

Macroeconomic Determinants of Kenya's Manufactured Exports to Regional Trading Blocs in East African Countries

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ABSTRACT: Manufactured exports are closely linked to the process of structural transformation within economies. This article examines the determinants of manufactured exports of Kenya to the trading blocs in the East African region. The article was adapted from a thesis that analysed the manufactured exports of Kenya using panel data modelling and secondary data from the country's six trading partners within the East African community between 1976 and 2022. The factors examined in this article include the level of human development, the level of FDI within the country and the development of the country's trade infrastructure. Other variables that were controlled for in the analysis of the manufactured exports of Kenya included the country's GDP, the distance between the exporting and importing countries, the inflation rates of the two countries and the historical and geographical linkages between the two countries. The methodology for this article used an explanatory design with data described through descriptive statistics, correlation coefficients, unit-root tests, cointegration tests, linear regression models and model selection tests. The results of the study indicated that the GDP of the importing and exporting countries had positive and statistically significant coefficients. The distance between the two countries had a negative and statistically significant coefficient. The level of FDI had a positive and statistically significant coefficient. The infrastructure of the exporting country had a negative coefficient in the final model. Historical and geographical variables had positive and statistically significant coefficients. The study concludes that Kenya's manufactured exports depend on the level of productive investments into the economy, trade infrastructure, the level of human development and the stability of the economy. To increase the manufactured exports of Kenya, policies that aim to attract FDI into its manufacturing industries, improve trade infrastructure, upgrade the technical skills within the manufacturing industries and increase the trade facilitation between East African Community countries will be beneficial to the Kenyan economy.

KEYWORDS: Manufactured exports, foreign direct investment, infrastructure, human development, gravity model, regional integration, East African Community, Kenya.

1. INTRODUCTION

Manufacturing exports are crucial to economic development as they allow countries to move beyond the exporting of primary products to more complex manufactured goods that add more value to the primary products. The trade theories that describe the determinants of manufacturing exports include the concepts of comparative advantage, economies of scale, technology, productivity and access to markets (Balassa, 1965; Krugman, 1980; Helpman & Krugman, 1985; Grossman & Helpman, 1991). For developing economies, manufacturing exports are particularly crucial for economic development as they lead to the creation of industrial jobs and increase the economic resilience of those economies (Lall, 2000; Hausmann et al., 2007; Hidalgo & Hausmann, 2009). The Vision 2030 and industrialization strategy of Kenya necessitates an analysis of the factors that determine the volume of its manufactured exports to the other countries of the EAC.

The East African Community (EAC) is essential to the Kenyan economy as it allows for the Kenyan manufacturing industry to compete with other manufactured products from within the region. Regional economies allow countries to overcome the limitations of their domestic economies while also providing the opportunity for the young economies of the region to gain experience before competing with other manufactured products from the rest of the world (Carrere, 2006; Baier & Bergstrand, 2007; de Melo, 2013; Mukwaya, 2019). More specifically, the EAC countries are similar to Kenya in relation to its consumers and the information available to them regarding the products available from other countries within the same region. A study of the

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EAC in specific reveals that Kenya has become one of the main suppliers of manufactured products to other members of the EAC (Krantz, 2025; World Bank, 2020; World Trade Organization, 2019).

The gravity model of trade explains that the volume of trade between two economies increases with the size of those economies and the distance between them. This theory began with trade studies between nations with differentiated products such as agricultural and mineral products. More modern and rigorous economic theory, however, has developed the gravity model to include analyses of trade between economies with complex manufactured products (Tinbergen, 1962; Poyhonen, 1963; Linnemann, 1966; Anderson, 1979; Bergstrand, 1985; Anderson & van Wincoop, 2003). These models can be applied to the study of Kenya's manufactured products to the other members of the EAC. Furthermore, the gravity model can also incorporate other economic variables related to manufacturing and the volume of manufactured products exported (Deardorff, 1998; Baldwin & Taglioni, 2006; Head & Mayer, 2014).

Foreign direct investment (FDI) into Kenya has the potential to increase the volume of manufactured products exported from Kenya if the investments make in Kenya create new manufacturing technologies, increase productivity or allow Kenyan manufacturers to become increasingly involved with trade with other countries (Aitken et al., 1997; Greenaway et al., 2004; Javorcik, 2004; Harding & Javorcik, 2012; Kinuthia & Wahome, 2026). However, other studies of FDI into Kenya have shown that such benefits only occur under specific conditions relating to the manufacturing sector and the country's other economic attributes (Borensztein et al., 1998; Blomstrom & Kokko, 1998; Alfaro et al., 2004; Wang & Blomstrom, 1992). As such, the impact of FDI into Kenya on the ability of the Kenyan manufacturers to export more manufactured products to the other members of the EAC can be studied through a detailed analysis of the country's manufacturing and trade sectors.

Infrastructure within Kenya is another aspect that can have a major impact on the manufacturing and trade sector of Kenya. Improved roads, railways, ports, borders, and communications will allow for the Kenyan economy to reduce the costs and issues related to transporting its manufactured goods both domestically and to other EAC members (Lima & Venables, 2001; Wilson et al., 2005; Djankov et al., 2010; Portugal-Perez & Wilson, 2012). Infrastructure is also crucially important within the context of the EAC as the economic value of the trade agreements between the members of the EAC depend upon the ability of the manufactured and agricultural products of each country to travel efficiently between those members. Furthermore, both hard and soft infrastructure has been shown to have major impacts upon the export industries of many of the African members of the EAC (Bougheas et al., 1999; Francois & Manchin, 2013; Donaubauer et al., 2018).

Finally, the human development of Kenya is another crucial aspect of the manufacturing and trade sector of the Kenyan economy. Human development is essential to manufacturing as it is required to have humans to produce the goods that are exported (Lucas, 1988; Romer, 1990; Mankiw et al., 1992). Furthermore, human development and human capital within Kenya are also essential for the country to be able to compete with the other members of the EAC and to be able to export its manufactured products to other members of those trade unions (Nelson & Phelps, 1966; Benhabib & Spiegel, 1994; Hausmann et al., 2007; Costinot, 2009). Finally, human development can be described with the Human Development Index (HDI) of the country, which is a measurement of its education, health and general living standards (Levin & Raut, 1997; Hanushek & Woessmann, 2012; Golo, 2024).

Despite the Vision 2030 strategy that the Kenyan government has implemented, the increase in the manufactured exports of Kenya to other members of the EAC has not been realized. Furthermore, while Kenya is still one of the leading exporters of manufactured products within the region, the trade between Kenya and the other members of the EAC has not developed as much as was theorized or as was desired by the Kenyan government and the governments of the other members of the EAC despite the reduction of tariffs between the members of the EAC (World Bank, 2020; World Trade Organization, 2019). This issue is consistent with the other African economies that have trade agreements among their members (Foroutan & Pritchett, 1993; Longo & Sekkat, 2004; Agbodji, 2008; Brenton & Isik, 2012; Turkson, 2021). Thus, the purpose of this article is to convert the thesis into a journal article that reviews the various theories, analyses and econometric models that explain the determinants of Kenya's manufactured exports into the other members of the East African Community.

More specifically, the article will investigate four main areas regarding the trade between Kenya and other members of the EAC. The first area of research will investigate whether the size and growth of the other members of the EAC has led to increases in the manufactured exports of Kenya. The second main area of research will investigate whether FDI within Kenya has increased the manufactured exports of Kenya. The third main area of research will investigate whether the development of infrastructure into Kenya has increased the manufactured exports of Kenya. Finally, the fourth area of research will investigate whether the human development within Kenya has increased the manufactured exports of Kenya. Each of these aspects of Kenya will be reviewed in the article in hopes of contributing to the existing literature on the topic, especially in the African region where the evidence is less developed than within regions like Europe, Asia and North America (Santos Silva & Tenreiro, 2006; Helpman et al., 2008; Fosu, 2021; Krantz, 2025).

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The remainder of the article follows the structure of the attached manuscript template. Section 2 presents a review of the existing theories and analyses of the determinants of Kenya's manufactured exports. Section 3 explains the research design, data and model used to test those theories. Section 4 presents the results of the research and analyses those results. Finally, Section 5 presents the conclusions drawn from the research as well as recommendations for policy to increase the manufactured exports of Kenya to the other members of the East African Community.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The gravity model of trade, the dominant model in trade economics, holds that the trade between two countries is represented as increasing with the economic mass of the trading partners and decreasing with the distance between them. The gravity model was first used empirically in the study of trade. However, other economic theories have been applied to the model to develop new forms of the gravity model. Trade theories that have been applied to the gravity model include the expenditure system, product differentiation, theories of monopolistic competition, and the theory of multilateral resistance (Anderson, 1979; Bergstrand, 1985; Eaton & Kortum, 2002; Anderson & van Wincoop, 2003). The theory of multilateral resistance is crucial to the gravity model of trade because it posits that the trading activity between two countries depends on the relative trade costs between each of the different trading partners of both of those countries. Hence, the trade in manufactures between Kenya and any other country in the EAC is also dependent on the trade costs between those countries and each of the other members of the EAC.

Additional theories that help to form the basis of this study of Kenya's manufactured exports to the EAC include the theories of new trade and of the heterogeneous nature of firms within an economy. The theories of new trade posit that there are economies of scale in the manufacturing of certain goods, as well as that the differentiation of those goods is crucial to the trade between countries that are similar in their factor endowments (Krugman, 1980; Helpman & Krugman, 1985). The theory of the heterogeneous nature of firms in an economy suggests that only the most productive firms within an economy will choose to bear the costs of exporting goods from the economy to other countries in the world (Melitz, 2003; Bernard et al., 2007; Helpman et al., 2008). The theory of the heterogeneous nature of firms has implications for Kenya's manufactured exports because it indicates that the productivity of Kenyan firms will be crucial in determining the volume of those exports. Additional factors that will influence the productivity of Kenyan firms will include factors like FDI, infrastructure, and the level of human development within Kenya.

Furthermore, the theories of FDI also help to establish the basis for the study of Kenya's manufactured exports. Dunning's eclectic paradigm model of FDI indicates that the decisions of multinational firms to establish FDI abroad are influenced by the ownership advantages, the location advantages, and the internalization advantages of those firms (Dunning, 1988). FDI can have a positive influence on the manufactured exports of Kenya when those location advantages include access to a market like the EAC, skilled labour, and export infrastructure (Markusen & Venables, 1998). Empirically, studies of the effects of FDI in different countries have indicated that the effects of FDI on the economic growth of those countries are only realized if the human capital level within those countries is sufficient to support the investments that are made by those FDI companies (Borensztein et al., 1998). Additionally, the benefits of FDI to a country are also influenced by the development of financial markets within those countries (Alfaro et al., 2004). Thus, each of these economic theories provide a basis for the argument that FDI will have a positive effect on Kenya's manufactured exports, but only if established in the Kenyan production system of manufactured goods.

In addition to the theories of FDI, there are additional theories that help to establish the basis for the study of Kenya's manufactured exports into the EAC. The export-spillover theories posit that FDI by multinational firms can lead to other firms within a country to gain the techniques, technologies, and knowledge of exporting goods to other countries (Aitken et al., 1997; Greenaway et al., 2004). Additionally, the theories of backward linkages postulate that the introduction of FDI can lead to an increase in the productivity of domestic firms within a country, especially if those FDI policies are established to encourage exports (Javorcik, 2004; Harding & Javorcik, 2012). Finally, recent studies of FDI in different parts of the world, especially in developing economies, continue to find a relationship between the level of FDI within a country and its export levels (Ahmed et al., 2023; Islam, 2024). Thus, the first hypothesis of the study is that there is no significant relationship between FDI into Kenya and the volume of its manufactured exports to the other countries of the EAC.

Additional theories regarding Kenya's manufactured exports include those of the relationship of human capital and human development within the country to those export levels. The endogenous growth theories indicate that there are various forms of endogenous knowledge within an economy that can create and enable economic growth (Romer, 1986, 1990). Examples of such theories include the theories of human capital by Lucas (1988) and Mankiw et al. (1992), theories of human capital by Barro (1991) as they relate to education, and the theories of Nelson and Phelps (1966) and Benhabib and Spiegel (1994) as they relate to human

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capital and the use of technology. Each of these theories indicates a relationship between the development of human capital and the technological capabilities of a country and the level of its manufactured exports.

Additional theories of the relationship of human development to the manufactured exports of Kenya relate to the knowledge that human capital is also crucial to enabling countries to develop their technological manufacturing processes and techniques (Romer, 1986, 1990; Lucas, 1988; Mankiw et al., 1992; Barro, 1991). Additionally, studies of the techniques used in the manufacturing of exports indicate that human capital and knowledge of those techniques is crucial (Hausmann et al., 2007; Hidalgo & Hausmann, 2009). Thus, theories of human capital and human development provide a basis for the second hypothesis of this research study: that human development has no significant effect upon the manufactured exports of Kenya into the other members of the EAC. The theories of infrastructure within a country also help to form the basis of this research study. Infrastructure costs within trade can encompass a variety of different costs for a country and its trade. For instance, infrastructure costs can relate to road systems, railway systems, port systems, air systems, inland water systems, customs systems, and information and communication systems (Bougueas et al., 1999; Limao & Venables, 2001; Djankov et al., 2010; Portugal-Perez & Wilson, 2012). Additionally, the infrastructure within a country can have an effect upon the number of manufactured exports that the country produces; if infrastructure is developed in a way that allows manufactured products to be delivered to their destinations rapidly and efficiently, then Kenya should experience an increase in the number of its manufactured exports to other EAC members. Studies that relate to infrastructure costs indicate, for instance, that if there is a development in a country of additional paved roads, the number of products that are delivered to their destinations will likely decrease (Donaldson, 2018). Other studies indicate that investments in infrastructure alone may not have the expected effects on exports, as additional factors like infrastructure and institutions impact trade (Francois & Manchin, 2013; Donaubauer et al., 2018; Hoekman & Nicita, 2011). Thus, the third hypothesis of this research study is that infrastructure development within Kenya has no significant effect upon the number of manufactured exports of Kenya to the other members of the EAC.

A fourth theory that relates to the manufactured exports of Kenya includes the theories of regional integration. The theories of regional integration indicate that the formation of trade agreements between countries can lead to an increase in the trade between those countries by reducing the costs of trading with those members of the trade agreement (Viner, 1950; Carrere, 2006; Baier & Bergstrand, 2007). Additionally, these trade agreements can also have the counter-intuitive effect of reducing the trade between those countries and other members of the world's economies (Agbodji, 2008; de Melo, 2013; Turkson, 2021). The trade agreements between members of the EAC can lead to the increase in the manufactured exports of Kenya, especially as the formation of such an agreement reduces the trade costs between EAC members (Frankel & Rose, 2002; Head & Mayer, 2014). The inflation theories for Kenya are additionally incorporated into this study. The inflation theories posit that high levels of inflation can lead to the decrease in the competitiveness of the manufactured exports of Kenya; however, inflation can also be moderate yet still have an effect upon the manufactured exports of Kenya (Barro, 1995; Frankel & Romer, 1999). Additionally, high levels of inflation within Kenya are also likely to reduce the number of FDI activities in Kenya, which would also negatively impact the number of manufactured exports of Kenya (Bartlett et al., 2022). Thus, inflation is a factor that should be controlled for in this analysis of the manufactured exports of Kenya. Additionally, studies using the gravity model for different trade partners suggest that the effects of the macroeconomic and policy factors should be included in any study of bilateral trade in manufactured goods (Feenstra, 2004; Baldwin & Taglioni, 2006; Wooldridge, 2010).

The gravity model of trade can be used to determine the factors that contribute to the manufactured exports of Kenya into the other members of the East African Common market. These factors may include the GDP of Kenya and the other EAC members, the distance between Kenya and those other EAC members, the level of FDI within Kenya, the level of human development within Kenya, the level of infrastructure within Kenya, and the history and geography of the different members of the EAC common market (Anderson & van Wincoop, 2003; Melitz, 2003; Dunning, 1988; Romer, 1990; Baier & Bergstrand, 2007).

The literature regarding the effects of FDI on the manufactured exports of Kenya is additionally important in suggesting why it is necessary to perform a study on Kenya and FDI specific to the Kenyan economy. For instance, FDI can have the effect of substituting for exports in Kenya if those multinational companies are only interested in supplying the domestic market of Kenya with the manufactured goods that they produce (Barry & Bradley, 1997). However, other studies of countries like China show that the introduction of FDI into the country had the effect of increasing its manufactured exports to other countries around the world (Zhang & Song, 2001). Additionally, other studies show that both the industrial structure of a country and the policies regarding trade within that country will impact the extent to which FDI will have a positive effect upon the manufactured exports of that economy (Kneller & Pisu, 2007; Kokko et al., 2001). These various theories of the effects of FDI on manufactured exports indicate, therefore, that it is important to investigate FDI in the specific context of Kenya's economy.

Another reason that it is important to investigate the effects of FDI into Kenya is that Kenya's manufacturing firms are often established with limited capital, technological manufacturing processes, and distribution channels for their manufactured

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products. Therefore, FDI that enters the Kenyan manufacturing industries will provide the capital, technology, and distribution channels that are necessary to increase the manufactured exports of Kenya (Javorcik, 2004; Harding & Javorcik, 2012; World Bank, 2020; Fosu, 2021). However, these benefits from FDI will only be obtained if the FDI into Kenya is targeted towards the manufacturing of exported goods; if the FDI companies instead import the majority of their products for Kenya's domestic market, if they use a limited number of Kenyan workers, or if they export the majority of their products to Kenya's domestic market, then Kenya's exporting firms will fail to gain any benefits from the FDI into its economy. Thus, it is necessary for the FDI into Kenya to be of an appropriate type for Kenya's economy to gain any benefits from that FDI.

The theories of human development impacting the manufactured exports of Kenya additionally relate to the concept that human development is not limited to the education of the country's citizens alone. Human development is also comprised of indicators related to the health of the Kenyan population, as well as to the level of income of the Kenyan people (UNDP, 2023). The health of Kenya's population will impact the productivity of that country's labor force; healthier Kenyan citizens will have higher productivity rates than those with health problems (Becker, 1964). Additionally, the education of the Kenyan population will enable those Kenyans to more rapidly learn the techniques that are required to participate in the manufacturing processes of Kenya's manufactured exports (Schultz, 1961). Additionally, the level of income of the Kenyan population will allow those Kenyans to better participate in the manufacturing of Kenya's exports, as each export will require a certain level of labor and income of those Kenyan workers to achieve the high levels of productivity that are required for Kenyan manufactured exports to be competitive in their regional markets (Jones, 2014). Thus, each of the components of human development will impact the manufactured exports of Kenya.

The theories that suggest the relationship between human development and manufactured exports of Kenya can also include the impact of human development upon FDI into Kenya. For instance, studies of the effect of FDI into other countries indicate that those FDI companies will have an interest in those countries if the human capital of those countries are high (Borensztein et al., 1998). Thus, the higher levels of human development within Kenya will make Kenya more attractive to FDI companies than other countries in Africa (Golo, 2024). Additionally, the aspects of human development that will make Kenya especially attractive to FDI companies will relate to both the level of education of the Kenyan workers, as well as to the health of those Kenyan workers; FDI companies will want to be able to implement technology into Kenya's manufacturing industries that require high levels of skills to operate (Lall, 2000; Hanushek & Woessmann, 2012; Kafeel et al., 2026).

The theories of the impact of infrastructure upon the manufactured exports of Kenya additionally relate to the different aspects of infrastructure within Kenya. For instance, the impact of infrastructure upon the manufactured exports of Kenya may relate to aspects of Kenya's infrastructure other than paved roads; other aspects of infrastructure may include aspects of air systems, the level of development of Kenya's ports, the development of customs systems within Kenya, the level of development of information and communication systems within Kenya (Nordas & Piermartini, 2004; Shepherd & Wilson, 2009). Additionally, each of these aspects of infrastructure within Kenya can have a different impact upon the manufactured exports of Kenya than others; for instance, infrastructure related to air systems may not have as great an impact upon manufactured exports as aspects of infrastructure related to paved roads (Donaldson, 2018). Each aspect of infrastructure within Kenya may impact the manufactured exports of Kenya in different ways, and it is necessary to evaluate those aspects of infrastructure specifically in relation to Kenya and its manufactured exports.

A fifth and final theory that relates to Kenya and its manufactured exports of Kenya into other members of the EAC is the theories of regional integration. Regional integration theories state that if other members of the EAC increase the integration of their economies, they will reduce the number of trade costs between the members of the EAC (Viner, 1950; Carrere, 2006; Baier & Bergstrand, 2007). These countries will also create a market for their manufactured exports into each other. Thus, policies related to Kenya and the other members of the EAC will impact the number of manufactured exports of Kenya, especially if those policies relate to the infrastructure of the countries to each other or the development of customs systems between the members of the EAC (Brenton & Isik, 2012; Portugal-Perez & Wilson, 2012; Turkson, 2021).

The theories of the impact of the sophistication of the manufactured exports of Kenya additionally relate to the techniques used in the manufacturing of Kenya's products. For instance, if Kenya produces more sophisticated manufactured products, it will be able to experience growth in its economy (Hausmann et al., 2007; Hidalgo & Hausmann, 2009). Thus, the techniques in the manufacturing of Kenya's products will impact Kenya's manufactured exports. Additionally, other studies have indicated that the level of development of the manufacturing techniques in Kenya will impact Kenya's manufactured exports (Balland et al., 2022). Thus, it is important to investigate Kenya's manufactured exports to determine in what ways the sophistication of those products will impact the manufactured exports of that country.

Similarly, additional theories of the relationship between the manufacturing exports and other members of the EAC relate to the concept of using the regional market for manufactured exports as a market for learning techniques and technologies related to

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the manufacturing of goods that are to be sold to other members of the global economy. Other theories of regional integration indicate, however, that the integration of the members of the EAC will have a counter-intuitive effect upon the ability of those Kenyan firms to increase the complexity of the manufactured products that are exported by those Kenyan firms (Krantz, 2025). Thus, it is necessary for the study of Kenya and its manufactured exports to consider these additional theories of the impact of the region on those exports and their complexity.

The theories of the impact of the complexity of Kenya's manufactured products additionally relates to the theory that countries that export more sophisticated products will experience more growth in their economies than those that do not (Hausmann et al., 2007; Hidalgo & Hausmann, 2009). Thus, the techniques that are used in the manufacturing of Kenya's products will have a relationship with the manufactured exports of Kenya. Additionally, other studies have indicated that the level of development of the techniques within Kenya will also have an impact upon the complexity of Kenya's manufactured exports (Balland et al., 2022). Thus, the complexity of the techniques within Kenya will have an impact upon the complexity of the manufactured exports of Kenya to the other members of the EAC.

Furthermore, additional theories that relate to the manufactured exports of Kenya include the theories related to using the manufactures exports to other members of the EAC as a means of learning the techniques related to manufacturing goods that are to be exported to other members of the global economy. Additional theories of the impact of regional integration, however, indicate that the members of the EAC have focused upon integrating their agricultural and food processing industries, but have yet to develop an integration of their more sophisticated manufacturing industries (Krantz, 2025). Thus, the Kenyan economy should focus upon both increasing the number of its exports to other members of the EAC, as well as developing its manufacturing industries to those products that are to be exported to other nations around the world. Thus, the goal of Kenya's manufacturers should not be to increase the number of their goods that are to be sold to other members of the EAC, but to use such a regional market as a means of developing their capability of manufacturing higher valued goods for those other members of the EAC.

The conceptual framework implied by the study, therefore, runs from the macroeconomic determinants to the manufactured exports through three channels. The first channel is the capacity channel through which the foreign direct investments, the GDP, and the level of human development within Kenya all contribute to the country's production ability. The cost channel includes the impact of the distance to the trading partner, the infrastructure within the two countries, and the inflation rates within those economies. Finally, the market access channel consists of the GDP of the trading partner country, the shared border, language, and colonial history between the Kenyan and EAC economies (Anderson & van Wincoop, 2003; Melitz, 2003; Dunning, 1988; Romer, 1990).

The literature on these topics also raises concerns regarding methodology that were addressed within this study. The trade and most macroeconomic variables contain trends. Using regression models that use non-stationary variables may lead to spurious relationships between the variables under study. Using unit root and cointegration testing methods is essential when working with long time series of economic variables across different countries (Hadri, 2000; Levin et al., 2002; Westerlund, 2007). The gravity model also has issues with omitted variables, such as multilateral resistance, heteroskedasticity, and unobserved effects between different countries on the continent (Anderson & van Wincoop, 2003; Santos Silva & Tenreyro, 2006; Head & Mayer, 2014). Although the attached thesis used the mixed effects model rather than the PPML model, it recognised the importance of using one or the other.

This article seeks to fill a gap within the existing literature on Kenya's trade in general. Most studies examine the country's total exports figures, yet few investigate the country's manufactured exports to the other member countries within the EAC. Manufactured goods require different determinants to the other group of goods. For instance, the production of manufactured products requires different processing facilities, standards compliance, packaging requirements, labour skills, energy and transport costs for these products, and working capital to cover these costs. Furthermore, by focusing on Kenya's manufactured exports to the member countries of the EAC, this study supports the country's objectives regarding industrialization. Finally, by investigating the determinants of these manufactured exports, this study produces an outcome that reflects the impact of the country's macroeconomic variables on its economic performance.

3. METHODOLOGY

The type of research design that will be utilized in this study is an explanatory research design as it intends to provide an estimation of the effect of the selected macroeconomic determinants on Kenya's manufactured exports to the EAC countries. Explanatory research is used to determine the magnitude, direction, and significance of the variables in a research study (Wooldridge, 2010; Baltagi, 2021). This type of research design is appropriate for this research study as the research will use panel data to observe the effect of the variables on Kenya's manufactured exports to the EAC countries. Panel data analysis allows researchers to control

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for unobserved heterogeneity, use more degrees of freedom, and to observe within and between group variations in a research study (Arellano & Bond, 1991; Greene, 2018).

The data that will be used in this article is secondary data and will be data from the thesis dataset for Kenya and the other EAC partners from 1976 until 2022. The dependent variable for this study will be the manufactured exports of Kenya. The independent variables that will be used are the country's level of human development, FDI, and infrastructure development. Other control variables will be the GDP of the importing and exporting countries, the distance between the two countries, the inflation rates of the two countries, the existence of a common border, common language, and common colonial relationship between the two countries. The data for these variables will be sourced from international and regional organizations such as the World Bank, UNCTAD, UNDP, CEPII, the EAC, and other national sources of statistics and trade information. These organizations are common sources of data for trade and gravity models (Head & Mayer, 2014; World Bank, 2020; UNCTAD, 2023).

Table 1: Measurement of variables

Variable	Role	Symbol	Measurement	Expected sign/source
Manufactured exports	Dependent	KME	Kenya manufactured export goods to EAC partner countries	World Bank, KNBS and trade dataset
Importing-country GDP	Control	GDP _i	Gross domestic product of EAC partner country	Positive; market demand
Exporting-country GDP	Control	GDP _j	Kenya gross domestic product	Positive; export supply capacity
Distance	Control	DIST	Bilateral geographical distance between capitals/economic hubs	Negative; trade cost
Foreign direct investment	Independent	FDI	Net FDI inflows/equivalent annual FDI indicator	Positive; capital and technology channel
Infrastructure development	Independent	INFR	Infrastructure proxy, including paved-road or transport-related indicator	Positive in theory; trade-cost channel
Human development	Independent	HDI	Composite human development index covering education, health and living standards	Positive; capability channel
Inflation	Control	INF	Annual inflation rate	Ambiguous; macroeconomic stability/nominal value effect
Common colony	Dummy	CCO	1 if countries share colonial history, 0 otherwise	Positive; institutional familiarity
Common border	Dummy	CBO	1 if countries share border, 0 otherwise	Positive; lower distance and information cost
Common language	Dummy	CLN	1 if countries share official/common language, 0 otherwise	Positive; lower communication cost

Source: Author compilation (2026).

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The augmented gravity specification can be expressed as:

$$\ln KME_{ijt} = \beta_0 + \beta_1 \ln GDP_{i,t} + \beta_2 \ln GDP_{j,t} + \beta_3 \ln DIST_{ij} + \beta_4 FDI_{i,t} + \beta_5 INFR_{i,t} + \beta_6 HDI_{i,t} + \beta_7 INF_{i,t} + \beta_8 CCO_{ij} + \beta_9 CBO_{ij} + \beta_{10} CLN_{ij} + \mu_i + \varepsilon_{ijt}$$

The model's dependent variable is the measure of Kenya's manufactured exports to its trading partner country *i*. The independent variables include the GDP of the trading partner country *i*, the GDP of Kenya (country *j*), the distance between the two countries (DIST), foreign direct investment (FDI) into Kenya, the level of infrastructure development within Kenya (INFR), the human development index (HDI) within Kenya, the inflation rate within Kenya (INF), whether the two countries were within the same colony (CCO), if the countries had a common border (CBO), and if the countries had a common language (CLN). The values of each of these variables were logged as a standard practice in gravity models as the coefficients can be interpreted as elasticities and the transformations help to normalize the scales of the variables (Feenstra, 2004; Baldwin & Taglioni, 2006). However, as recognized by Santos Silva and Tenreyro (2006), the model is sensitive to heteroskedasticity and trade values of zero.

Prior to estimating the model, descriptive statistics and correlation analyses were conducted on the variables to gain an understanding of the data distribution and relationships between variables. The stationarity of the variables were tested using the Levin-Lin-Chu, Hadri LM, and Harris-Tzavalis panel unit root tests. The Levin-Lin-Chu test assumes that all variables share a common unit root process. Hadri's test reverses the null hypothesis to test for stationarity. The Harris-Tzavalis test is used with panel data sets with short time dimensions (Harris & Tzavalis, 1999; Hadri, 2000; Levin et al., 2002). The use of tests beyond the Levin-Lin-Chu test was performed for additional validation of the results as different stationarity properties may exist within the panel data set for different assumptions (Breitung, 2005; Pesaran, 2007).

The test for cointegration between the variables used Westerlund's panel cointegration test. The purpose of the test was to determine if the variables were integrated of order one, meaning that they were non-stationary in their level forms but became stationary after first differencing, indicating a long-run equilibrium relationship between the variables (Westerlund, 2007). Following the test for cointegration, both the fixed-effects and the random-effects models were estimated. The Hausman test was used to determine which of the models was more appropriate, testing whether the difference between the coefficients of the two models was systematic (Hausman, 1978). The results of the test indicated that the random-effects model should be used for the analysis, as the p-value was 0.8553. Additional tests for serial correlation, heteroskedasticity, normality, and multicollinearity were performed following the estimation of the random-effects model (Wooldridge, 2010; Baltagi, 2021).

4. RESULTS AND DISCUSSION

Table 2: Summary descriptive statistics

Variable	Observations	Mean	Std. dev.	Minimum	Maximum
KME	144	207000	215000	688.86	832000
GDP _i	168	2.571e+10	1.560e+10	6.203e+09	5.317e+10
GDP _j	168	2.571e+10	1.560e+10	6.203e+09	5.317e+10
Distance	168	1,292	980	0	2,550
FDI	168	8.420e+08	8.950e+08	-2.432e+08	4.259e+09
Infrastructure	168	14.486	3.730	9.249	21.435
HDI	168	0.469	0.039	0.394	0.517
Inflation	168	13.900	20.450	1.536	93.588
Common colony	168	0.429	0.496	0	1
Common border	168	0.429	0.496	0	1
Common language	168	0.857	0.351	0	1

Source: Author compilation (2026).

The descriptive statistics for manufactured exports and other variables reveal considerable variation between the different countries within the EAC. Kenya experienced the highest number of observations for manufactured exports at 144, yet its mean value was the second lowest at 207,000 with a standard deviation of 215,000. The minimum value was 688.86 while the maximum was 832,000. FDI also had a high standard deviation at 8.950e+08 with a mean of 8.420e+08. This is in accordance with the literature on FDI as most studies have indicated their volatile nature (Dunning, 1988; Alfaro et al., 2004; UNCTAD, 2023). HDI had a mean of 0.469 with a standard deviation of 0.039 illustrating less variation in the human development statistics of the countries compared to FDI. Infrastructure had a mean value of 14.486 with a standard deviation of 3.73 while inflation had a mean of 13.9

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with a high standard deviation of 20.45 indicating instability of the inflation rates in some of the EAC countries over time. The implications of inflation are significant as the prices of manufactured products will fluctuate over time (Barro, 1995; Frankel & Romer, 1999).

The results of the unit-root tests reveal that the manufactured exports and inflation rate for Kenya are stationary as indicated by the Levin-Lin-Chu test. The macroeconomic variables of GDP, foreign direct investment (FDI) and the human development index (HDI) are not stationary in their level forms but become stationary after first differencing. The Hadri LM test for stationarity provides results that are different from the other tests which is normal as their null hypotheses are considerably different. Additionally, the Harris-Tzavalis test provides findings that are in agreement with the results from the Levin-Lin-Chu test. Performing various stationarity tests on panel data is encouraged to ensure that researchers do not rely on a single test to arrive at their conclusions (Harris & Tzavalis, 1999; Hadri, 2000; Levin et al., 2002; Breitung, 2005).

The Westerlund cointegration test rejects the null hypothesis of no cointegration between the four statistics. The Gt statistic of -3.102 has a p-value of 0.007, the Ga statistic of -2.876 has a p-value of 0.002, the Pt statistic of -3.210 has a p-value of 0.001, and the Pa statistic of -2.512 has a p-value of 0.004. These values all indicate a significant relationship between the four variables. The existence of a long-run equilibrium relationship between Kenya's manufactured exports and its determinants suggests that GDP, FDI, infrastructure development, inflation rates and the gravity variables have a relationship with the manufactured exports of the Kenyan economy in the long run. These results indicate that the use of panel data regression models can be used to analyse such a long-run relationship between these variables (Westerlund, 2007; Baltagi, 2021).

The results of the Hausman test reveal that the chi-square statistic is 0.03 with a p-value of 0.8553. As the p-value is greater than 0.05, the null hypothesis of the random-effects estimator is statistically consistent and is, therefore, preferred to the fixed-effects estimator. This is because the variables of interest such as distance between the different countries, whether they share a common border, language or colonial ties are time-invariant or nearly so. This is common within gravity models as the variables of interest are nearly constant over time (Baldwin & Taglioni, 2006; Head & Mayer, 2014).

Table 3: Random-effects gravity regression results

Variable	Coefficient	Std. error	t-statistic	p-value
GDP_i	0.6734	0.0632	10.65	0.000
GDP_j	0.7352	0.0465	15.81	0.000
LDIST	-0.4284	0.0671	-6.39	0.000
FDI	0.4500	0.0700	6.43	0.000
INFR	-3.25e-10	4.96e-11	-6.55	0.000
INF	0.0918	0.0298	3.08	0.002
CCO	1.5879	0.4489	3.54	0.000
CBO	0.5721	0.0769	7.44	0.000
CLN	2.8426	0.5632	5.05	0.000
Constant	-4.6125	1.4893	-3.10	0.002

source: Author compilation (2026)

The random-effects models' results support the gravity model's prediction that the economic size of a country increases its trade. The importing country's GDP had a coefficient of 0.6734 and was significant at $p < 0.001$. This shows that if the GDP of the importing country increases by one percent, Kenya's manufactured exports will increase by 0.6734 percent, holding all other variables constant. This finding is in alignment with trade literature, which posits that economies with higher GDPs have higher purchasing power and, thus, demand for manufactured goods (Tinbergen, 1962; Anderson, 1979; Bergstrand, 1985; Anderson & van Wincoop, 2003).

The economic factor of Kenya's GDP had a positive and significant coefficient of 0.7352. The findings indicate that as the economic size of Kenya increases, the country can produce and export more manufactured goods. Kenya's manufacturing exports depend on the productivity of its industries, the accumulation of capital, and the trade capabilities that arise from increasing the number of manufacturing enterprises in the country (Helpman & Krugman, 1985; Grossman & Helpman, 1991; Bernard et al., 2007). The positive coefficient indicates that policies that improve the manufacturing sector will increase the country's manufactured exports. Distance between Kenya and its trading partners in the EAC had a negative and significant coefficient of -0.4284. These findings confirm that as the distance between Kenya and its EAC trading partners increases, the manufactured exports of Kenya will decrease. This finding is expected because the geography of the EAC countries makes them geographically close to Kenya. The distance between two local economies creates issues regarding the quality of roads between the two countries, the number of

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customs borders that must be passed through, the cost of transportation, and the risks to the transported goods between the two countries (Lima & Venables, 2001; Djankov et al., 2010; Head & Mayer, 2014).

Foreign direct investment had a positive and significant coefficient of 0.4500. This demonstrates that there is a relationship between FDI and manufactured exports of Kenya; if there is a one percent increase in FDI, there will be a 0.45 percent increase in manufactured exports of Kenya, all else being equal. Existing literature shows that FDI impacts manufactured exports due to the technology and management practices that are introduced by the FDI investments into the manufacturing firms of the investing countries (Aitken et al., 1997; Greenaway et al., 2004; Javorcik, 2004; Harding & Javorcik, 2012). Furthermore, FDI impacts the manufactured exports of the developing countries of Africa, Asia, and Latin America (Ahmed et al., 2023; Islam, 2024).

The significant coefficient for FDI demonstrates that Kenya should prioritise FDI that increases its manufacturing exports. FDI in enclaves or for the domestic market alone will not create the same impacts on the country's manufactured exports as will FDI for export industries (Borensztein et al., 1998; Blomstrom & Kokko, 1998; Javorcik, 2004; Golo, 2024). Kenya should encourage FDI in manufacturing sectors that work with its domestic suppliers or that export goods to other EAC members to maximise the benefits of such investments.

Infrastructure development had a negative and significant coefficient according to the random-effects model's table. Despite the counter-intuitive result, this coefficient indicates that if the infrastructure in Kenya increases, the manufactured exports of the country will decrease. This could be due to the fact that the existing model for infrastructure uses a measure of the number of roads that are paved rather than the efficiency of the transport of manufactured goods by those roads. Furthermore, infrastructure development within Kenya may be a response to the manufactured exports of the country decreasing. Kenya's infrastructure does not necessarily have to include roads; the transport of manufactured goods can also occur via railways and ports (Francois & Manchin, 2013; Portugal-Perez & Wilson, 2012; Donaubaue et al., 2018).

The negative coefficient for infrastructure does not indicate that this factor is unimportant in Kenya's manufactured exports. Rather, infrastructure in Kenya should be developed with manufactured goods in mind. The infrastructure of Kenya does not just refer to the building of roads; it also includes the improvement of the border systems between Kenya and its neighbours in the EAC as well as the improvement of the transport of manufactured goods from production areas to ports of entry (Lima & Venables, 2001; de Melo, 2013; Brenton & Isik, 2012; Turkson, 2021).

Inflation within Kenya had a positive and significant coefficient of 0.0918. This coefficient is positive and significant despite the fact that the dependent variable for the model was the value of the manufactured exports of Kenya. Inflation can have both positive and negative impacts on Kenya's manufactured exports. High inflation rates can increase the manufacturing costs of Kenya and consequently reduce the exports of its manufactured goods. However, inflation can also impact the values of the manufactured exports of Kenya if the prices of those goods increase at a faster rate than the exports of those goods decline in volume (Frankel & Romer, 1999; Feenstra, 2004; Wooldridge, 2010).

Each of the following variables had positive and significant coefficients: the common colony coefficient was 1.5879, the common border coefficient was 0.5721, and the common language coefficient was 2.8426. These results indicate that the historical and geographical characteristics of Kenya, its neighbors in the EAC, and the common factors that tie them together impact the volume of Kenya's manufactured exports. Kenya shares a colonial history with the other members of the EAC, shares a border with several of those countries, and shares a common language with a few of them. These shared characteristics indicate that there are fewer transaction costs between Kenya and its neighbors that originate from these shared factors (Frankel & Rose, 2002; Head & Mayer, 2014; Baier & Bergstrand, 2007).

The diagnostic statistics that were performed on the random-effects model indicate that the model is adequate but should be used with caution. The value of the modified Wald test statistic is 0.0876, which indicates that the model has no heteroskedasticity at the 0.05 level of significance. The value of the Shapiro-Francia test for normality is 0.897, indicating that the normality of the residuals of the model is not a major concern. Furthermore, the mean value of the variance inflation factor is 5.93, which indicates only moderate multicollinearity of the independent variables. The VIF of the GDP_i variable was high, which is not unusual for the economic variables in this model. The use of random effects corrected for the issues of first-order serial correlation. Such corrections are necessary for panel-data models (Wooldridge, 2010; Baltagi, 2021).

For Kenya, the FDI factor is the most direct measure of the impact of a macroeconomic determinant upon the volume of Kenya's manufactured exports. The fact that the coefficient for infrastructure is significant but negative demonstrates that the development of infrastructure in Kenya should be targeted towards manufactured exports. Finally, the factor of human development is theoretically important; the number of manufactured exports of Kenya that are made in response to the FDI and infrastructure developments in the country depend upon the human development of the country. This factor was not explicitly incorporated into the model table due to the lack of a human development index (HDI) coefficient for the model, but is

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theoretically important in the response of Kenya's manufactured exports to these two factors (Nelson & Phelps, 1966; Levin & Raut, 1997; Lall, 2000; Hausmann et al., 2007; Hanushek & Woessmann, 2012).

The findings of this random-effects model support the explanation of the relationship between Kenya's manufactured exports and the factors noted above. The results of the model indicate that the size of the economic market in which Kenya's manufactured products compete has an impact upon its manufactured exports. Additionally, the distance between Kenya and the EAC countries has an impact upon those manufactured exports. FDI had a positive relationship with Kenya's manufactured exports, as did the other factors that impact the geographical and historical relationship between Kenya and its neighbors in the EAC region. While the findings support the importance of FDI and infrastructure (even if the impact of infrastructure was counter-intuitive), they also demonstrate the need to consider the impact of Kenya's human development factors upon its manufactured exports.

Furthermore, some of the findings of the random-effects model of Kenya's manufactured exports demonstrate that the country should not rely upon the reduction of trade tariffs between the EAC members as the main policy change to increase the manufactured exports of Kenya. While the implementation of a customs union between the EAC members will open up trade opportunities for its members, the findings of this model indicate that the members will have to work to reduce the logistical, technological, and financial constraints upon the movement of manufactured goods within the region. (Agbodji, 2008; Carrere, 2006; de Melo, 2013; Mukwaya, 2019; Krant).

Table 4: Diagnostic tests and model decision

Test	Statistic/result	p-value
Westerlund Gt	-3.102	0.007
Westerlund Ga	-2.876	0.002
Westerlund Pt	-3.210	0.001
Westerlund Pa	-2.512	0.004
Hausman test	chi-square = 0.03	0.8553
Modified Wald	chi-square = 80.30	0.0876
Shapiro-Francia	W = 0.90890	0.897
Variance inflation factor	Mean VIF = 5.93	-

Source: Author compilation (2026).

5.CONCLUSION AND RECOMMENDATIONS

The article investigated the macroeconomic determinants of the manufactured exports of Kenya to the trading blocs in East African countries. The results of the gravity model showed that market size was a powerful determinant of manufactured exports of Kenya's products to other East African countries. The GDP levels of both the importing and Kenyan countries were found to be positively and significantly linked to the manufactured exports of the Kenyan economy. The distance between Kenya and the other member countries of the East African trading bloc was significantly and negatively associated with the manufactured exports of Kenya. Foreign direct investment in East Africa was also found to be significantly positively associated with the manufactured exports of Kenya. Finally, the infrastructure in Kenya was significantly but negatively associated with the manufactured exports of Kenya to East African countries.

The factors that determine the manufactured exports of Kenya to other East African countries include the demand-side forces and supply-side forces of Kenya and its neighbors. Demand-side forces include the economic size of the other countries in East Africa. The supply-side forces of Kenya that impact the manufactured exports of the country include its industrial capacity, FDI with an export orientation, and the level of development of its human capital and infrastructure. All these factors interact to determine the volume of manufactured products that Kenya exports to other East African countries. The positive coefficients for the variables of common border, common language, and common colony indicate that Kenya has historical and geographical forces that positively impact its manufactured trade. However, these factors are only beneficial if there are reforms that exist to even improve the trade between these East African countries.

The first recommendation that should be made for Kenya is to attract more FDI for the purpose of increasing the manufactured exports of the Kenyan economy. The incentives for investors should be tied to the export outcomes of the companies that receive these incentives. The second recommendation is for Kenya to develop its human capital to support the increased manufactured exports of the country. Technical, vocational, engineering, and managerial skills are required to operate the technologies that will enhance the manufacturing activities of Kenya's industries. The third recommendation is for Kenya to change the indicators for its infrastructure to the outcomes of its infrastructure developments. The outcomes of Kenya's manufacturing industry will benefit from improved roads, railways, and ports. The fourth recommendation is for the East African countries to eliminate trade barriers

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that are detrimental to the manufactured exports of Kenya. Finally, Kenya should continue to implement the economic policies that will allow for the preservation of the macroeconomic conditions of the Kenyan economy. Future studies should separate the export values from the export volumes, include a discussion on the exchange rates and non-tariff trade barriers, investigate different estimators for trade volume, and investigate the different manufactured exports of East African countries at the firm level. Despite their limitations, the findings of the study will allow Kenya to formulate a strategy that integrates economic, industrial, human, and trade policies to increase its manufactured exports to other East African countries.

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