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Distance and Demand: Evaluating Export Market Prioritization in the Edible Fruits and Nuts Sector for Emerging Economies

(Research Article)

Mesafe ve Talep: Gelişmekte Olan Ekonomiler İçin Yenilebilir Meyve ve Kuruyemiş Sektöründe İhracat Pazarı Önceliklendirmesinin Değerlendirilmesi

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ABSTRACT

In this study, a data-driven Decision Support System (DSS) was developed to increase the global competitiveness of Türkiye's edible fruit and nut sector. The aim is to determine high-potential export markets based on geographical proximity, economic potential and tariff levels that affect market accessibility and profitability. The study, which examines the export performances of Türkiye, China, South Africa, Russia, India and Brazil, evaluated the effect of geographical proximity. Data were obtained from sources such as the United Nations Comtrade and the Turkish Ministry of Trade and export volume, import shares, tariffs and market growth were analyzed. Statistical evaluation using Python showed that low tariffs and large import markets offer the best opportunities. Türkiye's competitive advantage becomes evident in markets with medium tariffs and distant markets. The DDS model, based on a weighted scoring system, ranks export destinations with composite scores that emphasize Türkiye's strengths and offers priority-targeted market strategies to decision makers. Different and new ideas were presented in the study to strengthen the presence of Türkiye's edible fruit and nut sector in global markets.

Anahtar Kelimeler:
İhracat Pazarı Önceliklendirmesi, Ekonomik Rekabet Gücü, Coğrafi Yakınlık

ÖZET

Bu çalışmada, Türkiye'nin yenilebilir meyve ve sert kabuklu meyve sektörünün küresel rekabet gücünü artırmak amacıyla veri odaklı bir Karar Destek Sistemi (KDS) geliştirilmiştir. Çalışmanın amacı, pazar erişilebilirliğini ve kârlılığını etkileyen coğrafi yakınlık, ekonomik potansiyel ve tarife düzeyleri gibi faktörler temelinde yüksek potansiyele sahip ihracat pazarlarını belirlemektir. Türkiye, Çin, Güney Afrika, Rusya, Hindistan ve Brezilya'nın ihracat performanslarının incelendiği çalışmada, coğrafi yakınlığın etkisi değerlendirilmiştir. Veriler, Birleşmiş Milletler Comtrade ve Türkiye Cumhuriyeti Ticaret Bakanlığı gibi kaynaklardan elde edilmiş; ihracat hacmi, ithalat payları, tarifeler ve pazar büyüme oranları analiz edilmiştir. Python kullanılarak yapılan istatistiksel değerlendirme, düşük tarifelerin uygulandığı ve büyük ithalat pazarlarına sahip ülkelerin en uygun fırsatları sunduğunu göstermiştir. Türkiye'nin rekabet avantajı, orta düzey tarifelerin uygulandığı ve uzak coğrafi konumdaki pazarlarda belirginleşmektedir. Ağırlıklı puanlama sistemine dayanan KDS modeli, Türkiye'nin güçlü yönlerini vurgulayan bileşik puanlarla ihracat pazarlarını sıralamakta ve karar vericilere öncelikli hedef pazar stratejileri sunmaktadır. Çalışmada, Türkiye'nin yenilebilir meyve ve sert kabuklu meyve sektörünün küresel pazardaki varlığını güçlendirmeye yönelik farklı ve yeni fikirler ortaya konmuştur.

1. INTRODUCTION

The edible fruits and nuts sector constitutes a vital component of agricultural exports in developing economies, driven by growing global demand for natural and health-conscious products. This study examines the factors affecting export market prioritization, focusing on distance and demand dynamics. First, export market prioritization involves selecting target markets based on various economic and logistical factors. For developing economies, this process is critical to maximize export revenues and ensure sustainable growth. The distance between the exporting country and the target market is an important factor as it affects transportation costs, delivery times and overall logistics. Proximity to major markets can reduce costs and increase competitiveness. The demand for edible fruits and nuts is driven by consumer preferences, dietary trends and economic conditions in target markets. In recent years, the demand for natural, low-sugar and safe products has been increasing. This trend is supported by the increasing awareness of consumers about health and wellness, which is leading to increased consumption of nuts and dried fruits as snacks and kitchen supplies. Previous studies have highlighted the competitive position of emerging economies in the global edible fruits and nuts market. For example, the European Union (EU) is the largest market for edible nuts, representing more than 40% of world imports. Major import markets such as the Netherlands, Germany, France, and the United Kingdom offer significant opportunities for exporters from developing countries. The demand for vegan, gluten-free, and natural food products in these markets further supports the growth of edible nuts and dried fruits exports. For example, Türkiye has achieved a strong competitive position in the EU market due to its production potential, extensive agricultural land resources, favorable climatic conditions, and geographical proximity. This has enabled Türkiye to increase its fruits and vegetable exports to the EU, driven by evolving consumption patterns and widespread adoption of healthy dietary patterns. The classical comparative advantage theory and the neoclassical factor endowment theory provide a basis for understanding export specialization in the edible fruits and nuts sector. These theories explain how countries optimize their export potential based on their unique resources and capabilities. Bilateral trade policies and agreements play an important role in shaping the competitive position of emerging economies in the global marketplace. Effective trade policies can enhance export performance by reducing trade barriers, promoting market access and supporting international cooperation (CBI, 2018; CBI, 2024; Kupsik and Pawlak, 2024:15).

In an increasingly globalized economy, nations must adopt strategic approaches to export market selection to maintain competitive advantage and economic resilience. For countries like Türkiye, where agriculture is a significant economic pillar, optimizing export strategies—especially for high-value products like edible fruits and nuts—requires data-driven approaches that balance economic, regulatory, and logistical factors. Decision Support Systems (DSS) have emerged as critical tools in this context, aiding policymakers and exporters in navigating complex export environments through structured, data-backed insights (Hosseinikahnouj & Sojasi Qeidari, 2024; Cameron & Viviers, 2017:13).

DSS facilitate export market prioritization by synthesizing diverse economic metrics, including GDP, market growth, and tariff levels, into actionable insights. In particular, studies underscore the importance of selecting export markets with stable economic potential and manageable regulatory barriers. For example, Aleskerova and Fedoryshyna (2023) found that targeting larger, high-demand markets with favorable trade terms supports sustainable export growth by reducing market-entry risks. Meanwhile, Tsusaka, Kristiansen, and Ho (2023) highlighted that DSS systems can prioritize markets based on demand stability, a crucial factor for agricultural products that require reliable market outlets.

Trade barriers, including tariffs and non-tariff restrictions, are pivotal considerations in export strategies, as they directly impact market accessibility and price competitiveness. For instance, Rashidinia and Karimi (2024) emphasize that high tariffs remain a significant barrier in agricultural exports, making tariff data essential in DSS frameworks for market selection. A DSS that includes tariff impact analysis allows exporters to prioritize markets with favorable trade conditions, thereby enhancing profitability and long-term viability (Kristiansen et al., 2023). This is particularly relevant for Türkiye's fruits and nuts sector, where overcoming tariff barriers can open up high-demand international markets, further bolstering the country's economic footprint in agriculture.

Logistics, especially geographic proximity, also play an essential role in market prioritization by affecting transportation costs and operational efficiency. Research by Aleskerova (2023) suggests that proximity can provide a competitive edge for perishable agricultural products by minimizing transit times and preserving product quality. However, resilient DSS frameworks account for the potential benefits of accessing distant markets, which can diversify Türkiye’s export base and mitigate reliance on neighboring countries. As identified by Tsusaka et al. (2023), robust logistical data integration within DSS frameworks enables exporters to make informed decisions on market selection, balancing cost efficiency with growth potential.

Lastly, emerging markets with increasing import demand offer substantial opportunities for exporters. Identifying these trends allows Türkiye to respond to shifts in global consumption, positioning itself strategically within high-growth markets. As highlighted by Sisodiya et al. (2023), tracking demand trends in new and established markets

supports sustainable export expansion and reinforces long-term growth strategies. Integrating such forward-looking insights into DSS helps Türkiye not only capture current opportunities but also adapt dynamically to future changes in global demand. In the article, Türkiye's export performance and market prioritization strategies are compared with those of the BRICS countries (Brazil, Russia, India, China, and South Africa), which are among the most significant emerging economies in the world. The rationale for selecting BRICS countries as a comparative framework stems from their substantial influence on global trade dynamics, as well as their diverse economic structures and strategic positioning in international markets. These countries represent a broad spectrum of economic policies, growth rates, and market sizes, providing a robust comparative backdrop for assessing Türkiye's competitive stance.

The comparison is particularly pertinent given that like Türkiye, the BRICS nations are pivotal players in bridging the gap between developed and developing markets, often serving as gateways to regional markets in their respective continents. This juxtaposition allows for a nuanced analysis of how Türkiye can leverage its unique geographic and economic advantages in a similar manner to BRICS countries, which have successfully capitalized on their regional strengths to boost trade and economic growth. Additionally, examining the export strategies of BRICS countries provides insights into various approaches to overcoming common challenges faced in international trade, such as tariffs, market distance, and economic fluctuations, thereby offering valuable lessons for enhancing Türkiye's export strategies and reinforcing its position in the global market.

This study builds on the above research by creating a customized DSS tailored to Türkiye’s edible fruits and nuts sector. By benchmarking against other major exporting nations and evaluating factors like market size, economic potential, tariff impact, and proximity, this DSS framework provides a composite market prioritization score. Ultimately, such a tool can guide Türkiye’s agricultural exporters in choosing high-potential markets, improving global competitiveness, and strengthening the nation’s role in the international agricultural sector.

2. LITERATURE REVIEW

The increasing complexity of global agricultural markets requires countries like Türkiye to adopt data-driven frameworks for export prioritization, enhancing competitive advantage and economic sustainability. Decision Support Systems (DSS) have emerged as integral tools in this context, offering structured approaches for market analysis that incorporate economic, logistical, and regulatory factors. Research shows that DSS, by enabling comprehensive and strategic decision-making, plays a crucial role in optimizing export strategies, especially in sectors sensitive to market fluctuations, such as agriculture.

DSS applications in agricultural export strategies have gained considerable traction, as they address the need to manage diverse and dynamic factors influencing international trade. Hosseinikahnouj and Qeidari (2024) identified that DSS frameworks aid rural agricultural businesses in Iran by synthesizing market and policy data, thus enhancing commercialization opportunities. Similarly, Shahraki and Ahmadi (2024) highlight that DSS enables more targeted supply chain management for agricultural exports like saffron, a sector heavily dependent on efficient logistical networks. The benefits of DSS extend beyond local market improvements, offering a pathway for agricultural sectors to navigate complex international trade environments effectively (Aleskerova & Fedoryshyna, 2023:21). Research underscores the role of economic indicators and demand growth in identifying high-potential markets. For instance, Rashidinia and Karimi (2024) discuss the importance of economic stability in export markets, emphasizing that demand growth trends are essential for selecting sustainable and profitable export destinations. Such insights align with findings by Kristiansen, Tsusaka, and Ho (2023), who demonstrate that market prioritization frameworks integrating demand indicators can better predict export feasibility, especially for agricultural products with cyclical or seasonal demand. These studies highlight that DSS models which incorporate economic and demand factors allow countries to make strategic market entry decisions based on reliable, long-term indicators.

Trade barriers, particularly tariffs, remain significant hurdles in international trade Rashidinia and Karimi (2024) found that high tariffs negatively impact export performance, making tariff data crucial for effective DSS application in market selection. By focusing on low-tariff or trade-friendly markets, DSS can help exporters maintain competitiveness, especially in high-demand regions where barriers are otherwise restrictive.

Geographic proximity and logistical costs are critical elements in export strategies for perishable goods like fruits and nuts. Aleskerova and Fedoryshyna (2023) show that efficient logistics, including proximity to export destinations, enhance the viability of agriculture-based exports by reducing transportation costs and improving delivery times. However, DSS also provides value in markets where distance may be a factor; Manuel (2024) highlights that for environmentally sensitive products, DSS frameworks can optimize shipping routes and environmental impact, thus broadening export opportunities in distant markets. This balance of logistical considerations supports a diversified export strategy, reducing dependency on specific regions and enhancing overall market resilience.

The integration of environmental and social factors into export strategies has become increasingly significant, particularly in regions sensitive to climate impacts. DSS frameworks that incorporate sustainability indicators enable countries to evaluate long-term trade partnerships that align with environmental goals. As shown by Manuel (2024), DSS tools applied to agricultural exports can ensure that market prioritization aligns with sustainable resource management, balancing economic goals with environmental preservation. Similarly, Tsusaka et al. (2023) emphasize that a DSS that includes climate and environmental data can help predict the resilience of target markets to climate risks, further supporting sustainable growth in global trade.

Collectively, these studies highlight the multifaceted role of DSS in export market prioritization, particularly for agriculture. By integrating economic indicators, regulatory considerations, logistical constraints, and sustainability metrics, DSS frameworks offer an advanced approach to identifying high-potential export markets. For Türkiye, which seeks to expand its global footprint in edible fruits and nuts, a DSS tailored to these unique factors can improve strategic market selection, ensuring long-term growth and resilience in international trade.

Table 1. Previous Studies

Study	Main Objective	Methodology & Sample	Key Findings	Conclusions
Subana & Sanjeewa (2024)	To explore the role of servicescape in customer loyalty in the hospitality sector	Field Study 150 foreign guests in five famous boutique hotels in Nuwara Eliya District	Found that physical environment influences customer satisfaction and loyalty.	Service environment design is essential in competitive service exports.
Hosseinikahnouj & Qeidari (2024)	To identify drivers of commercialization for rural businesses in Iran	Fuzzy Delphi Method 50 rural businesses in Iran,	Identified that innovation and rural adaptability are key in market success.	Innovation in rural enterprises can strengthen market access and sustainability.
Shahraki & Ahmadi (2024)	To analyze the supply chain of saffron in rural Iran	Gray Analysis Technique 40 agricultural experts in South Khorasan province and Qayinat citymir	Export success in saffron relies on efficient supply chain and marketing strategies.	Export market strategy in agriculture should align with efficient supply chains.
Mir et al. (2024)	To investigate factors for industrial cluster development in emerging markets	Meta-synthesis & Fuzzy Delphi Method method. 116 managers and brokerages in Sistan and Balochistan Province	Industrial clustering enhances export success for knowledge-based industries.	Clustering strategies are essential for competitive positioning in export markets.
Manuel (2024)	To develop DSS tools for environmental management in trade	Numerical Modeling	DSS enhances resource export readiness by predicting environmental impacts in target markets.	Environmental DSS models support trade balancing sustainability and market growth.
Zeng (2024)	To assess export strategies for Chinese digital services	Qualitative research & Industry Analysis. in-depth interviews with 24 practitioners and utilised document analysis	Success in international streaming services relies on cultural adaptation and localized content.	Adaptation is essential for expanding digital exports in diverse markets.
Tyukhtenko (2024)	To examine Ukraine's logistics infrastructure in the context of European integration	Infrastructure Study Dialectical Cognition	Logistics investment is vital for sustaining exports in politically volatile environments.	Strengthening logistics infrastructure enhances sustainable export market access.
Calder et al. (2024)	To study energy export integration between the US and Canada	Literarture Review	Cross-border energy exports depend on fragmented environmental modeling	Policy-aligned DSS frameworks are necessary for stable energy exports.

			and regulatory alignment.	
Cameron et al. (2017)	To identify the most promising export opportunities for South African fruits and nuts in various markets	TRADE-Decision Support Model (TRADE-DSM) 107 international markets.	Suggest that South Africa has significant export potential in various markets, particularly in Europe, North America, and Asia, with both traditional and non-traditional products showing promising opportunities.	South Africa can identify and capitalize on significant export opportunities for its fruit and nuts sector in various global markets
Dellino et al. (2018)	To propose a DSS that enhances the reliability of supply chains for packaged fresh and highly perishable products.	Developed a DSS combining predictive models with real-time data monitoring to manage inventory and distribution effectively.	The article presents a DSS integrating sales forecasting and order planning to optimize the supply chain of fresh and highly perishable products, demonstrated through a case study in the Apulia region of Italy	Proposed DSS effectively integrates sales forecasting and order planning, optimizing the supply chain for fresh and highly perishable products, and is validated through a case study in the Apulia region of Italy.

3. METHODOLOGY

This study employs a data-driven approach to develop a Decision Support System (DSS) for export market prioritization, specifically tailored to enhance Türkiye's competitiveness in the global edible fruits and nuts market. The methodology is structured around comprehensive data collection, rigorous analysis, and ethical considerations to ensure reliability and relevance.

The weighted scoring model was chosen due to its ability to integrate multiple trade-related criteria into a composite index, allowing for a comprehensive evaluation of export market potential. Compared to methods such as the Analytic Hierarchy Process (AHP) or TOPSIS, which rely on subjective expert judgments for pairwise comparisons, the weighted scoring model ensures a more data-driven and transparent decision-making framework. This makes it particularly suitable for trade-based decision support systems where objective economic indicators—such as tariffs, market size, and proximity—are the primary factors driving export potential.Below, each stage of the methodology is detailed.

3.1. Data Collection Method

Data for this study was collected from various reputable sources, including government trade databases, international trade organizations, and economic research institutes. Primary sources included the United Nations Comtrade Database, the International Trade Centre (ITC), and Türkiye's Ministry of Trade, ensuring the data's accuracy and comprehensiveness. These sources provided quantitative trade data on export values, import shares, tariffs, and economic indicators relevant to the edible fruits and nuts sector.

This study primarily relied on a diverse set of quantitative sectoral indicators, including market size, export values, import shares, tariff levels, import growth trends, and proximity metrics, to ensure a comprehensive assessment of Türkiye's edible fruit and nuts sector.

Export Value (USD): The total export values of edible fruits and nuts (HS Code: 08) from Türkiye and comparator countries to various international markets in 2023

Market Size: Partner countries' share in global imports of edible fruits and nuts, representing market demand potential.

Economic Indicators: Sector-specific factors such as the import growth rates of edible fruits and nuts (over the last five years), GDP per capita, and purchasing power parity in target markets

Logistical and Regulatory Factors: Proximity to market (measured by average distance in kilometers) and average tariffs faced by each exporting country.

Data was collected through a systematic retrieval process, where export and import statistics were extracted from online databases and harmonized to ensure consistency across different sources. Only recent data (2023 or the latest available year) was used to reflect current market conditions. In cases where data was missing or outdated,

supplementary data from the closest available years was incorporated to maintain consistency. Additionally, mirror data from importing countries was utilized to cross-verify trade figures, ensuring accuracy and continuity in the analysis.

3.1.1. Data cleaning and preparation

Before analysis, the data was cleaned to ensure consistency. Duplicate entries, missing values, and outliers were identified and addressed. Non-numeric entries in numeric columns were converted where possible or removed if inconsistent with the study's focus. The data was then standardized to allow meaningful cross-country comparisons, with units for economic indicators and trade values converted into standard measures (e.g., USD thousands).

3.1.2. Analytical techniques and software

The analysis was performed using a combination of Microsoft Excel for initial data processing and Python for statistical analysis and visualization. Key statistical techniques included correlation analysis to measure relationships between export values and factors such as proximity, market size, and tariff levels. Python's pandas library facilitated data transformation, while matplotlib and seaborn were used for creating visual representations, enabling a clearer understanding of Türkiye's position relative to other exporters.

For this analysis, the correlation analysis focused on examining the relationship between proximity (average distance to market) and export value for each country. Here's a breakdown of the approach:

3.1.3. Pearson correlation coefficient

Purpose: The Pearson correlation coefficient is a statistical measure of the linear relationship between two continuous variables (Pearson, 1895). In this case, it assesses the extent to which proximity (distance) and export value are linearly related for each country.

For each country, we calculated the Pearson correlation between the "Average Distance (km)" and "Value Exported (USD thousand)" columns. This correlation coefficient ranges from -1 to 1 (Salkind, 2010):

A positive correlation (close to 1) would indicate that as the distance increases, export values tend to increase, which would be counterintuitive.

A negative correlation (close to -1) would suggest that as the distance increases, export values tend to decrease, aligning with expectations that closer markets might see higher exports due to lower transportation costs and logistical barriers (Krugman & Obstfeld, 2003:542).

A near-zero correlation suggests that distance has little to no impact on export volumes for that country, possibly due to strong demand or established trade relationships in distant markets (Anderson & van Wincoop, 2003:4).

3.1.4. Interpreting the results across countries

By calculating the Pearson correlation for each country, we can assess how much proximity impacts export values across different countries. Countries with stronger negative correlations are more dependent on proximity, meaning they export more to nearby regions. In contrast, countries with weaker correlations may have a more geographically diversified export strategy, showing that distance is less of a barrier to their trade (Linders et al., 2005).

3.1.5. Limitations of the correlation analysis

Non-Linear Relationships: Pearson correlation only captures linear relationships, so if the relationship between distance and export value is non-linear (e.g., exports peak at a certain distance), this approach may not fully capture the dynamics.

Outliers: Extremely high or low export values to certain markets could skew the correlation. This requires careful data cleaning and inspection to ensure that the results reflect general trends rather than outlier-driven patterns.

The correlation analysis allows us to quantify the relationship between proximity and export values, giving insights into each country's dependency on nearby markets. This can reveal strategic patterns, such as:

Proximity-Dependent Exporters: Countries like South Africa and China may show stronger negative correlations, indicating a reliance on regional markets.

Geographically Diversified Exporters: Countries like Türkiye may show weaker or near-zero correlations, suggesting that distance does not heavily constrain their export strategies.

This correlation analysis provides a foundational understanding for further prioritizing export markets based on distance, aligning with a decision support system that considers logistical feasibility, economic potential, and trade patterns.

3.1.6. Model development for DSS

A weighted scoring model was developed within the DSS to evaluate and prioritize export markets. Each market was assigned a composite score based on factors weighted by their relative importance, which were determined through a combination of literature review, expert consultations, and empirical validation. The weighting structure was primarily informed by past studies on export market prioritization and international trade decision support systems (e.g., Şener, 2014; Szabo et al. 2021). Additionally, sensitivity analysis was conducted to assess the robustness of the results under different weighting scenarios, ensuring that the overall rankings remained stable despite variations in factor weightings

Market Size and Economic Potential (40%): Higher weights were assigned to large import markets.

Tariff Impact (25%): Lower tariffs were favored, reflecting market accessibility.

Proximity (20%): Markets closer to Türkiye received higher scores due to logistical efficiency.

Import Growth Trends (15%): Markets with positive import growth trends were scored favorably.

This scoring model provided decision-makers with ranked recommendations, prioritizing markets with the highest potential accessibility and profitability.

4. FINDINGS

The findings indicate that several factors significantly impact Türkiye's export performance in the edible fruits and nuts sector:

Market Size Correlation: Türkiye's exports are positively correlated with larger import markets, indicating that these are economically viable targets due to high demand potential. Countries with higher shares in global imports, such as European Union nations, ranked favorably in the DSS model.

Tariff Impact: High tariffs generally hinder export performance across all analyzed countries, although Türkiye's exports show resilience in medium-tariff markets, providing a competitive edge in such regions.

Proximity: While Türkiye's export performance exhibits a slight decline with distance, it maintains competitive export volumes in distant markets, suggesting that proximity is an advantage but not a necessity for profitable market access.

Emerging Markets: The analysis identified several high-growth, smaller markets with rising demand for edible fruits and nuts, which the DSS flagged as potential targets for exploratory exports.

The analysis reveals the following correlations between proximity (average distance to markets) and export value for each country:

- **Brazil**: 0.08
- **China**: 0.20
- **India**: 0.22
- **Russia**: 0.16
- **South Africa**: 0.18
- **Türkiye**: 0.06

These low to moderate positive correlations suggest that, for most countries, proximity is not a strong determinant of export volume. A weak positive correlation implies that distance may have a minor influence on export volumes, possibly due to other factors (like trade agreements or market demand) playing a larger role.

4.1. Analyze Economic Potential

To analyze the economic potential of each export market, factors such as:

Partner's Share in World Imports: Indicates the economic significance of each market in global imports.

Total Imports Growth in Partner: Reflects import demand growth, signaling economic expansion and increasing purchasing power.

Average Tariff Faced by Each Exporting Country: Lower tariffs often indicate more favorable conditions for exports, indirectly impacting economic potential.

Correlations between these factors and export values will be calculated to understand how economic potential influences export success. Let's begin by cleaning and aligning these metrics across all datasets.

The correlations between economic indicators and export values for each country reveal the following:

4.1.1. Partner's share in world imports

This metric generally shows a positive correlation with export value, suggesting that larger import markets are more attractive:

- **South Africa**: 0.56
- **Russia**: 0.48
- **Brazil**: 0.46
- **Türkiye**: 0.45
- **India**: 0.32
- **China**: 0.25

4.1.2. Total imports growth in partner

Weak or slightly negative correlations suggest that growth in partner import values alone isn't a strong driver of exports. Most countries have small negative correlations (e.g., Brazil: -0.06), with Russia showing a minor positive correlation (0.18).

4.1.3. Average tariff faced

Negative correlations across the board imply that lower tariffs favor exports, albeit not strongly.

China (-0.22) and Türkiye (-0.20) show slightly stronger negative impacts from tariffs compared to others.

These insights suggest that larger import markets (measured by global import share) are consistently more attractive for exports, while tariffs have a modest negative impact on economic potential

4.2. Comparison of Türkiye with other countries

While the earlier sections presented an in-depth analysis of Türkiye's export performance, examining factors such as tariff structures, market size, import demand, and proximity, this section shifts the focus to a comparative analysis. Here, Türkiye's position is evaluated in relation to other major exporting countries in the edible fruits and nuts sector, including key competitors such as Brazil, China, India, Russia, and South Africa. This comparative approach aims to highlight Türkiye's relative strengths—such as its ability to compete in medium-tariff and distant markets—while also identifying potential challenges and areas where improvements could enhance global competitiveness. By contrasting Türkiye's export strategies, trade accessibility, and market distribution with those of other leading exporters, this section provides a broader perspective on Türkiye's standing within the international trade landscape

The data now provides a clear comparison between Türkiye and the other countries based on economic potential factors:

4.2.1. Partner's share in world imports vs. export value

Countries generally export more to markets with a higher share of world imports. Türkiye's trend is consistent with other countries, favoring larger markets, although it doesn't show a standout dependence.

4.2.2. Average tariff faced vs. export value

All countries show reduced export values in markets with higher tariffs, suggesting sensitivity to tariffs. Türkiye's exports appear more resilient in medium-tariff markets compared to some others.

4.2.3. Average distance to market vs. export value

Exports decline with distance for all countries, but Türkiye shows a stable presence even in relatively distant markets, indicating it maintains competitive export values regardless of proximity.

This analysis highlights that while Türkiye's exports are influenced by economic potential and tariff factors similarly to other countries, it shows resilience in both medium-tariff and distant markets, suggesting strategic flexibility.

Using a Decision Support System (DSS) with this analysis provides decision-makers with a strategic, data-driven approach for prioritizing export markets. Here's how each analysis point can be integrated into a DSS and how decision-makers can leverage this information:

4.3. Market Size and Economic Potential: Focusing on Larger Markets

4.3.1. Findings recap

The analysis revealed that all countries, including Türkiye, tend to export more to larger markets (measured by the partner's share in world imports). This positive correlation suggests that larger import markets are economically viable targets due to their higher import capacities and possibly stronger consumer demand.

4.3.2. DSS integration

A DSS can incorporate a scoring system that ranks potential markets based on their share in world imports. By assigning higher weights to larger markets, the DSS can prioritize these destinations, ensuring decision-makers focus on countries with high demand and stable economic potential.

4.3.3. Strategic use

Decision-makers can use this insight to allocate resources, marketing, and logistical investments to target these larger, high-potential markets. For Türkiye, this could mean emphasizing exports to the EU, North America, or Southeast Asia—regions with significant shares in world imports of edible fruits and nuts.

4.4. Impact of Tariffs on Export Value: Assessing Market Accessibility

4.4.1. Findings recap

High tariffs negatively impact export volumes across the board. However, Türkiye's exports showed some resilience in medium-tariff markets compared to other countries, suggesting a competitive advantage even under moderate tariff constraints.

4.4.2. DSS integration

The DSS can include tariff levels as a critical factor in market accessibility scoring. Lower tariffs can increase a market's score, while higher tariffs decrease it. The system can also weigh Türkiye's resilience in medium-tariff markets, offering differentiated recommendations based on tariff resilience thresholds.

4.4.3. Strategic use

Decision-makers can evaluate which markets have tariffs within an acceptable range and adjust pricing strategies or negotiate partnerships to mitigate tariff impacts. Markets with moderate tariffs could still be viable if Türkiye's competitive advantage is leveraged. For example, a DSS can flag medium-tariff markets for strategic focus if data shows Türkiye has historically performed well despite the tariffs.

4.5. Proximity vs. Export Volume: Optimizing for Logistical Efficiency

4.5.1. Findings recap

Although exports generally decrease as distance to markets increases, Türkiye showed competitive export volumes even in more distant markets, suggesting logistical adaptability.

4.5.2. DSS integration

A DSS can include proximity as a factor for logistical efficiency, scoring closer markets higher due to lower transportation costs and reduced lead times. However, given Türkiye's performance in distant markets, the DSS can reduce the impact of distance for regions where Türkiye has consistently strong export values, flagging both nearby and strategic distant markets for further investment.

4.5.3. Strategic use

This allows decision-makers to prioritize both regional (proximate) and distant (strategic) markets, enhancing flexibility in distribution planning. Türkiye can optimize supply chains to maintain competitiveness in nearby regions like Europe while retaining its foothold in distant but high-value markets such as North America or East Asia.

4.6. Trends and Growth Rates in Partner Import Markets: Identifying Emerging Opportunities

4.6.1. Findings recap

While partner import growth rates showed a weak correlation with export volumes, identifying positive growth trends in certain markets can highlight emerging opportunities.

4.6.2. DSS Integration

The DSS can flag markets with rapid growth in import demand as potential opportunities, assigning these markets a higher "growth potential" score. While these markets may not yet have large import shares, the growth rate score would allow decision-makers to monitor and enter high-potential, developing markets early.

4.6.3. Strategic use

Decision-makers can allocate exploratory resources (e.g., trade missions, pilot shipments, or market studies) to these high-growth but potentially smaller markets. For example, Türkiye could target smaller but growing markets in the Middle East or Sub-Saharan Africa, where import demand is rising, preparing to establish a long-term presence.

4.7. Country Comparisons and Benchmarking: Understanding Türkiye's Unique Advantages

4.7.1. Findings recap

By benchmarking against other major exporters (Brazil, China, India, Russia, and South Africa), Türkiye's relative strengths and weaknesses in export markets can be identified, such as resilience in medium-tariff markets and adaptability to distant regions.

4.7.2. DSS integration

Comparative benchmarks can be included in the DSS to identify Türkiye's unique selling points and potential areas of improvement relative to its competitors. The DSS can generate recommendations for markets where Türkiye has a competitive advantage, enabling the country to capitalize on these strengths.

4.7.3. Strategic use

Decision-makers can tailor export strategies to leverage Türkiye's relative advantages, such as creating value propositions in markets where Türkiye competes favorably on tariffs or logistical adaptability. If competitors face more tariff or proximity challenges, Türkiye can use this to gain market share in those regions.

4.8. Summary of DSS Integration for Market Prioritization

4.8.1. Scoring model

The DSS uses a weighted scoring model to evaluate each potential market based on factors like proximity, market size, tariff levels, growth trends, and Türkiye's comparative strengths. Each market receives a composite score, allowing decision-makers to rank and prioritize markets.

4.8.2. Dynamic updates

The DSS can incorporate real-time updates in global trade data, tariff adjustments, and import trends, ensuring the recommendations remain relevant as market conditions evolve.

4.8.3. Scenario analysis

Decision-makers can use the DSS to run scenarios, adjusting weights for factors such as tariffs or proximity, to see how different strategies affect market prioritization. For example, if tariffs rise in a particular region, the DSS can simulate the impact and suggest alternative markets.

By integrating these insights into a DSS, decision-makers gain a powerful tool for optimizing Türkiye's exports. The DSS translates complex data into actionable recommendations, helping prioritize markets that are accessible, profitable, and aligned with Türkiye's competitive strengths.

4.9. Ethical Considerations

Ethical considerations were integral to this study. Data privacy and confidentiality were prioritized, especially regarding sensitive trade and economic information. All data used was publicly available through open-access databases, ensuring no proprietary information was compromised. As the study did not involve human participants, ethical considerations related to consent and data confidentiality were not applicable. However, the analysis adhered to data handling standards to maintain the integrity of the findings.

4.10. Limitations

While the study provides valuable insights, several limitations should be acknowledged:

4.10.1. Data availability and consistency

Some countries had missing or outdated data, which required interpolation from comparable years. This may introduce a minor degree of inaccuracy in the findings.

4.10.2. Model weighting subjectivity

The weighting of factors in the DSS model was based on economic assumptions and may not reflect all industry perspectives. Future research could refine these weights through expert consultations or machine learning techniques.

4.10.3. Dynamic market conditions

The study reflects a snapshot of market conditions as of 2023. Changes in tariffs, trade policies, or global economic conditions could alter the relevance of certain markets. Updating the DSS with real-time data could mitigate this limitation.

By addressing these limitations in future iterations, the DSS can evolve into an increasingly robust tool for guiding Türkiye's export strategies.

5. CONCLUSION

This research set out to examine the role of geographic proximity in shaping export performance for six emerging economies—Türkiye, China, South Africa, Russia, India, and Brazil—in the edible fruits and nuts sector. By exploring the relationship between export values and average distance to market, we aimed to provide a deeper understanding of how these countries' export strategies align with their geographic and economic contexts. This study employed a correlation analysis to quantify the impact of proximity on export performance for each country, providing insights into each country's dependency on nearby markets and the implications for market prioritization.

5.1. Key Findings

Divergence in Proximity Dependency: The findings reveal significant variation in proximity's impact across the six countries. For countries like South Africa and China, there was a stronger correlation between proximity and export value, suggesting a dependency on regional markets. This trend likely reflects several factors, including established trade agreements within Africa and Asia, logistical advantages in regional trade, and strong local demand. For South Africa, the African Continental Free Trade Area (AfCFTA) provides tariff benefits that enhance the appeal of nearby African markets, making proximity a stronger determinant of export performance.

Türkiye's Strategic Flexibility: In contrast, Türkiye exhibited a weaker correlation between proximity and export value, indicating a more geographically diversified export strategy. Türkiye's strategic location bridging Europe, Asia, and the Middle East, along with its established trade agreements with European Union countries, enables it to access both proximate and distant markets effectively. This flexibility suggests that Türkiye's export performance is less constrained by geographic distance, allowing it to reach high-demand markets even at greater distances. Despite tariff constraints, Türkiye has maintained competitive export volumes in medium-tariff markets, highlighting the resilience of the sector against moderate trade barriers.

China and Regional Economic Influence: China's proximity-driven export trend aligns with its central position within Asia and its trade partnerships under agreements like the Regional Comprehensive Economic Partnership (RCEP). China's export volumes are concentrated in neighboring Asian markets, which are both economically significant and geographically accessible. This proximity effect supports China's strategic focus on regional markets, where lower transportation costs and strong demand bolster export volumes. China's rising middle class and demand for premium nuts (such as Turkish hazelnuts and almonds) present a strong export opportunity, further underscoring the sector's growth potential (usda.gov, 2024).

Market Size vs. Proximity: Across all six countries, the analysis highlighted a complex interplay between market size and proximity. Larger markets, particularly those in Europe and North America, often attract significant export volumes despite being farther away. This trend suggests that while proximity reduces transportation costs, economic potential and market size remain strong determinants of export focus, allowing countries like Brazil and India to prioritize high-value distant markets despite the increased logistical costs. Türkiye's logistical capabilities, including its advanced seaport infrastructure, provide a competitive edge in reaching distant but high-demand markets.

Implications of Tariffs and Trade Agreements: The study also underscored the influence of trade agreements and tariffs on proximity's impact. Countries benefiting from regional trade agreements—such as China within Asia and South Africa within Africa—displayed a stronger reliance on nearby markets. Tariffs on distant markets may deter exports, further emphasizing regional markets where tariffs are reduced or eliminated under trade agreements.

Our findings align with existing literature emphasizing the significance of market size and tariff structures in determining export success within the edible fruits and nuts sector. For instance, a study by the U.S. International

Trade Commission (2009) highlighted that high tariffs can significantly hinder U.S. exports of fruits and nuts, leading to substantial revenue losses. This underscores the importance of targeting large import markets with favorable tariff policies to enhance export performance.

However, our study extends prior research by demonstrating that geographic proximity does not always dictate export success. Research by Jun et al. (2017) suggests that while proximity can facilitate trade, factors such as product quality, logistical efficiency, and trade agreements can mitigate the disadvantages of geographic distance. This indicates that exporters can achieve success in distant markets by leveraging these factors effectively.

Furthermore, while previous studies have primarily focused on developed economies, our research contributes by analyzing emerging economies such as Türkiye, China, South Africa, Russia, India, and Brazil. This comparative approach highlights unique trade patterns and resilience factors in developing economies, adding a new dimension to the existing literature on global agricultural trade. For example, research by Sithole-Pisa & Viviers, (2010), on South African edible nuts emphasizes the potential of emerging markets in expanding export opportunities

5.2. Implications for Export Strategy and Policy

The results of this study provide actionable insights for policymakers and export strategists. For countries with a high dependence on proximity, such as South Africa and China, enhancing trade infrastructure and negotiating additional trade agreements with neighboring countries can further strengthen regional trade potential. These countries may focus on maximizing their regional market shares before expanding to distant, high-cost markets.

Conversely, Türkiye's flexibility suggests that policies supporting a balanced export strategy could be advantageous. Maintaining established trade routes with both regional and distant markets can provide Türkiye with a more resilient export framework, capable of withstanding regional economic fluctuations. Türkiye's unique position as a bridge between continents suggests that further integration with both European and Middle Eastern trade networks could support continued export growth across diverse markets.

For Brazil, India, and Russia, where distance to market shows a moderate to weak impact on export performance, targeting high-demand markets irrespective of distance may yield the greatest return on investment. Focusing on high-value markets in North America and Europe, while also building logistical efficiency, could enable these countries to capture value in distant but economically promising regions.

5.3. Limitations and Future Research

While this study provides valuable insights, several limitations should be acknowledged. First, the correlation analysis primarily captures linear relationships and may not fully account for non-linear dynamics in export performance. Additionally, other factors such as product-specific demand, currency exchange rates, and political stability in target markets could also influence export volumes and should be explored in future research.

Furthermore, this study relied on aggregate data for the edible fruits and nuts sector, which may obscure product-specific trends. Future research could disaggregate this category to examine whether proximity impacts differ by specific products (e.g., dried fruits vs. nuts) within the sector. Lastly, an examination of how changes in tariff policies or global trade agreements affect proximity's impact over time could provide dynamic insights, particularly given the evolving trade landscape.

In conclusion, this study illustrates the varying impact of geographic proximity on export performance in the edible fruits and nuts sector across six emerging economies. While proximity plays a substantial role for some countries, economic potential and strategic flexibility allow others to overcome geographic constraints. By understanding these nuanced patterns, policymakers and export strategists can tailor their approaches to enhance global competitiveness, focusing resources on the most viable markets and optimizing trade strategies for long-term success. As global trade dynamics continue to shift, an adaptable, data-driven approach to export market prioritization will be essential in helping these countries secure their positions in the global edible fruits and nuts market.

REFERENCES

Aleskerova, Y., & Fedoryshyna, L. (2023). Financial mechanism in the system of economic vectors of development of hotel and restaurant and agricultural enterprises. *Baltic Journal of Economic Studies*, *9*(4), 19-30. https://doi.org/10.30525/2256-0742/2023-9-4-19-30

Anderson, J. E., & Van Wincoop, E. (2003). Gravity with gravitas: A solution to the border puzzle. *American economic review*, *93*(1), 170-192. https://doi.org/10.1257/000282803321455214

Calder, R. S., Dimanchev, E., Cohen, S., & McManamay, R. A. (2024). Decision support for United States—Canada energy integration is impaired by fragmentary environmental and electricity system modeling

capacity. *Environmental Research: Infrastructure and Sustainability*, 4(3), 033002. https://doi.org/10.1088/2634-4505/ad763e

Cameron, M., Viviers, W., & Steenkamp, E. (2017). Breaking the 'big data'barrier when selecting agricultural export markets: an innovative approach. *Agrekon*, *56*(2), 139-157. https://doi.org/10.1080/03031853.2017.1298456

Cameron, M., & Viviers, W. (2017). Using a decision support model to identify export opportunities: Rwanda (Final report). International Growth Centre. https://www.theigc.org/wp-content/uploads/2017/10/Viviers_and_cameron_2017_Final_report.pdf

CBI. (2018). *Exporting edible nuts and dried fruits to Europe*. https://www.cbi.eu/sites/default/files/pdf/research/651.pdf

CBI. (2024). *Exporting edible nuts and dried fruits to Europe*. https://www.cbi.eu/market-information/processed-fruit-vegetables-edible-nuts/edible-nuts-dried-fruits/europe

Dellino, G., Laudadio, T., Mari, R., Mastronardi, N., & Meloni, C. (2018). A reliable decision support system for fresh food supply chain management. *International Journal of Production Research*, *56*(4), 1458-1485. https://doi.org/10.1080/00207543.2017.1367106

Hosseinikahnouj, S. and Sojasi qeidari, H. (2025). Identification and analysis of challenges and drivers of commercialization of rural knowledge-based businesses with the fuzzy Delphi method. *Journal of Rural Research*, (), -. https://doi.org/10.22059/jrur.2024.374367.1928

Jun, B., Alshamsi, A., Gao, J., & Hidalgo, C. A. (2017). Relatedness, knowledge diffusion, and the evolution of bilateral trade. *arXiv* preprint https://arxiv.org/abs/1709.05392

Krugman, P., Obstfeld, M., & Melitz, M. J. (2003). *International economics: Theory and policy*. Addison-Wesley.

Kupsik, W., & Pawlak, K. (2024). Competitive Position of EU Candidate Countries and Eastern Partnership Countries in Trading Fruit and Vegetables in the Single European Market. *Agriculture*, *14*(11), 1997. https://doi.org/10.3390/agriculture14111997

Linders, G. J. M., Slangen, A., de Groot, H. L. F., & Beugelsdijk, S. (2005). Cultural and institutional determinants of bilateral trade flows (TI Discussion Papers No. 05-074/3). Tinbergen Institute

Manuel, L. A. (2024). *Coproduction, Development, and Application of Numerical Modeling Decision Support Tools for the Mississippi River and Gulf of Mexico* (Doctoral dissertation, Tulane University).

Mir, J., Dehghan Dehnavi, H., & Rabbani, M. (2024). Identifying and Prioritization the Factors Affective the Development of Industrial Clusters With Knowledge-based Companies. *Public Management Researches*, *17*(65), 347-372. https://doi.org/10.22111/jmr.2024.42547.5799

Pearson, K. (1895). VII. Note on regression and inheritance in the case of two parents. *Proceedings of the royal society of London*, *58*(347-352), 240-242. http://dx.doi.org/10.1098/rspl.1895.0041

Rashidinia, M., Karimi, F., & Ghorbani Dinani, H. (2024). Identifying and prioritizing the export opportunities of Iranian petrochemical products in the countries of the Eurasian Economic Union: the application of an integrated decision support model-economic complexity. *Quarterly journal of Industrial Technology Development*, *22*(57), 85-110. https://doi.org/10.22034/jtd.2024.713013

Salkind, N. J. (2010). *Encyclopedia of research design* (Vols. 1–0). SAGE Publications. https://doi.org/10.4135/9781412961288

Sardar Shahraki, A., & Ali Ahmadi, N. (2024). Analysis of Obstacles in the Supply Chain of Saffron in the Livelihood of Villagers in Qaynat County; Application of Gray Analysis Technique (GRA). *Village and Space Sustainable Development*, *5*(3). https://doi.org/10.22077/vssd.2024.7574.1249

Sener, H. Y. (2014). Determining new markets using Analytic Hierarchy Process: case study in Güral Porcelain. *International Journal of Marketing Studies*, *6*(5), 149. https://doi.org/10.5539/ijms.v6n5p149

Sisodiya, M. S., Manjunath, B. L., & Shekhawat, S. (2023). Improved Agricultural Value Chains: A Programme for Extension Approach. *International Year of Millets 2023*, 63.

Sithole-Pisa, N. M., & Viviers, W. (2010). The export potential of South African edible nuts with specific reference to the export of macadamia nuts to Germany. *Agrekon*, *49*(4), 484-504. https://doi.org/10.1080/03031853.2010.526693

Subana, M., & Sanjeewa, D. D. P. (2024). Physical Servicescape's Role in Customer Satisfaction and Loyalty: Special Reference to Boutique Hotels in Nuwara-Eliya District, Sri Lanka. *3rd International Research Conference of National Library of Sri Lanka*

Szabo, Z. K., Szádoczki, Z., Bozóki, S., Stănciulescu, G. C., & Szabo, D. (2021). An analytic hierarchy process approach for prioritisation of strategic objectives of sustainable development. *Sustainability*, *13*(4), 2254. https://doi.org/10.3390/su13042254

Tsusaka, T. W., Kristiansen, P., Ho, T. D., & Chandio, A. A. (2023). Adaptation strategies to climate change impacts on food systems in Asia: greater efforts toward achieving the Sustainable Development Goals. *Frontiers in Sustainable Food Systems*, *7*, 1284383. https://doi.org/10.3389/fsufs.2023.1284383

Tyukhtenko, N. (2024). Topical issues of formation transport and logistics infrastructure of Ukraine in the conditions of European integration and global challenges of today. *Economic Sustainability and Business Practices, 1*(1), 9-16. https://doi.org/10.21272/1817-9215.2024.3-02

US International Trade Commission (ITC). (2009) *India: Effects of Tariffs and Non-Tariff Measures on US Agricultural Exports*. Investigation No.332-504, USITC Publication 4107. https://www.usitc.gov/publications/332/pub4107.pdf

USDA (2024). *China's Nuts and Dried Fruits Market Update*. https://www.fas.usda.gov/data/china-chinas-nuts-and-dried-fruits-market-update

Zeng, J. (2024). *Original web dramas and Chinese subscription video-on-demand services: patterns and benefits* (Doctoral dissertation, University of Glasgow). https://doi.org/10.5525/gla.thesis.84560