Adept Journal of Agricultural and Environmental Sciences (AJAES)
Vol. 2, No. 1 (2026)
https://journals.unizik.edu.ng/index.php/ajaes

NIGERIA'S AGRICULTURAL EXPORT TRADE WITH SELECTED AFRICAN PARTNER COUNTRIES: TRADE INTENSITY, EXPORT POTENTIALS AND GRAVITY MODEL ANALYSIS

DAVID F.A., REUBEN J. and ZUBAIRU I. A. *

Department of Agricultural Economics and Extension, Taraba State University, Jalingo, Nigeria.

Corresponding Author:
ibrahim.z@tsuniversity.edu.ng
0009-0001-5965-7774

DOI:
https://doi.org/10.5281/zenodo.23137094

Copyright © 2026 The Author(s). THIS IS AN OPEN ACCESS ARTICLE DISTRIBUTED UNDER THE TERMS OF CREATIVE COMMONS ATTRIBUTION NONCOMMERCIAL-NODERIVATIVES 4.0 INTERNATIONAL (CC BY-NC-ND 4.0), WHICH PERMITS ANYONE TO SHARE, USE, REPRODUCE AND REDISTRIBUTE IN ANY MEDIUM, PROVIDED THE ORIGINAL AUTHOR AND SOURCE ARE CREDITED

ABSTRACT*: This study analyzed Nigeria's agricultural export trade with selected African partner countries, focusing on trade intensity, unrealized export potential, and the economic and geographical factors influencing bilateral exports. The study covered nine African countries: Côte d'Ivoire, Ghana and Togo in West Africa; South Africa, Angola and Zimbabwe in Southern Africa; and Egypt, Morocco and Algeria in North Africa. Secondary annual data covering 2020–2024 were obtained from the International Trade Centre (Trade Map), UN Comtrade, CEPII and the World Bank. Agricultural products classified under Harmonized System (HS) Chapters 01–24 were examined, with particular attention to cocoa beans, sesame, cashew nuts and ginger. Descriptive and trend analyses, Trade Intensity Index and International Trade Centre Export Potential Map were employed, while pooled Ordinary Least Squares, Fixed Effects, Random Effects and robust estimators were used to estimate the gravity model. The results indicated substantial fluctuations and relatively limited export flows for several agricultural commodities across the selected African markets. The Export Potential Map revealed unrealized opportunities in several destinations, particularly Morocco, Egypt, Algeria and South Africa, although the magnitude varied by commodity. The Hausman specification test supported the Fixed Effects model. Nigeria's GDP had a negative and significant effect on agricultural exports, while destination-country GDP had a positive and significant effect in the Fixed Effects specification. Destination population exhibited a negative and significant coefficient, although its interpretation was constrained by substantial multicollinearity with destination GDP. Geographical distance negatively influenced exports in the pooled, Random Effects and robust specifications. The study recommends strengthening trade facilitation, transport infrastructure, export logistics, product quality compliance, and market-specific export promotion to improve Nigeria's utilization of identified African agricultural export opportunities. These measures could enhance market access and support sustained expansion of agricultural exports within the African regional market.*

KEYWORDS: *Agricultural exports, Trade intensity, Export potential, Gravity model, African trade, Nigeria.*

Introduction

International trade promotes economic growth by enabling countries to specialize, access larger markets, earn foreign exchange and improve resource allocation. Agricultural trade is particularly important for developing economies because of its contribution to employment, income generation, economic diversification and non-oil export earnings. In Nigeria, agricultural products such as cocoa, sesame, cashew, ginger and other commodities remain important components of the non-oil export base. Empirical evidence indicates that expanding agricultural and agri-food exports could contribute to Nigeria's economic diversification and strengthen its participation in international markets (Abdullahi *et al*., 2021; Busari & Kehinde, 2021).

Nigeria's agricultural export opportunities are particularly important within the African market. As a major West African economy and member of ECOWAS, Nigeria has established trade relationships with several African countries, while the African Continental Free Trade Area (AfCFTA) provides a broader framework for expanding intra-African trade. However, regional market access does not automatically translate into increased agricultural exports, as trade flows are influenced by economic size, market demand, geographical distance, transportation costs and other bilateral characteristics. Evidence from African trade studies suggests that regional trade arrangements can improve market integration and create opportunities for agricultural export expansion (Edeme *et al*., 2022).

Despite these opportunities, Nigeria's agricultural exports remain constrained by inadequate infrastructure, high logistics costs, limited value addition and difficulties in meeting market and quality requirements. Using a gravity-model framework, Abdullahi *et al*. (2021) found that economic size, importer population, ECOWAS membership and contiguity influenced Nigeria's agri-food exports, while geographical distance negatively affected trade. Similarly, Busari and Kehinde (2021) reported that Nigeria's GDP positively influenced agricultural trade, whereas distance reduced trade flows. These findings demonstrate that Nigeria's agricultural export performance depends not only on domestic production capacity but also on the economic and geographical characteristics of destination markets.

Nevertheless, existing studies have largely examined Nigeria's agricultural trade over longer periods and across broad international markets. Less attention has been given to the recent pattern of Nigeria's agricultural exports specifically within African markets during the period 2020–2024,

including differences between actual and potential trade across destinations. Recent evidence from Nigeria's commodity-specific export studies also indicates that some trading partners may record unrealized export opportunities (Olalere *et al*., 2025). This creates a need for a contemporary assessment of Nigeria's agricultural export destinations and the factors shaping bilateral export flows within Africa. Against this background, this study investigates Nigeria's agricultural exports within the African region, identifies destination markets with unrealized export potential, and examines the economic and geographical factors influencing Nigeria's bilateral agricultural exports using the gravity-model framework.

Despite Nigeria's substantial agricultural production capacity and strategic position in the African regional economy, its agricultural export potential within African markets remains underutilized. Agricultural products are important to the country's non-oil export base, but exports continue to face constraints such as inadequate infrastructure, high transportation and logistics costs, limited value addition, quality requirements, and difficulties in accessing regional markets. These challenges may limit Nigeria's ability to benefit fully from expanding intra-African trade opportunities. The issue is particularly relevant given Nigeria's participation in ECOWAS and the African Continental Free Trade Area (AfCFTA). However, regional trade agreements alone do not guarantee increased bilateral agricultural exports, as trade flows also depend on economic size, market demand, geographical distance, transportation costs, and other country-specific factors. Understanding these determinants is therefore important for assessing Nigeria's agricultural export performance within African markets.

Previous studies provided useful evidence but left important gaps. Abdullahi *et al*. (2021), using a gravity model for Nigeria's agri-food exports to 70 major trading countries from 1995 to 2019, found that economic and geographical factors influenced export performance and identified unrealized export potential in some markets. Similarly, Busari and Kehinde (2021) reported significant effects of Nigeria's GDP and geographical distance on agricultural trade flows over 1970–2019. However, these studies covered broader international markets and longer historical periods, providing limited evidence on the recent pattern of Nigeria's agricultural exports within Africa. Furthermore, limited attention has been given to identifying African markets where Nigeria may have unrealized export potential alongside examining the factors influencing bilateral export flows. This creates an empirical gap regarding the contemporary structure and determinants of

Nigeria's agricultural exports during 2020–2024, a period of increasing emphasis on intra-African trade and continental market integration. Addressing this gap can provide evidence for improving market targeting, trade facilitation, logistics, export promotion, and regional agricultural trade strategies. Accordingly, this study examines Nigeria's agricultural exports within the African region, identifies destination markets with unrealised export potential, and determines the economic and geographical factors influencing bilateral agricultural exports using the gravity-model framework.

Objectives of the Study

The broad objective of this study is to examine Nigeria's agricultural export performance and trade potential within selected African markets from 2020 to 2024.

The specific objectives are to:

1. Examine the export growth performance of selected Nigerian agricultural commodities, particularly cocoa, sesame, ginger, and cashew, in selected African markets from 2020 to 2024.
2. Assess the unrealised export potential of selected Nigerian agricultural commodities in selected African destination markets.
3. Estimate the determinants of Nigeria's agricultural exports to selected African countries using the gravity model of international trade.

Methodology

This study focused on selected Nigerian partner countries across the broader African region to analyse Nigeria's agricultural export trade. Africa comprises 55 countries, as recognised by the United Nations, and spans approximately 29.65 million km² of land, with a population exceeding 1.5 billion people as of 2024 (United Nations, 2024a). Within this vast continental context, agricultural production systems and trade flows are significantly influenced by prevailing climatic conditions, which determine distinct agroecological and geographic zones. These zones affect crop suitability, production potentials, and the patterns of intra-continental agricultural trade that form the foundation of this research (United Nations, 2024a). For this study, nine major African partner countries were selected, representing three key geographic regions, West Africa, Southern Africa, and North Africa, each with distinct agro-ecological characteristics and socio-economic contexts:

West African Zone: This zone typically comprises tropical and subtropical climates, ranging from humid coastal zones to semi-arid interiors, conducive to a variety of staple and tree-crop

cultivation. The selected countries in this zone are Côte d'Ivoire, Ghana, and Togo. West Africa covers an area of approximately 6.06 million km². It has an estimated population of around 466.5 million people in 2025, making it one of the most densely populated and agriculturally active regions on the continent (United Nations, 2024b; Worldometer, 2025). The climatic diversity supports diversified agricultural systems, from cocoa and oil palm in the humid south to cereals and legumes in savanna areas, contributing to both domestic food security and regional trade.

Southern African Zone: Southern Africa is characterised by semi-arid to sub-tropical climates, with significant variation between coastal zones and highland plateaus that influence agricultural production. In this region, South Africa, Angola, and Zimbabwe are considered key partners in Nigeria's agricultural exports. The Southern African region covers about 2.65 million km² and had a population of approximately 74 million in 2025, making it the least densely populated African subregion yet critical to trade dynamics due to its unique climatic zones and export-oriented agriculture (United Nations, 2024c; Worldometer, 2025). Agriculture in this zone includes maize, livestock, horticultural products, and irrigated high-value crops, with climatic variability increasingly affecting production patterns.

North African Zone: North Africa includes predominantly arid and Mediterranean climatic regimes, where irrigated agriculture along river basins and coastal plains forms the basis of production. The selected North African partners are Egypt, Morocco, and Algeria. The North African subregion covers approximately 7.77 million km² of land and had an estimated population of about 276.3 million in 2025 (United Nations, 2024d; Worldometer, 2025). Egypt's Nile irrigated systems, Morocco's diversified agricultural sector, and Algeria's extensive arid lands with pockets of productive irrigated agriculture reflect the region's agro-ecological diversity and its influence on trade in cereals, horticultural produce, and processed agricultural products.

Classifying these partner countries within their respective geographic and agro-ecological zones underscores how climatic conditions and regional demographic and land-use patterns shape agricultural production capabilities and trade relations with Nigeria. This regional segmentation provides the analytical framework for assessing Nigeria's export performance and comparative advantage across diversified African agricultural markets.

The African region comprises 55 nations as recognized by the United Nations, with the return of Morocco, which has an estimated population of over 1.2 billion people. The region covers a total

area of approximately 30million km^2 (Pannhausen and Untied, 2010). The region can be divided into three agro-ecological production zones, which are mainly determined by prevailing climatic conditions. These zones are important factors in existing agricultural production systems and intra-regional agricultural trade flows.

Secondary data on yearly time series of bilateral merchandise export values for all categories of agricultural commodities (HS Codes 01-24) at 2-digit levels were obtained from the Trademap (ITC-International Trade Centre Database) for the period 2020-2024. The choice of this period was to examine the impact of Nigeria's current administration and regional strategies on export trade in agricultural and food products. All product values were measured in US Dollars, in thousands. The revised 2002 edition of the Harmonised System (HS) of product classification was adopted. Other data sources included the UNCOMTRADE database and weighted distance data from the website http://www.cepii.fr. The data on population and national GDP series were from the World Bank Data Bank.

Data Analysis

The trade intensity index (TII) was pioneered by Brown (1947) and developed and popularized by Kojima (1964) as applied by Drysdale and Garnaut (1982). The model was later modified and used by Mothana (2005) and Reuben and Arene (2013), was used to address objective (i). TII is expressed in two forms: the export intensity index (XII) and the import intensity index (MII), which was specified as follows:

$$TII_{ij} = \frac{X_{ij}/X_i}{X_{wj}/X_w} \quad (1)$$

Where:

TII_{ij} = Trade Intensity Index of exports from country i to country j
X_{ij} = exports from country i to country j
X_i = total exports of country i
X_{wj} = total world exports to country j
X_w = total world exports

The trade intensity index assumes that trade regionalization occurs when there is a high concentration of trade flows biased to a certain geographical region. Thus, the index indicates the intensity of trade within a sub-region. For instance, a value greater than one shows that a region's trade is not only biased to but also gives more importance to a particular region than it does to the world market. To achieve objective(ii), the study used the International Trade Centre's (ITC) Export Potential Map (EPM) to identify African markets where Nigeria has room to expand its

agricultural exports. The analysis examined Nigeria's current export levels relative to the estimated export potential of the specific agricultural products under study across different African markets. The difference between the estimated potential and actual exports shows the export potential gap. A positive gap suggests scope for Nigeria to increase its exports to that market. The markets with the largest potential gaps were therefore identified as the destinations with the greatest opportunities for expanding Nigeria's agricultural exports.

Export Potential Analysis

To address objective (ii), the study used the International Trade Centre's (ITC) Export Potential Map (EPM) to identify African markets where Nigeria has opportunities to expand exports of the selected agricultural commodities. The analysis compared estimated export potential with actual export values for each commodity and destination market. The export potential gap was calculated as follows:

EPG_{ij}=EP_{ij} - AX_{ij} (2)

Where:

(EPG_{ij}) = export potential gap for commodity (i) in destination country (j);
(EP_{ij}) = estimated export potential for commodity (i) in destination country (j);
(AX_{ij}) = actual exports of commodity (i) to destination country (j).

A positive gap indicates estimated room for additional exports, whereas a zero or negative gap indicates that actual exports have reached or exceeded the estimated potential. Markets with the largest positive gaps were identified as priority destinations for further consideration. These estimates represent model-based opportunities and should not be interpreted as guaranteed export outcomes.

Gravity model analytical framework was used to address objective (iii), has been used in several fields of study, such as human migration and investment flows across countries; its application in international trade seems to dominate its overall use. The gravity trade model borrows from Isaac Newton's (1687) "Law of Universal Gravitation", which postulates that the force of attraction, F_{ij}, between two separate entities *i* and *j* is a positive function of the entities' respective masses, m_i and m_j, and inversely related to the squared distance, d_{ij}, between the objects. This law is formalized as seen in equation 3:

$$\boxed{F_{ij} = G\frac{M_i M_j}{D_{ij}^2}} \quad (3)$$

Where notation is defined as follows

F_{ij} = the attractive force.

M_i and M_j = are the respective two countries' masses.
D^2_{ij} = the distance between the two objects.
G = a gravitational constant depending on the units of measurement for mass and force.

In analyzing trade, the basic gravity trade model, which has been used in empirical work over the years, was originally specified by Tinbergen (1962) and Poyhonem (1963) as seen in equation 4 as follows:

$$Trade_{ij} = \alpha \frac{GDP^{\beta 1} GBP^{\beta 2}}{D_{ij}^{\beta 3}} \quad (4)$$

Where $Trade_{ij}$ represents bilateral trade between country *i* and *j*, while GDP_i and GDP_j denote country *i* and *j*'s respective gross domestic products. D_{ij} is used as a proxy of bilateral distance between the two trading countries. In the formula above, α and βs are parameters and the sign of $\beta_1$and β_2 are expected to be positive, while that for β_3 will have *a priori* negative signs. Thus, comparing equations (3) and (4), it can be seen that in analyzing trade using the same gravity principle, the entities in equation (3) are replaced by a pair of countries in equation (4), while the countries' masses in equation (3) are proxied by the respective gross domestic product (GDP) in equation (4) with distance replaced by a variable representing resistance (which in most cases is the actual distance between the pair of trading countries).

Representing equation (4) in logarithmic format, a linear version of the model can be represented as seen in equation 5 as follows (Batra, 2004; and Ghosh and Yamarik, 2004):

$$In(Trade_{ij}) = \alpha + \beta_i \ln GDP + \beta_2 \ln GDP - \beta_3 \ln (D_{ij}) + \mu_{ij} \quad (5)$$

Where α, β_1, β_2 and β_3 are coefficients to be estimated. The disturbance error term (μ_{ij}) captures random events that which may have an impact on bilateral trade between the two trading countries and is assumed to be stationary, with a mean of zero and a constant variance. Thus equation (5) is the core gravity equation which has been used in all empirical studies, though with added right-hand side (RHS) variables (with each RHS variable added depending on the particular facet of trade being analyzed, the objectives to be achieved and availability of data). In this basic gravity, a positive correlation is expected between trade and GDPs, while a negative relationship will be expected between trade and distance.

Results and Discussion

Table 1: Annual Growth Rate of Nigeria's Cocoa Exports to Selected African Countries, 2020–2024

Destination	2020	2021	2022	2023	2024
Ghana	Nil	-99.9	-100.0	0.0	N/C
Togo	0.0	0.0	0.0	0.0	0.0
Angola	Nil	0.0	0.0	0.0	0.0
Algeria	Nil	0.0	0.0	0.0	0.0
South Africa	Nil	N/C	0.0	0.0	0.0
Egypt	Nil	-99.9	-100.0	0.0	N/C
Morocco	Nil	0.0	0.0	0.0	0.0
Zimbabwe	Nil	0.0	0.0	0.0	0.0
Côte d'Ivoire	Nil	0.0	0.0	0.0	0.0

Source: Author's computation from trade data, 2026

Annual Growth Rate of Nigeria's Cocoa Exports

The result in Table 1 shows that Nigeria's cocoa exports to the selected African destinations were generally very low and irregular during 2020–2024. Ghana recorded a decline of 99.9% in 2021 and 100% in 2022, while Egypt similarly recorded declines of 99.9% and 100% over the same period. The zero or nil growth recorded for several destinations should not necessarily be interpreted as evidence of stable export performance because, in many cases, the underlying export value was either extremely small or zero. Similarly, the "not computable" observations arise because percentage growth cannot be calculated where the preceding year's export value was zero.

The result indicates that Nigeria did not maintain a strong and continuous cocoa-export presence in most of the selected African markets during the period. This finding is important because Nigeria remains a significant cocoa-producing country, yet its cocoa export performance does not appear to have translated into sustained trade expansion across the selected African destinations. The finding is partly consistent with Aluko *et al*. (2021), who observed that although Nigerian cocoa exports remained internationally competitive, the industry experienced declining stages in its export performance.

The finding also contrasts with the positive long-run export drivers reported by Ogbanje and Ihemezie (2023), who found that cocoa output and cocoa export earnings were positively associated with Nigeria's long-run cocoa export performance. The difference may arise because

the present analysis is specifically concerned with African destination markets over 2020–2024, whereas the earlier study examined Nigeria's aggregate cocoa export performance over a much longer period. Thus, an increase in Nigeria's overall cocoa export capacity does not necessarily imply proportional growth in exports to every African destination.

Table 2: Annual Growth Rate of Nigeria's Sesame Exports to Selected African Countries, 2020–2024

Destination	2020	2021	2022	2023	2024
Ghana	Nil	-100.0	0.0	0.0	0.0
Togo	Nil	0.0	0.0	0.0	0.0
Angola	Nil	N/C	-100.0	0.0	0.0
Algeria	Nil	62.13	134.58	79.61	-90.10
South Africa	Nil	-69,100.0	N/C	316.20	281.80
Egypt	Nil	-96.54	-12.50	1,852.70	32.29
Morocco	Nil	0.0	0.0	0.0	0.0
Zimbabwe	Nil	0.0	0.0	0.0	0.0
Côte d'Ivoire	Nil	0.0	0.0	0.0	0.0

Source: Author's computation from trade data, 2026.

Annual Growth Rate of Sesame Exports

The result in Table 2 indicates considerable volatility in Nigeria's sesame exports to the selected African countries. Algeria recorded positive growth of 62.13% in 2021, 134.58% in 2022 and 79.61% in 2023 before declining by 90.10% in 2024. Egypt also experienced substantial fluctuations, including a remarkable 1,852.70% increase in 2023 followed by a 32.29% increase in 2024. South Africa recorded an extremely large negative growth rate in 2021 and substantial positive growth in subsequent years. The very high growth rates should, however, be interpreted cautiously because they can result from small initial export values. For example, the reported Nigerian sesame export value to Egypt was only about US$31,490 in 2021 and US$35,750 in 2022. Consequently, a relatively small absolute change can produce a very large percentage growth rate. The result therefore demonstrates volatility rather than necessarily indicating a large expansion in the absolute volume of trade.

The finding is consistent with Okoronkwo, Njoku and Agwu (2024), who found that sesame export performance in Nigeria was significantly influenced by factors such as exchange rate and sesame production, both in the long and short run. This supports the view that changes in production and

macroeconomic conditions can produce substantial changes in export performance. However, the present result differs from a simple expectation of continuous export expansion, because some African markets experienced sharp declines despite Nigeria's continued sesame-export activity. This may reflect differences in destination demand, competing suppliers, transaction costs and the concentration of Nigeria's sesame exports in non-African markets.

Table 3: Annual Growth Rate of Nigeria's Ginger Exports to Selected African Countries, 2020-2024

Destination	2020	2021	2022	2023	2024
Ghana	Nil	N/C	N/C	N/C	N/C
Togo	Nil	N/C	N/C	N/C	N/C
Angola	Nil	N/C	N/C	N/C	N/C
Algeria	Nil	N/C	-100.0	N/C	N/C
South Africa	Nil	-27.65	118.57	-41.22	-89.05
Egypt	Nil	75.39	-1.17	44.90	-91.32
Morocco	Nil	98.36	246.53	130.83	-99.53
Zimbabwe	Nil	N/C	N/C	N/C	N/C
Côte d'Ivoire	Nil	N/C	N/C	N/C	N/C

Source: Author's computation from trade data, 2026.

Annual Growth Rate of Ginger Exports

The result in Table 3 shows that Nigeria's ginger exports to the selected African markets were highly unstable during 2020–2024. Morocco recorded strong positive growth between 2021 and 2023, with growth rates of 98.36%, 246.53% and 130.83%, respectively, before recording a sharp decline of 99.53% in 2024. Egypt recorded positive growth in 2021 and 2023 but experienced a 91.32% decline in 2024. South Africa also experienced alternating increases and decreases.

The result indicates that Nigeria's ginger export performance differed substantially across African destinations and years. The sharp decline recorded in 2024 may be associated with supply-side and market disruptions affecting the Nigerian ginger industry during the period. However, because the table represents growth rates rather than production or causal estimates, such explanations should be regarded as possible contributing factors rather than direct causal conclusions. The finding agrees broadly with Okoronkwo *et al*. (2024), who found that Nigerian ginger export performance was significantly influenced by ginger export price, export volume, interest rate, exchange rate and ginger production in both the long and short run. It also corresponds with the earlier evidence

of Alabi *et al*. (2021/2022) that ginger export performance in Nigeria is influenced by export quantity, exchange rate, interest rate and price-related variables. Importantly, the decline in selected African destinations does not necessarily mean that Nigeria's total ginger exports declined by the same magnitude. WITS data, for example, show that Nigeria exported ginger to several international markets, including the United Arab Emirates, Sudan, India, Germany and Vietnam. Thus, the result primarily demonstrates destination-specific instability.

Table 4: Nigeria's Export Potential for Cocoa Beans in Selected African Markets

Destination	Potential (US$)	Actual (US$)	Unrealised Potential (US$)
Ghana	0	0	0
Togo	0	0	0
Côte d'Ivoire	0	0	0
South Africa	27,000	0	27,000
Angola	868	0	868
Zimbabwe	0	0	0
Egypt	0	0	0
Morocco	6,700	0	6,700
Algeria	137,000	0	137,000

Source: ITC Export Potential Map data, 2026.

Export Potential for Cocoa

The result in Table 4 shows that Algeria recorded the largest estimated unrealised export potential for Nigerian cocoa beans, valued at US$137,000, followed by South Africa at US$27,000 and Morocco at US$6,700. Angola recorded a relatively small estimated opportunity of US$868. The result suggests that selected African markets may provide additional opportunities for Nigeria's cocoa exports, particularly where estimated potential exists but actual exports were recorded as zero. However, the estimated potential should be interpreted as a model-based trade opportunity rather than a guaranteed export value.

The finding is particularly relevant when considered alongside evidence that Nigerian cocoa remains internationally competitive. Aluko *et al*. (2021) found that Nigeria's cocoa industry remained competitive in international markets despite weaknesses in export performance. Therefore, the existence of unrealised opportunities in African markets may reflect destination-specific market access, demand, trade relationships and transaction costs rather than an absence of Nigerian cocoa competitiveness.

Table 5: Nigeria's Export Potential for Sesame in Selected African Markets

Destination	Potential (US$)	Actual (US$)	Unrealised Potential (US$)
Ghana	72,000	1,300	71,000
Togo	105	0	105
Côte d'Ivoire	12,000	0	12,000
South Africa	245,000	410,000	0
Angola	14,000	0	14,000
Egypt	4,400,000	536,000	3,900,000
Morocco	11,000,000	2,300	11,000,000
Algeria	2,700,000	1,400,000	1,400,000

Source: ITC Export Potential Map data, 2026.

Export Potential for Sesame

The result in Table 5 indicates that Morocco represents the largest estimated unrealised sesame export opportunity, with approximately US$11 million, followed by Egypt with US$3.9 million and Algeria with US$1.4 million. Ghana, Côte d'Ivoire and Angola also recorded smaller unrealised opportunities. On the other hand, South Africa recorded actual exports of US$410,000 against estimated potential of US$245,000. This indicates that the model's estimated potential should not be interpreted as a maximum permissible export value. Rather, it represents an estimated opportunity under the conditions incorporated in the Export Potential Map methodology.

The result is relevant to the findings of Okoronkwo *et al*. (2024), who established that sesame production and exchange-rate conditions significantly influence Nigerian sesame export performance. Hence, exploiting identified market opportunities would also depend on Nigeria's capacity to maintain production, quality, competitiveness and favourable trade conditions.

Table 6: Nigeria's Export Potential for Cashew Nuts in Selected African Markets

Destination	Potential (US$)	Actual (US$)	Unrealised Potential (US$)
Ghana	276,000	181,000	95,000
Togo	485	0	485
Côte d'Ivoire	—	—	—
South Africa	569,000	414,000	155,000
Angola	55,000	44,000	11,000
Zimbabwe	—	—	—
Egypt	214,000	23,000	191,000
Morocco	86,000	102,000	760,000*
Algeria	163,000	40,000	123,000

Source: ITC Export Potential Map data, 2026.

Export Potential for Cashew Nuts

The result in Table 6 shows unrealised cashew export opportunities in Ghana, South Africa, Angola, Egypt and Algeria. Egypt recorded an estimated unrealised opportunity of US$191,000, while South Africa and Algeria recorded US$155,000 and US$123,000, respectively. The result is consistent with the broader evidence that Nigerian cashew export performance has been unstable. Ogunwolu *et al*. (2024) found that Nigeria's cashew export value experienced substantial fluctuations and that production and exchange-rate conditions were important determinants of export value.

Table 7: Nigeria's Export Potential for Ginger in Selected African Markets

Destination	Potential (US$)	Actual (US$)	Unrealised Potential (US$)
Ghana	410,000	429,000	409,000*
Togo	87,000	0	87,000
Côte d'Ivoire	20,000	867	19,000
South Africa	557,000	1,200,000	0
Angola	19,000	0	19,000
Zimbabwe	140	—	140
Egypt	446,000	1,200,000	0
Morocco	2,300,000	1,200,000	1,100,000
Algeria	44,000	0	44,000

Source: ITC Export Potential Map data, 2026.

Export Potential for Ginger

The result in Table 7 shows that Morocco has the largest clearly reported unrealised ginger export potential among the selected African destinations, estimated at US$1.1 million. Togo, Algeria, Côte d'Ivoire and Angola also have smaller estimated opportunities. Conversely, actual exports to South Africa and Egypt exceeded the reported potential estimates.

The result demonstrates that Nigeria's ginger export opportunities are not evenly distributed across African markets. This finding agrees with Okoronkwo *et al*. (2024), who established that ginger export performance is influenced by production, prices, exchange rates and other macroeconomic variables. The result also agrees with Alabi *et al*. (2021/2022), who identified exchange rate, interest rate, export price and domestic producer-price conditions among the factors influencing Nigerian ginger export performance. The implication is that identified market potential can only

be translated into actual exports where production and market conditions allow Nigerian exporters to compete effectively.

Table 8: Estimates of the Gravity Model of Nigeria's Agricultural Exports to Selected African Countries

Variables	Pooled OLS	Fixed Effects	Random Effects	Robust OLS
ln Nigeria GDP	-0.4146	-1.1968***	-0.7412***	-0.6718*
ln Destination GDP	0.3491	0.2824**	0.1514	0.1968
ln Destination Population	-0.1651	-6.4213***	-0.5948	0.0395
ln Distance	-1.7616***	Omitted	-1.1879*	-1.6986***
Year effects	No	Yes	Yes	Yes
Observations	45	45	45	45
Countries	—	9	9	—
R^2	0.6689	0.9567 within	0.5265	0.6925
F/Wald statistic	20.20***	110.39***	384.75***	12.48***

Note: *, ** and * significance at 10%, 5% and 1%, respectively.**

Gravity Model of Nigeria's Agricultural Exports

The result in Table 8 shows that the fixed-effects model provides the preferred specification based on the Hausman test reported below. The coefficient of Nigeria's GDP is negative and statistically significant at the 1% level under the fixed-effects specification ($\beta = -1.1968$; $p < 0.01$). This indicates that, holding the other variables constant within the model, increases in Nigeria's GDP were associated with lower agricultural exports to the selected African destinations during the study period.

This finding disagrees with Busari and Kehinde (2021), who reported a positive influence of Nigeria's GDP on agricultural trade flows. It also differs from Abdullahi *et al*. (2021), who found economic size, including Nigeria's GDP, to stimulate Nigeria's agri-food exports. The divergence may be associated with the shorter 2020–2024 period, the restriction of the present study to nine African destinations and the unusual economic and trade conditions during the period.

The coefficient of destination-country GDP is positive and statistically significant at the 5% level in the fixed-effects model ($\beta = 0.2824$; $p = 0.013$). This means that larger destination economies were associated with higher Nigerian agricultural exports. This finding agrees with Abdullahi *et al*. (2021), who found that economic size of Nigeria and its trading partners stimulates Nigerian agri-food exports. It is also consistent with the theoretical expectation of the gravity model that

larger economies generate greater trade flows. Destination population has a negative and statistically significant coefficient in the fixed-effects model ($\beta = -6.4213$; $p < 0.01$). This finding disagrees with Abdullahi *et al*. (2021), who reported that the importer population positively stimulated Nigeria's agri-food exports. Nevertheless, negative population effects are not impossible in gravity models. Previous IMF gravity evidence indicates that population can have a negative coefficient where larger populations are associated with greater domestic self-sufficiency or lower income per person for a given GDP level.

Finally, distance has a negative and statistically significant coefficient in the pooled OLS and robust OLS models, with coefficients of −1.7616 and −1.6986, respectively. The random-effects coefficient is also negative and weakly significant (−1.1879; $p = 0.078$). This finding agrees with Busari and Kehinde (2021) and Abdullahi *et al*. (2021), both of whom identified distance as a negative determinant of Nigeria's agricultural/agri-food trade. It is also consistent with broader evidence that geographical distance constitutes a significant impediment to intra-African trade.

Conclusion

The study examined Nigeria’s agricultural export performance and export opportunities in selected African markets, focusing on cocoa, sesame, ginger and cashew. The results show that exports to the selected African destinations were generally low, irregular and highly volatile between 2020 and 2024. The export-potential analysis, however, revealed unrealized opportunities for expanding Nigeria’s agricultural exports, particularly for sesame in Morocco, Egypt and Algeria, cocoa in Algeria and South Africa, cashew in Egypt and South Africa, and ginger in Morocco. The gravity-model results further show that destination-country GDP had a positive and significant effect on Nigeria’s agricultural exports, while Nigeria’s GDP and destination population recorded negative coefficients in the fixed-effects model. Distance was negatively associated with exports in the pooled, random-effects and robust models. The Hausman test supported the fixed-effects specification, while the Wooldridge test indicated serial correlation and the VIF results revealed substantial multicollinearity between destination GDP and population. Overall, the findings indicate that Nigeria has opportunities to expand agricultural exports within Africa, but greater market access, production capacity, trade facilitation and efficient logistics are required to translate these opportunities into actual exports.

Recommendations

Based on the findings, the study recommends that:

1. Nigeria should target identified African markets with unrealized export potential, particularly for sesame, cocoa, cashew and ginger.
2. Production and product quality should be improved through better inputs, extension services, processing, packaging and compliance with export standards.
3. Trade and transport infrastructure should be strengthened to reduce the cost and difficulty of moving agricultural products to African markets, given the negative effect of distance on exports.
4. Export market information and financing should be improved to enable producers and exporters to respond effectively to demand and market opportunities.
5. Commodity-specific export strategies should be developed, since the level of export potential differs considerably across commodities and destination countries.

References

Abdullahi, N. M., Aluko, O. A., Huo, X., Zhang, Q., Shahriar, S., Kea, S., & Abdullahi, A. M. (2021). Nigeria's cocoa exports: A gravity model approach. *Ciência Rural, 51*(11), e20201043. https://doi.org/10.1590/0103-8478cr20201043

Abdullahi, N. M., Huo, X., Zhang, Q., & Azeez, A. B. (2021). Determinants and potential of agri-food trade using the stochastic frontier gravity model: Empirical evidence from Nigeria. *SAGE Open, 11*(4), 1-16.

Abdullahi, N. M., Zhang, Q., Shahriar, S., Kea, S., & Huo, X. (2021). Relative export competitiveness of the Nigerian cocoa industry. *Competitiveness Review, 32*(6), 1025-1046.

Alabi, O. O., Madaki, M. J., Sanusi, S. O., Umar, S. A., Omole, E. B., Olumuyiwa, S. A., David, H. S., Emeghara, U. U., Waziri-Ugwu, P. R., & Shaba, M. G. (2022). Factors influencing

export performance of ginger (*Zingiber officinale*) in Nigeria. *International Journal of Agriculture, Environment and Food Sciences, 6*(3), 370-377.

Brown, A. J. (1947). *Applied economics: Aspects of the world economy in war and peace*. George Allen & Unwin.

Busari, A. O., & Kehinde, A. L. (2021). Macro economic variables and Nigeria agricultural trade flows: A gravity model analysis approach. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, 21*(4), 95-100.

Drysdale, P., & Garnaut, R. (1982). Trade intensities and the analysis of bilateral trade flows in a many-country world: A survey. *Hitotsubashi Journal of Economics, 22*(2), 62-84. https://doi.org/10.15057/7939

Edeme, R. K., Nkalu, C. N., & Iloka, C. E. (2022). Potential impacts of free trade areas and common currency on sustainable agricultural export in Africa. *Journal of Public Affairs, 22*, e2392. https://doi.org/10.1002/pa.2392

International Trade Centre. (2025). *Export Potential Map*. International Trade Centre.

Kojima, K. (1964). The pattern of international trade among advanced countries. *Hitotsubashi Journal of Economics, 5*(1), 16-36. https://doi.org/10.15057/8091

Ogbanje, E. C., & Ihemezie, E. J. (2023). Cocoa export growth and long-run export drivers in Nigeria: A vector error correction model approach. *Agricultural Economics and Extension Research Studies, 11*(2), 85-102.

Ogunwolu, Q. A., Adesanya, K. A., Orisasona, T. M., Adesida, F. A., & Alli, M. A. (2024). Factors affecting the export value of Nigerian cashew nut: A time series analysis. *Agro-Science, 22*(2), 38-42. https://doi.org/10.4314/as.v22i2.6

Okoronkwo, F. C., Njoku, M. E., & Agwu, N. M. (2024). Determinants of export of selected non-traditional products in Nigeria from 1980 to 2022. *Nigeria Agricultural Journal, 55*(3), 974-989.

Olalere, J. O., Raufu, M. O., & Akinyode, A. E. (2025). Trends analysis and trade potential assessment of Nigeria's sesame export: Gravity model approach. *International Journal of Agricultural Economics and Rural Development, 15*(1), 1-10.

Pöyhönen, P. (1963). A tentative model for the volume of trade between countries. *Weltwirtschaftliches Archiv, 90*, 93-100.

Reuben, J., & Arene, C. J. (2013). *[Trade intensity reference—full publication details require verification from the original source]*.

Tinbergen, J. (1962). *Shaping the world economy: Suggestions for an international economic policy*. Twentieth Century Fund.

World Bank. (2015). *Connecting food staples and input markets in West Africa: A regional trade agenda for ECOWAS countries*. World Bank.

World Bank. (2021). *A blueprint for strengthening food system resilience in West Africa: Regional priority intervention areas*. World Bank.

World Bank. (2023). *Regional integration removes barriers to development in Africa*. World Bank.