Indian Farmer
Volume 13, Issue 08, 2026, Pp. 438-446
Available online at: www.indianfarmer.net
ISSN: 2394-1227 (Online)

Original Article

OPEN ACCESS

Trade Direction and Market Stability of Kenyan Mango (*Mangifera indica*)

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Received: 07/08/2026 *Accepted on:12/08/2026*

INTRODUCTION

Kenya's mango industry has evolved from a predominantly domestic enterprise into one of the country's most promising horticultural export sectors. Blessed with favourable climatic conditions, diverse agroecological zones and a wide range of commercial varieties such as Apple, Kent, Keitt, Tommy Atkins, Ngowe and Van Dyke, Kenya has become one of Africa's leading mango producers [1]. The fruit is cultivated mainly in Makueni, Machakos, Embu, Kilifi, Tana River, Kwale and Meru counties, providing livelihoods to hundreds of thousands of smallholder farmers [1,2]. Despite this production potential, only a relatively small proportion of Kenya's mango harvest reaches international markets, while a significant share is sold domestically or lost through post-harvest spoilage [3]. Expanding export opportunities, therefore, remains crucial pathway for increasing farmer incomes, reducing post-harvest losses and strengthening Kenya's horticultural competitiveness [4].

Understanding Trade Direction

Trade direction refers to the geographical pattern or flow of exports from one country to its importing markets. In context of Kenyan mangoes, trade direction describes the countries and regions where Kenyan mangoes are exported and the relative importance of these destinations over time.

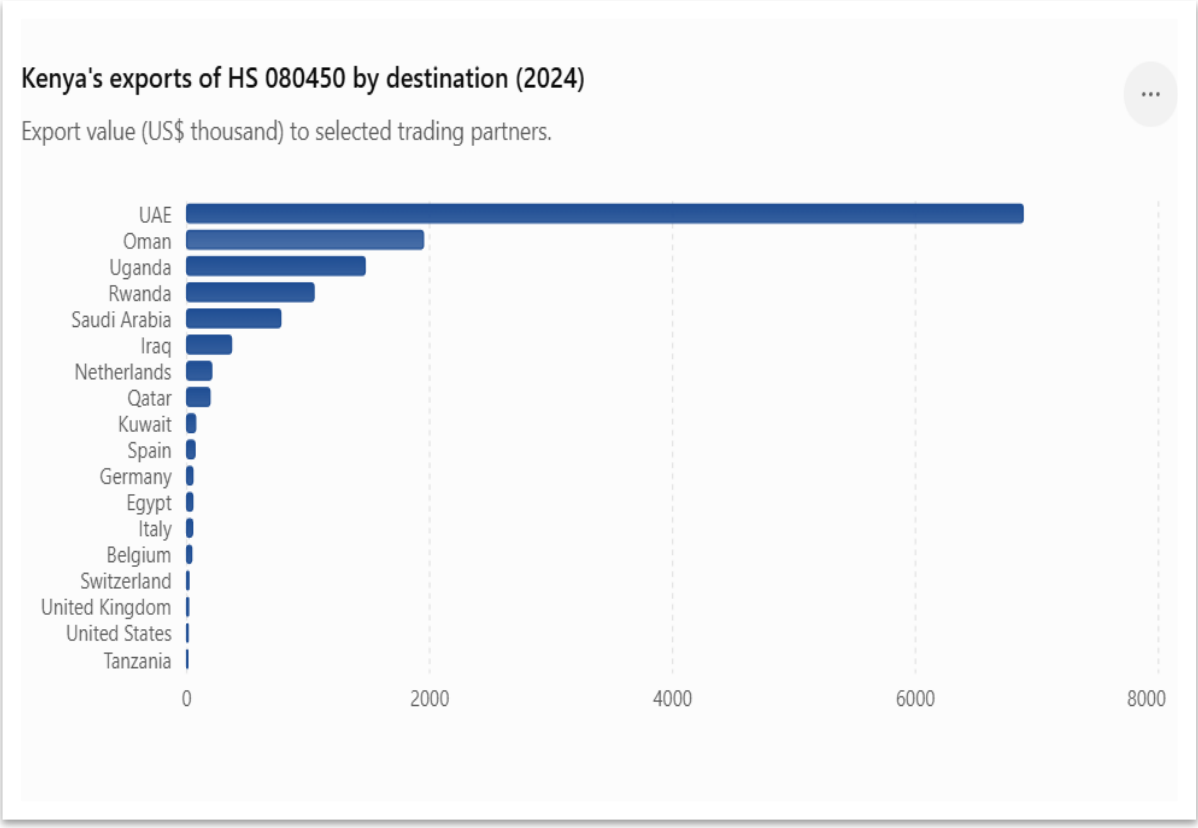
Kenya's main export partners are United Kingdom, Netherlands, Uganda, Tanzania, United States and Pakistan back 2012. In 2012, UK was Kenya's largest export partner which accounted for more than 10% of total export volumes and remained so even before the EU was formed. Additionally, by 2011 Kenya's export trade growth with USA grew by 30% from $226 million in 2009 to $293 million in 2011, recorded as 110th largest goods export market in 2018 that amounted to $365 million [5].

After formation of European Union, it has been identified as destination for 92% of Kenya's horticulture exports, with United Kingdom and the Netherlands each importing 32%, France 17% and Germany 11% [6]. Moreover, UK retailers by 2009 controlled 70-90% of fresh produce imported

from Kenya and other Sub-Saharan countries, indicating a concentration of market control within the importing region [7]. The export market has diversified reduces market risk, with Kenya's mango exports directed toward three major regional blocks, Middle East and Gulf countries, European Union and Regional East African market. However, the share of export directed to EU has been declining due to the stringent rules on Global GAP, Sanitary and phytosanitary standards and controlled chemical residue [8].

Where Does Kenya Export Mangoes?

Trade statistics based on 2020-2022 time series data obtained from International Trade Centre (Trade Map) indicate that Kenya exports mangoes to numerous international destinations [9]. From the data, international Harmonized System (HS) trade code, was used to identify Fresh or dried guavas, mangoes and mangosteens which bares a six-digit code as HS 080450. Thus, the principal importing countries were (Figure 1) United Arab Emirates (UAE), Oman, Saudi Arabia, Qatar, Kuwait, Netherlands, Germany, Spain, France, United Kingdom, Italy. Belgium, Uganda, Rwanda, Tanzania, Egypt, Iraq, Switzerland and United States, with India and China as emerging markets [10].



NB: These figures are given in US dollars to indicate the economic value of each market.

Figure 1: Kenya Export of Mango under code HS 080450 by destination in 2024

The Gulf region has become particularly important because of its large expatriate population, growing demand for tropical fruits, efficient logistics and relatively short shipping times from East Africa [9]. The European Union on the other hand remains attractive because of its large consumer market and premium prices, although exporters must comply with stringent phytosanitary standards, traceability requirements and quality certifications [2,9] Moreover, regional African

markets like Uganda and Rwanda provide additional opportunities due to proximity, lower transport costs and fewer regulatory barriers [10].

How is the market share by destination?

Table 1: Market Share by Destination

Rank	Destination	Export value (US$ '000)	Market share (%)
1	United Arab Emirates	6,886	49.15
2	Oman	1,948	13.91
3	Uganda	1,469	10.49
4	Rwanda	1,048	7.48
5	Saudi Arabia	774	5.53
6	Iraq	369	2.63
7	Netherlands	205	1.46
8	Bahrain	192	1.37
9	Qatar	191	1.36
10	Hong Kong (China)	174	1.24

Where is Trade Direction?

This is identified by the Trade Direction Index which is the share of exports going to major regional blocks. Therefore, trade direction in Kenya (Table 2) is moving towards Middle East/Gulf, East Africa and Europe, an indication that Kenya's export orientation has become increasingly towards Gulf (Middle East), with the United Arab Emirates emerging as the dominant export destination throughout the five years study period. The UAE recorded highest export value (6,886) and a strong positive growth rate (Table 3) of CAGR = 9.8%, confirming its importance as principal and fastest-expanding market. Oman remained the second most significant destination, exhibiting relatively stable export performance (1,948) despite a modest growth rate of CAGR = 1.3%. Overall, the results suggest that the export flow is increasingly oriented toward Gulf Cooperation Council (GCC) countries, particularly the UAE, which offers the greatest potential for future market expansion due to its sustained demand and growing import capacity [10].

What is market stability?

Market stability refers to the ability of an export destination to provide consistent demand, predictable prices, reliable purchasing relationships and long-term market access with minimal fluctuations. A stable market will be characterised by the following attributes;

I. Continuous import demand throughout the years.

II. Predictable purchasing volumes.

III. Stable or gradually increasing prices.

IV. Reliable trade policies and import regulations.

V. Strong buyer-seller relationships.

VI. Efficient logistics and payment systems.

For fresh produce like mangoes, market stability is particularly important because the fruit is highly perishable, and stable markets will reduce marketing uncertainty and encourage farmers and exporters to invest in quality improvement, cold chain infrastructure and value addition [1,2,10] Therefore, this article identifies the market stability using 5 years period time series bringing out the direction of trade in terms of how export destinations have changed over time, determining stability of market in terms of consistent imports rather than one-off purchases and also by computing market share and compound annual growth rate indicators to strongly support objective of stable export market.

Market stability is determined by coefficient of variation (CV) which is given by;

$$CV = \frac{\sigma}{\mu} \times 100$$

Where;

CV = Coefficient of variation

σ= Standard deviation (sample)

μ= Mean

Table 3: Market Stability Index and Compound Annual Growth Rate (CAGR) from 2020–2024

Importing country	2020	2021	2022	2023	2024	Mean	CV (%)	CAGR (%)
United Arab Emirates	4,736	8,643	8,470	7,846	6,886	7,316	21.80	**9.8**
Oman	1,849	1,766	2,356	1,892	1,948	1,962	11.70	**1.3**
Uganda	2,566	833	1,029	1,492	1,469	1,478	45.40	-13.0
Rwanda	579	981	2,474	2,074	1,048	1,431	56.08	15.99
Saudi Arabia	2,077	2,474	2,408	1,275	774	1,802	41.43	-21.9
Iraq	1	192	475	326	369	273	67.00	338.3*
Netherlands	11	167	16	125	205	105	84.00	107.8*
Qatar	863	203	367	175	191	360	71.91	-31.4
Kuwait	27	56	94	83	73	67	42.13	28.2

**The high CAGR values are due to extremely small starting value in 2020 and cannot be interpreted as sustained market growth. (From the dataset CAGR percentage greater than 20 (>20%) indicates rapidly growing market, between 10-20 is a strong market and from 0-10 indicates a slow but positive market growth, whereas a 0% CAGR shows a stable market with no long-term growth, with < 0% showing a declining market.)*

Compound annual growth rate (CAGR), when used in conjunction with market stability indices, identifies the export markets that are more stable and more favourable direction of trade. It is one of the best indicators for trade analysis for measuring average annual rate at which exports are growing or declining over a period of time, assuming a constant rate of growth. It smoothens out year-to-year fluctuations providing an overall trend.

$$\text{CAGR} = \left(\frac{\text{Beginning Value}}{\text{Ending Value}} \right)^{1/n} - 1$$

Where;

Beginning Value = Value of export in 2020,

Ending Value = value of export in 2024,

n = number of years in intervals (4 intervals from 2020 to 2024).

Therefore, results (Table 3) indicate that export market performance varied considerably across importing countries during 2020–2024 in terms of average export value, growth and stability. Results also show that United Arab Emirates as the leading market, recording highest mean export value (7,316) and a strong positive CAGR of 9.8%, reflection of sustained market expansion despite moderate year-to-year fluctuations (CV = 21.8%). However, Oman ranked as a stable market with a mean export value of 1,962, lowest variability (CV = 11.7%) and a modest CAGR of 1.3%, indicating consistent but slow growth. Thus, these results suggest that UAE and Oman markets has strong long-term growth and stable opportunities due to high values of CAGR and lower coefficients of variation, with Rwanda and Kuwait exhibiting a strong positive growth but high volatility [5,10].

Which Country Offers the Most Stable Market?

Although Kenyan mangoes are exported to many countries, evidence suggests that the United Arab Emirates (UAE) currently offers one of the most stable export markets for Kenyan mangoes.

Table 4: Ranking of Market Stability and Trade Direction

Country	CAGR (%)	CV (%)	Interpretation
United Arab Emirates	+9.81	21.84	Growing and moderately stable with largest export market
Oman	+1.31	11.72	Highly stable but slow-growing
Rwanda	+15.99	56.08	Fast-growing but highly volatile
Uganda	−13.02	45.41	Declining and volatile
Saudi Arabia	−21.87	41.43	Declining and volatile
Qatar	−31.42	71.91	Declining and highly volatile
Kuwait	+28.23	42.13	Fast-growing but volatile
Maldives	+46.92	41.85	Fast-growing but volatile
Iraq	+338.28*	66.99	Emerging but highly volatile*
Netherlands	+107.77*	83.99	Emerging but highly volatile*

Note: *Market stability was assessed using the coefficient of variation (CV) calculated from annual export values for 2020–2024. Lower CV values indicate greater market stability. Markets were classified as highly stable (CV < 20%), moderately stable (20% ≤ CV < 40%), and volatile (CV ≥ 40%). The sample standard deviation (n−1) was used in calculating the CV.*

The CAGR and coefficient of variation (CV) analysis reveals substantial differences in the growth potential and stability of Kenya's mango export markets. The United Arab Emirates (UAE) remains the strongest overall market, combining steady export growth (CAGR = 9.81%) with relatively low variability (CV = 21.84%), making it both an expanding and dependable destination. Oman exhibits the highest market stability (CV = 11.72%) but only marginal growth (CAGR = 1.31%), suggesting a mature market with limited expansion opportunities. Among the rapidly expanding markets, Maldives (CAGR = 46.92%) and Kuwait (CAGR = 28.23%) demonstrate strong growth despite relatively high variability, indicating attractive but less predictable export prospects. Similarly, Rwanda shows considerable growth (CAGR = 15.99%) but experiences substantial fluctuations (CV = 56.08%), reflecting an unstable yet promising market. In contrast, Uganda, Saudi Arabia, and Qatar record negative CAGR values, indicating declining export performance, while their moderate to high CV values suggest that these markets are also unstable and therefore less attractive for long-term export planning. Although Iraq (CAGR = 338.28%) and the Netherlands (CAGR = 107.77%) exhibit exceptionally high growth rates, their very high coefficients of variation (66.99% and 83.99%, respectively) indicate that this growth is based on small or irregular export volumes and should therefore be interpreted cautiously as emerging rather than established market opportunities. Results suggest that the UAE offers the best balance between growth and stability, Oman provides a reliable but slow-growing market, while Maldives, Kuwait, Rwanda, Iraq and the Netherlands present high-growth opportunities that require careful risk management due to their greater market volatility.

Strengthening Market Stability

To enhance long-term market stability, Kenya needs to invest in several strategic interventions like improving cold chain infrastructure that can reduce post-harvest losses and maintain fruit quality during transportation [4,11]. Strengthening farmer cooperatives and advisory services can increase bargaining power and ensure consistent supply volumes demanded by international buyers [2,12]. Compliance with international food safety standards, improved traceability, and wider adoption of certification schemes will facilitate access to premium markets [1,13]. In addition, value addition through dried mangoes, mango puree, juice, concentrates, and frozen products can reduce dependence on fresh fruit exports and stabilize export earnings throughout the year [2,5]. Government agencies, including the Agriculture and Food Authority (AFA), together with export promotion institutions and private-sector stakeholders, also have an important role in negotiating market access, supporting exporters with technical compliance, and promoting Kenyan mangoes through international trade fairs and branding initiatives [5,13].

The Role of the European Market

Although the UAE provides remarkable market stability, European countries continue to represent premium-value destinations [14,15]. The Netherlands, Germany, France, Spain, Belgium, and the United Kingdom import Kenyan horticultural products through sophisticated distribution systems. Among these, Netherlands deserves special attention because it functions as Europe's major logistics hub [15]. However, European markets present greater challenges whereby exporters must comply with strict Maximum Residue Limits (MRLs), GLOBALG.A.P. certification, phytosanitary inspections, traceability systems and increasingly demanding sustainability requirements [14,15], which increase production costs but also reward compliant exporters with premium prices [16,17].

Emerging Opportunities

Beyond traditional destinations, several emerging markets are creating new opportunities for Kenyan mango exporters. India has demonstrated growing demand for tropical fruits and with Indias' mango season alternating with that of Kenya, it stands a potential destination export market for Kenya [18]. Recent horticultural reports also identify expanding opportunities in Mexico and Portugal, a diversification of export markets that can reduce dependence on a limited number of buyers and improve resilience against market shocks [19,20].

Looking Ahead

Kenya's mango industry possesses enormous export potential, supported by favorable production conditions and increasing global demand for tropical fruits. The country's trade direction has expanded from regional African markets to the Gulf, Europe and emerging Asian destinations. While numerous countries import Kenyan mangoes, United Arab Emirates stands out as the most stable market because of its consistent demand, efficient logistics, favorable trading environment and role as a regional distribution hub. Meanwhile, the European Union continues to offer high-value opportunities for exporters who are capable of meeting stringent quality standards.

Future growth will depend on diversifying export destinations, strengthening cold chain systems, enhancing compliance with international standards and investing in value addition. By pursuing these strategies, Kenya can transform its mango industry into a more resilient, competitive and sustainable contributor to agricultural exports and rural economic development.

Limitation of the article

Data extracted from 2020-2024 period (years) from International Trade Centre database, is an official bilateral trade statistics which bears trade code HS 080450 that represents 'Fresh or dried guavas, mangoes and mangosteens' combined. Therefore, the limited exports quantities of guava and mangosteen make Kenya utilise these figures as a close proxy for fresh mango exports.

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