchange rate appreciation, and banking facilities positively affected Iran's pistachio exports, while the error correction coefficient indicated a relatively slow adjustment process. The authors recommended improving financial support and exchange-rate management to promote exports. However, competitive performance was not explicitly considered.

Table 1. Continued

Study Scope	Authors	Year	Method	Key findings
Internal	Soleymanipour et al.	2023	Structural Equation Modeling	The study found that product characteristics and pricing significantly influenced the development of Iranian pistachio exports, with product attributes having a stronger effect than price. Nevertheless, export performance was not assessed in detail.
International	Alamri et al.	2024	Gravity Model	The study found that GDP per capita and common borders positively influenced Saudi Arabia's date exports, whereas GCC membership had a negative effect, with actual exports reaching only 83% of their estimated potential. The authors recommended targeting underexploited markets such as Türkiye, Yemen, Oman, and Qatar. However, the study did not assess adaptation to demand structures in target markets.
Internal	Aminizadeh et al.	2024	Gravity Model	The study found that greater concentration in importing markets promoted Iran's pistachio exports, whereas higher market competition reduced export performance. The authors recommended identifying export determinants and segmenting consumers in competitive markets to develop appropriate marketing strategies. Nevertheless, the study did not evaluate adaptation to demand structures.
International	Ibrahim et al.	2024	Concentration Ratio Analysis	The study found that Egypt possessed a comparative advantage in date exports, although export concentration in a limited number of markets increased vulnerability to price and quantity fluctuations. The authors recommended expanding into new markets and cultivating high-quality date varieties. However, export performance was not analyzed in detail.
International	Lontoh et al.	2025	Constant Market Share (CMS) and Revealed Comparative Advantage (RCA) Models	The study found that Indonesia possessed a revealed comparative advantage in nutmeg exports, but negative commodity composition and competitiveness effects indicated misalignment between export structures and global demand, as well as production and infrastructural constraints. The market distribution effect was positive but limited. The study focused on only one product.
International	Cano-Espinosa and Méndez-León	2025	CMS and RCA Models	The study found that Mexico's fresh grape exports experienced a substantial decline in both market share and revealed comparative advantage (RCA) in the U.S. market between 2002 and 2022. However, the analysis was limited to a small number of markets and a single product.
Internal	Kazemiyeh et al.	2025	SWOT and Delphi Methods	The study identified the high quality and diversity of Iranian pistachios as major strengths, while limited marketing capabilities and insufficient compliance with international standards and consumer preferences were recognized as key weaknesses. It also found that branding strategies could enhance competitiveness and increase global market share. Nevertheless, the study did not dynamically analyze export structures.
Internal	Khodaverdizadeh et al.	2025	Gravity Model and Poisson Pseudo-Maximum Likelihood (PPML)	The study found that trading partners' GDP, geographical proximity, and common religion positively influenced Iranian date exports, whereas economic disparities, strong competitors, and sanctions had negative effects, while import-market structures were not significant. The authors recommended diversifying export markets and strengthening political and economic relations with non-sanctioning countries. However, the study focused on factors affecting competitiveness rather than dynamic export performance.

International	Kong et al.	2025	CMS Model	The study found that competitiveness was the primary driver of China's aquatic export growth to ASEAN markets, whereas structural effects contributed the least to export performance.
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سنجش تطبیق پذیری صادرات پسته و خرمای ایران با ساختار تقاضای جهانی

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اطلاعات مقاله	چکیده
نوع مقاله: مقاله پژوهشی	پسته و خرما، از محصولات ارزشمند در تجارت غیر نفتی بوده و نقشی کلیدی در دستیابی به توسعه پایدار ایفا می نمایند؛ از این رو، تحلیل صادرات این محصولات، در ارتقای رقابت پذیری ایران در بازار جهانی حائز اهمیت است. این پژوهش، به این پرسش که «آیا ایران به عنوان یک صادرکننده عمده در بازار این محصولات، توانسته است به طور مناسب، الگوی صادرات خود را به نحوی که با تغییرات ساختار تقاضای جهانی این محصولات حداکثر سازگاری را داشته باشد، تنظیم نماید؟»، با استفاده از الگوی سهم بازار ثابت (CMS) و تجزیه تغییر در حجم صادرات به مؤلفه های «اثر مقیاس»، «اثر رقابتی» و «اثر مرتبه دوم»، پاسخ داده است. داده های مربوط به صادرات از پایگاه ITC و برای دوره ۲۰۱۳ تا ۲۰۲۲ استخراج شده است. نتایج نشان داد که صادرات پسته ایران با کاهش سهم بازار و اثر رقابتی منفی مواجه بوده؛ در حالی که خرما روند افزایشی و سهم بازار پایدار داشته است. تحلیل CMS نشان داد که اثر مرتبه دوم (SOE) به طور کلی مثبت بوده و بیانگر توان نسبی ایران در انطباق با تغییرات ساختار تقاضای جهانی است. یافته ها همچنین تأکید می کنند که کیفیت، برندسازی و توافق نامه های تجاری می توانند اثر رقابتی و انطباق با تقاضای جهانی را تقویت کنند. بنابراین، تقویت سیاست های رقابتی و بازاریابی هدفمند در الگوی صادرات پسته و ادامه سرمایه گذاری در رقابت پذیری و انطباق خرما با تغییرات تقاضای جهانی می تواند به بهبود عملکرد صادراتی ایران کمک کند.
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