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The Impact of Manufacturing Exports on Economic Growth in Tanzania: A Time Series Analysis

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Abstract

This study investigates the impact of manufacturing exports, specifically ceramics, iron and steel, and plastics on economic growth in Tanzania from 1991 to 2023. Grounded in the Heckscher-Ohlin and Export-Led Growth theories, using a multiple regression model supported by diagnostic stability tests and a Variance Inflation Factor (VIF) test to ensure robustness. The results reveal that exports of ceramics and plastics have significantly increased over the study period and positively contributed to economic growth, reinforcing the role of export expansion in driving economic development. However, the growing volume of plastic exports raises environmental concerns, suggesting a trade-off between short-term economic benefits and long-term ecological sustainability. In contrast, iron and steel exports show no substantial impact on growth, possibly due to dependency on imported raw materials, limited technological advancement, and underdeveloped domestic value chains. The analysis also finds that foreign direct investment (FDI) exerts a positive effect on growth, whereas exchange rate fluctuations have minimal influence on the performance of Tanzania's manufacturing sector. These findings underscore the need to strengthen the country's export-led growth strategy by enhancing support for manufacturing sectors through targeted investment, technology upgrading, and industrial policy. They also highlight the importance of designing incentive structures that not only boost competitiveness in export markets but also encourage environmentally sustainable production practices. Addressing these areas, Tanzania can better harness the potential of its manufacturing sector to drive inclusive and sustainable economic growth.

Keywords: Manufacturing exports, impact, economic growth, time-series, Tanzania.

Introduction

Manufacturing exports play a vital role in accelerating economic growth, particularly in developing economies striving for industrial transformation (Opoku & Yan, 2019). In Tanzania, the government's strategic emphasis on export-led growth has positioned the manufacturing sector as a key driver of economic diversification and structural change. However, the extent to which specific manufacturing exports contribute to national growth remains underexplored. This study examines the impact of selected manufactured exports; ceramics, iron and steel, and plastics on Tanzania's economic growth. Through assessing sectoral export performance within the framework of the Heckscher-Ohlin and Export-Led Growth theories, the study offers empirical evidence to inform industrial policy, export promotion strategies, and sustainable development planning.

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Understanding the link between trade and growth is crucial, especially for developing countries integrating into global markets. Economists have long been interested in why countries grow at different rates and how wealth accumulates across regions (Tadele & Sirany, 2021; Armeanu et al., 2017). Among the many drivers of growth, international trade has emerged as a central pillar. Historically, countries that produce goods for export tend to be more productive and efficient than those focusing only on domestic consumption (Wan et al., 2022). However, the impact of trade on economic growth is not uniform it can be either positive or negative depending on a country's trade policies, institutional frameworks, and level of integration into global value chains (Purnama & Yao, 2019). In the modern global economy, no country can thrive in isolation. Autarkic models are no longer viable, making trade an indispensable component of economic strategy. Both classical economic theory, which emphasizes comparative advantage, and neoclassical theory, which highlights efficiency gains, underscore the pivotal role of international trade in driving long-term economic growth (Magai, 2021). Against this backdrop, Tanzania's manufacturing exports offer a valuable case for evaluating how sector-specific trade performance influences broader economic outcomes. Against this backdrop, Tanzania's manufacturing exports present an important case for evaluating how sector-specific trade performance influences broader economic outcomes.

Over the past 50 years, success in manufacturing exports has been closely associated with rapid economic growth (Marak & Biswal, 2023). With few exceptions, countries that have experienced the largest increases in GDP per capita have also seen the fastest growth in manufactured goods exports (Dao, 2018). The most notable examples are the East Asian nations, where incomes increased by a factor of four to seven, driven by labour-intensive manufacturing exports, fourfold in Southeast Asia and sevenfold in the Four Tigers (Tampubolon & Nababan, 2022). Beyond East Asia, African countries such as Somalia have also sustained rapid economic and export growth in manufactured goods (Ali, 2018). The benefits of export-led growth and the potential links between exports and economic expansion have been extensively discussed in the literature. There is broad consensus that manufacturing exports foster closer ties with foreign businesses using advanced technologies, promote economic specialization, encourage high rates of investment in profitable activities, and provide foreign exchange to finance imports of capital goods that cannot be produced locally (Marak & Biswal, 2023; Wan et al., 2022). These factors collectively contribute to faster economic growth and technological advancement (Mohamed et al., 2022). Moreover, there is widespread agreement on some of the key policies and prerequisites necessary to promote growth in manufacturing exports (Wan et al., 2022). These include access to duty-free imports of capital goods and raw materials, political stability, reliable infrastructure and sound macroeconomic policies, such as maintaining small budget deficits, appropriate exchange rates and low inflation (Zieba & Mbugua, 2022).

Despite strategic investments, the share of manufacturing exports in total merchandise exports remained relatively low, at 25% in both 2016 and 2017 (Kibona et al., 2022). Additionally, these exports contributed little value to the economy due to their low skill requirements and low technological intensity. Between 1997 and 2015, the percentage of manufacturing exports consisting of medium and high-tech products averaged just 15.1%, and their integration into the global and regional value chains, key drivers of international trade, remains limited. As a result, Tanzania may struggle to achieve its long-term growth objectives, which depend on the efficiency

and competitiveness of its manufacturing exports (Misati & Ngoka, 2021). As noted by Leyaro (2021), Tanzania benefits from trade interactions with other member states through trade agreements and direct trade relations with the United States and the European Union, owing to its membership in international communities such as the East African Community (EAC) and the Common Market for Eastern and Southern Africa (COMESA). However, the nation continues to face a growing trade deficit, as imports exceed exports by a factor of two. In 2017, Tanzania recorded a $3.3 billion trade deficit, with $8.33 billion in exports and $11.68 billion in imports. This imbalance worsened in 2018, as imports rose by 7.8% while the gross export value declined by 3.9%. Nevertheless, it is anticipated that the negative trade balance will rapidly shrink as coal reserves and hydrocarbon production increase (UN Comtrade, 2019). As a result, the nation's trade balance for the year ending in January 2020 showed a surplus of $699.6 million, compared to a deficit of $861.3 million for the same period in 2019 (Kilindo, 2021). In 2021, Tanzania's exports of plastics, iron or steel products, and ceramic goods totalled $64.21 million, $29.03 million, and $46.2 million, respectively (UN Comtrade, 2022).

Tanzania’s steel scrap exports totalled 224 shipments, with 28 Tanzanian exporters supplying 56 buyers. Tanzania primarily exports scrap steel to India, Pakistan and Uganda. Globally, the top three exporters of steel scrap are the United States (460,240 shipments), Vietnam (55,271 shipments), and the United Arab Emirates (40,116 shipments). Tanzania’s iron and steel exports were valued at US$60.21 million in 2021 (UN Comtrade, 2022). Tanzania’s exports of commodity category 6904 (ceramic building bricks, flooring blocks, support or filler tiles and similar items) totalled $816 thousand in 2021. However, sales of commodity group 6904 fell by 89% in value between 2010 and 2020. Exports of ceramic building bricks, flooring blocks and related items dropped by $6.69 million, as total 6904 exports from Tanzania in 2020 amounted to $7.5 million. Plastic granule exports from Tanzania comprised 6 shipments, exported by 3 Tanzanian exporters to 2 buyers. Most of Tanzania's plastic granules are shipped to Kenya and India. The top three global exporters of plastic granules are Vietnam (19,478 shipments), India (19,032 shipments) and China (15,048 shipments) (UN Comtrade, 2022).

Since trade is one of the most critical sectors of the Tanzanian economy, the contribution of international commerce and trade policy reform has garnered considerable attention. While some scholars argue that trade positively contributes to economic growth, others remain sceptical, creating a need for empirical investigation. Therefore, this study seeks to assess how manufacturing exports have influenced Tanzania's economic performance, particularly given the ongoing debate among economists regarding the role of foreign trade in the country’s development trajectory. The study focuses on three key subcategories of manufacturing exports; plastics, iron and steel, and ceramic goods, not only due to their growing trade volumes but also because of their strategic economic and industrial relevance. These sectors represent distinct dimensions of industrial development: ceramics reflect the expansion of non-metallic mineral-based industries linked to construction and housing; plastics represent a fast-growing segment with increasing domestic and international demand, though they raise concerns about environmental sustainability; and iron and steel are critical to infrastructure development and broader industrialization efforts, serving as essential inputs across multiple value chains. Through examining these sectors, the study offers a more nuanced understanding of how different types of manufactured goods contribute to economic growth, investment attraction, and structural transformation in Tanzania.

Theoretical Foundation

This study draws on two foundational theories: the Heckscher-Ohlin (H-O) Theory and the Export-Led Growth (ELG) Theory. The H-O Theory posits those countries export goods that intensively use their abundant factors of production.For instance, plastics manufacturing, a capital-intensive industry, is dominated by capital-rich countries like China and Thailand due to their strong industrial infrastructure (Nara et al., 2021; Widodo, 2015). However, the classical H-O model has limitations, particularly in explaining the rise of emerging economies like China and India. Though once labour-abundant, these countries have transformed their factor profiles through industrial policies, FDI inflows, and technological upgrading. In capital-intensive sectors like plastics, ceramics, and iron and steel, their competitiveness stems more from strategic interventions than inherent capital abundance. As Choi and Harrigan (2007) note, comparative advantage today is shaped by dynamic factors such as human capital, institutional quality, and integration into global value chains. Therefore, while the H-O model remains useful especially in manufacturing trade, it must be complemented by frameworks that account for evolving factors like FDI, policy reform, and industrial upgrading. This is particularly relevant for countries like Tanzania seeking to position themselves in global manufacturing value chains.

The study also utilized the Export-Led Growth (ELG) Theory, proposed by Kindleberger in 1962, as an economic strategy that emphasizes exports as a key driver of national growth, particularly in emerging markets such as Tanzania. This theory suggests that, by increasing exports, a country can leverage foreign demand to stimulate domestic production, leading to industrial expansion, technological advancements and overall economic development (Werner & Olson, 2014; Kumar & Begam, 2020). The plastics, iron and steel, and ceramics industries are significant sectors in global manufacturing trade that have benefited from ELG, especially in developing economies. Countries like China and India have adopted the ELG model by focusing on exporting plastic goods, ranging from packaging to industrial components to larger markets in the West (Zhu et al., 2019). Moreover, the iron and steel sector has historically played a central role in industrialization for many export-oriented economies. The proponents of ELG argue that, integrating this sector into the global economy through exports has enabled countries like South Korea and Japan to emerge as industrial powerhouses. By tapping into global demand, these countries modernized their steel, and ceramics industries, contributing to the diversification of their industrial base (Liu et al., 2020). While the ELG Theory has undoubtedly contributed to industrial development in the plastics, iron and steel, and ceramics sectors, debates persist about its sustainability (Zhou et al., 2023). Although exporting these manufactured products has driven growth, there is a need for caution against dependency on external markets, which could undermine long-term growth and increase economic vulnerability.

Together, the H-O and ELG theories offer complementary perspectives for understanding and guiding Tanzania's industrial and trade development. The H-O theory informs sectoral specialization based on Tanzania's factor endowment structure, while the ELG model provides a strategic pathway for transforming domestic production into export-oriented growth. However, both frameworks must be applied dynamically recognizing that Tanzania's participation in global manufacturing trade will depend not only on static comparative advantages, but also on deliberate policy actions aimed at improving infrastructure, building human capital, securing investment, and ensuring industrial resilience. Therefore, developing competitive capacities in ceramics,

plastics, and iron and steel is both a reflection of Tanzania's resource base and a strategic aspiration to reposition itself within the global export economy.

Revisiting Manufacturing Export Goods

The empirical literature on the relationship between exports of manufactured goods such as plastics, ceramics, and iron and steel and economic growth reveals both supportive and contradictory findings, largely shaped by contextual and methodological differences across studies. For instance, several studies highlight the positive contribution of the plastics sector to economic growth in developing countries. Ali et al. (2018) found that plastic-related trade enhanced Somalia's economic development, a conclusion echoed by Tadele and Sirany (2021) and Armeanu et al. (2017), who point to the sector's growing relevance in industrial upgrading and job creation. Similarly, Pintu (2016) argues that improvements in plastics manufacturing processes have stimulated economic growth in South Asia. However, these studies typically focus on trade and industrial performance indicators without accounting for externalities. Conversely, research by Diggle and Walker (2022) emphasizes the negative environmental consequences of plastics, particularly plastic bags, which undermine long-term export sustainability and public health. This perspective introduces an important caveat: while plastics may drive short-term economic growth, their environmental costs could erode gains through regulatory restrictions, reputational risks, or loss of market access, particularly in environmentally-conscious markets.

A similar pattern emerges in studies on the iron and steel sector. Jordaan and Eita (2009) found that iron exports positively impacted economic growth in Botswana. However, more comprehensive studies (Mele & Magazzino, 2020; Liu et al., 2020) report negative or insignificant effects, especially when external variables like energy intensity, emissions, or global price volatility are included. These contradictions suggest that while iron and steel can be engines of growth under efficient and regulated conditions, they may hinder growth when plagued by inefficiencies or sustainability challenges. The ceramics sector generally shows a more consistent positive impact on growth. Studies by Biswas and Pandey (2016), Almamari (2017), and Paul (2018) highlight ceramics' export potential, especially where local resources and artisanal skills are leveraged. However, firm-level evidence Athari and Bahreini (2023) reveals uncertainty in profitability, particularly where capital structures are weak or financial mismanagement exists. This suggests that while the sector holds promise, its contribution to growth depends on firm-level competitiveness and access to markets.

When it comes to FDI, findings are especially mixed. Zhang (2021) presents evidence that Chinese FDI in African countries significantly boosts exports in sectors like ceramics, plastics, and steel. The argument is that Chinese FDI is more development-oriented, offering not just capital but also infrastructure, technology, and market access. This aligns with Asajile (2014), who identifies increased FDI flows to Tanzania but notes limited impact on GDP and human development. Other studies (Mwaitete & Magai, 2023; Magai, 2021) confirm that the effectiveness of FDI depends not only on volume but also on absorptive capacity, sectoral targeting, and governance structures. On the other hand, Wu et al. (2020) and Bénétrix et al. (2023) find negative or weak effects of FDI on economic growth under specific conditions, such as fiscal imbalances or high dependency on corporate taxation. These contradictions imply that FDI is not inherently growth-enhancing; its effectiveness is shaped by the recipient country's

policy environment, institutional strength, and alignment with national development priorities. A relatively more consistent pattern emerges in studies examining the real exchange rate (RER). Ridhwan et al. (2023), Sandoyan and Galstyan (2020), and Zaki et al. (2019) all point to the benefits of a moderately undervalued RER, which can boost export competitiveness, attract investment, and stimulate structural transformation. However, these benefits are conditional: RER volatility, as documented in broader macroeconomic studies, tends to undermine investor confidence and trade flows, suggesting that exchange rate stability is as crucial as its level.

Generally, the reviewed literature reveals that the relationship between trade-related variables and economic growth is non-linear, context-specific, and contingent on broader structural conditions. Positive effects are often conditional on environmental sustainability, institutional capacity, macroeconomic stability, and the strategic alignment of FDI and trade policies. For policymakers in countries like Tanzania, this implies that leveraging sectors such as ceramics, plastics, and iron and steel for growth requires a nuanced, coordinated policy approach that mitigates risks while enhancing competitiveness and sustainability.

Methodology

The secondary data collected from the National Bureau of Statistics (NBS), and the World Bank (WB), form the foundation of this study. The period considered spans from 1991 to 2023, covering 33 years since the economic reforms that followed the introduction of an open-market policy in 1985. This timeframe was chosen to examine the relationships among variables in the post-reform period when many governments worldwide adopted policies of privatization, trade liberalization and open capital accounts, inspired by the experiences of other countries (Meseguer, 2009). Economic growth is used as the dependent variable, while exports of manufactured goods (including the real export values of ceramics, steel and iron, and plastics), supported by exchange rates and FDI, are included as explanatory variables, as detailed in Table 1.

Table 1: Variables and Data Sources

Variables	Proxy & Unit of Measurements (Million $)	Data	Source
Economic Growth*	% of GDP, Constant Price in $	NBS & WB	1991-2023
Plastic Exports	Real market values in $	NBS & WB	1991-2023
Iron and Steel Exports	Real market values in $	NBS & WB	1991-2023
Ceramic Exports	Real market values in $	NBS & WB	1991-2023
Exchange Rate	Real values in $	WB	1991-2023
Foreign Direct Investment	Annual average percentage	NBS	1991-2023

*Dependent Variable.

With the assistance of the STATA software package, the multiple regression model (equation 1) was estimated. The model was developed based on empirical research on the link between manufacturing exports and economic growth. The exchange rate and FDI were introduced in order to elucidate the nexus between manufacturing exports and economic growth in Tanzania. The regression equation takes the form of:

$$GDP = \alpha 0 + \alpha_1 PLE + \alpha_2 ISE + \alpha_3 CRE + \alpha_4 EXR + \alpha_5 FDI + e \ldots\ldots (i)$$

Whereby; GDP represents the Economic Growth; PLE, Plastic Exports; ISE, Iron and Steel Exports; CRE, Ceramic Exports; EXR, Exchange Rate; FDI, Foreign Direct Investment; e = Error Term; while α is a Parameter to be estimated.

Results

Descriptive Statistics

The descriptive statistics explore relationships among key economic variables. GDP averages 16.56 with a standard deviation of 3.58, indicating moderate fluctuation (Soyres et al., 2023). Ceramics exports average 8.2 million with high variability, while plastics exports average 23.5 million, also showing considerable dispersion, likely due to market and regulatory factors (Zhang et al., 2023). FDI averages 2.62, reflecting relative consistency, and the exchange rate averages 1,261.6 with notable variation influenced by policy and market dynamics. Most variables exhibit slight to moderate positive skewness, except for CRE, which shows a strong positive skew (1.7998). EXR is negatively skewed, while the remaining variables display positive skewness. Kurtosis analysis reveals all variables are platykurtic except ceramics exports, which are leptokurtic. The Jarque-Bera test confirms normality for GDP, FDI, exchange rate, and plastics exports, with skewness and kurtosis values close to zero, supporting the normality assumption of the OLS model. Full results are shown in Table 2.

Table 2: Descriptive Statistics

	GDP	CRE	EXR	FDI	ISE	PLE
Mean	16.4901	8157444	1261.598	2.5810	21375340	23536245
Median	16.2841	442500	1252.300	2.2962	12880889	21235512
Maximum	24.0747	49550000	2298.500	5.6637	76990000	85288974
Minimum	10.0250	1637.000	10.2600	0.0002	3022.000	2014.600
Std. Dev.	3.58368	13885399	741.0023	1.4430	24268695	24348937
Skewness	-0.04894	1.7998	-0.0879	0.3190	0.9647	0.7120
Kurtosis	2.48888	5.1644	2.0332	2.4036	2.7069	2.597027
Jarque-Bera	0.3611	23.5218	1.2875	1.0170	5.0783	2.9209
Probability	0.8348	0.0000	0.5253	0.6014	0.0789	0.2321
Sum	527.6836	2.6114	40371.15	82.5922	6.8474	7.5345
Sum Sq.	398.1250	5.9845	17021617	64.5536	1.8316	1.8404

VAR Lag Order Selection Criteria

The lag length was chosen based on VAR Lag Order Selection Criteria method where lag length n was selected. All five lag selection criteria confirmed the selection of the lag length of 2 as shown in Table 3. It should be noted that the lag order is chosen to avoid autocorrelation in the residual.

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1918.247	NA	1.73e+50	132.7067	132.9895	132.7953
1	-1812.784	160.0126	1.53e+48	127.9161	129.8963	128.5363
2	-1751.063	68.10582*	3.69e+47*	126.1423*	129.8198*	127.2940*

* Indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level), FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion

Estimation and Testing Procedures

This sub-section outlines the key methodological approaches employed in the study, with a particular focus on unit root testing. Unit root tests are used to determine whether a time series is stationary, which is essential for ensuring that the statistical methods applied are both appropriate and robust (Afriyie et al., 2020). These tests serve as a diagnostic tool to examine the time series properties of the data, thereby helping to avoid spurious regressions and enabling meaningful interpretation of both short-run dynamics and long-run relationships. In this study, the Augmented Dickey-Fuller (ADF) test, developed by Dickey and Fuller (1979), is employed to assess the stationarity of each variable in the model.

Results for the unit root

All variables, become stationary at first difference, indicating that they are integrated of order one I(1), as supported by Hendry and Juselius (2000). Based on these unit root test results, it was deemed appropriate to proceed with testing for cointegration rather than applying alternative techniques. Consequently, methods such as the Engle-Granger two-step procedure or the Johansen cointegration test were considered to assess the existence of a long-run equilibrium relationship among the variables, see Tabe 4.

Table 4: Results for Unit Root Tests

Variables	Intercept (t)	Trend and intercept (t)	Intercept (t)	Trend and intercept (t)
	Augmented Dickey-Fuller (ADF) test			
	At levels		At first difference	
GDP	-1.461563	-2.349534	-5.102008***	-4.975010***
Plastic	-1.574184	-2.638767	-5.807996***	-5.682424***
Iron and Steel	-0.223374	-6.674891	-6.898991***	-7.154747***
Ceramic	4.553931	2.246760	-1.975552	-8.626583***
Exchange Rate	-0.839532	-2.904646	-6.226433***	-6.169565***
FDI	-0.994626	-2.596259	-4.941865***	-5.032061

Source: Author's own computation

Note: MacKinnon's (1996) critical values used in the rejection of the null hypothesis of the unit root, where ***, ** and * represent 1%, 5% and 10% respectively

Diagnostic Stability Test

Table 5 presents the diagnostic checks conducted in this analysis, which demonstrate satisfactory model performance. The Breusch-Godfrey Serial Correlation LM test, used to detect autocorrelation in regression model residuals, yields a low F-statistic with a probability of 0.0840. This suggests the absence of autocorrelation, as there is no strong evidence of serial correlation at the 0.05 significance level, thus supporting the null hypothesis. Similarly, the Breusch-Pagan-Godfrey test was employed to check for heteroskedasticity in the model residuals. Heteroskedasticity could lead to biased parameter estimates and standard errors, violating a key

assumption of linear regression. The test's F-statistical probability of 0.7758, which is above the conventional significance level of 0.05, indicates no evidence of heteroskedasticity in the model. Therefore, the null hypothesis cannot be rejected.

Table 5: Diagnostic Test Results

Statistical method	Test statistic	Prob	Decisions
Breusch-Godfrey Serial Correlation LM Test	0.172692	0.0840	Do not reject H0
Heteroskedasticity Test (Breusch-Pagan- Godfrey)	0.4965	0.7758	Do not reject H0

To test for multicollinearity, the Variance Inflation Factor (VIF) test was used to detect multicollinearity in a multiple regression model. Multicollinearity occurs when two or more independent variables in the model are highly correlated, which can lead to unstable parameter estimates, inflated standard errors and reduced model reliability. In this analysis, the VIF values are cantered and fall below the threshold of 10 for all independent variables, indicating no strong evidence of multicollinearity in the model, see Table 6.

Table 6: Multicollinearity Test Results

Coefficient	Un-centered	Centered	
Variable	Variance	VIF	VIF
Ceramic (CRE)	0.0003	5.0791	3.4371
Exchange Rate (EXR)	0.0013	5.7560	3.0083
Foreign Direct Investment (FDI)	0.0007	2.2578	2.0783
Iron and Steel (ISE)	0.0003	1.5781	1.2325
Plastic (PLE)	0.0008	3.7499	4.9644
Constant (C)	0.0015	8.2304	NA

Regression Results

The study employed multiple regression to analyse the relationship between manufacturing exports and economic growth in Tanzania, incorporating exchange rates and foreign direct investment as control variables. The model explained approximately 48.04% of the variation in growth of GDP, with an adjusted R-squared value of 37.65%, indicating a moderate explanatory power. The F-statistic of 4.62 and a low probability (F-statistic) value of 0.0040 (below the standard significance level of 0.05) confirm the model's overall statistical significance, indicating that it effectively explains the variation in growth of GDP.

Table 7: Regression Results

Variable	Coefficient	Std. Error	T-Statistic	Prob.
CRE	0.0676	0.0181	3.7301	0.001
EXR	-0.023	0.0367	-0.6252	0.5375
FDI	0.09	0.0268	3.3608	0.0025
ISE	-0.0802	0.0484	-1.6594	0.1095
PLE	0.0156	0.0117	1.3333	0.0436
Constant	2.9867	0.2038	14.656	0

R-squared	0.4804	Mean dependent variable	2.7819
Adjusted R-squared	0.3765	S.D. dependent variable	0.2324
S.E. of Regression	0.1835	Akaike info criterion	-0.3812
Sum Squared Residuals	0.8418	Schwarz criterion	-0.1037
Log Likelihood	11.909	Hannan-Quinn criterion.	-0.2907
F-Statistic	4.6236	Durbin-Watson statistic	0.9552
Prob (F-Statistic)	0.004		

Discussion of Findings

The study reveals that Tanzania's ceramic exports have been increasing, with GDP rising in direct proportion to this growth. This suggests that each one-million-dollar increase in ceramic exports contributes approximately $0.068 million to GDP growth, highlighting the impact of ceramic exports on economic growth. The data demonstrate that, as ceramic exports rise, GDP also increases, supporting the export-led growth model, which posits that export expansion is a key driver of economic growth. Therefore, a country's overall growth can be achieved not only through increased labour and capital, but also by expanding exports. Specifically, the expansion of ceramic exports promotes national economic growth. These findings align with those of Biswas and Pandey (2016), who examined glass clusters operating under an Increasing Returns to Scale (IRS) environment and found a significant positive impact of ceramic exports on economic growth. Similarly, study Paul (2018), identified a positive correlation between ceramic exports and economic growth, reinforcing the value of ceramics (glass clusters) as beneficial exports.

Iron and steel exports exhibit a coefficient of -0.0802, which is statistically insignificant ($p = 0.1095$), indicating that increases in these exports do not significantly influence economic growth. This insignificant relationship can be attributed to two key structural challenges: high import dependency and insufficient domestic investment in technology and skills. As Liu et al. (2020) highlight, the iron and steel sector in Tanzania is heavily reliant on imported inputs such as machinery, raw materials, and technology. This dependence erodes the net benefits of exports by reducing value addition within the domestic economy and diminishing foreign exchange gains. Moreover, Lyaya (2022) emphasizes the sector's low level of technological advancement and limited investment in workforce skills. Without improvements in these areas, productivity remains low, and the industry struggles to transition toward higher-value or more competitive production.

In addition to these domestic constraints, the sector faces intense international competition, making it difficult for Tanzanian exports to gain a significant foothold in global markets. These findings are consistent with broader literature: Coccia (2014) found no significant correlation between steel production and national economic development, while Jordaan and Eita (2015) reported a negative and insignificant relationship between iron and steel exports and economic growth. Given these challenges, the iron and steel sector, in its current form, should not be prioritized as a strategic driver of Tanzania's economic growth. However, this does not preclude its future potential. Policy measures such as local content requirements, technology upgrade

grants, and incentives for skills development and R&D investment could address the underlying constraints. By building domestic capacity and reducing import reliance, these interventions can enhance the sector's productivity and competitiveness. Until such reforms are implemented and begin yielding results, the role of iron and steel exports in Tanzania's growth strategy should remain limited.

The regression results show that plastic exports have a positive and statistically significant impact on economic growth, with a coefficient of 0.0156 ($p = 0.0436$), indicating that each unit increase in plastic exports contributes approximately \$0.068 million to GDP. This finding aligns with studies by Ali et al. (2018) and Pintu (2016), which highlight the economic benefits of plastic exports through their support for key sectors such as packaging, construction, and manufacturing. However, the environmental implications of increased plastic exports are a critical concern, particularly in countries with limited waste management infrastructure. As noted by Shen et al. (2020) and Strobel et al. (2023), rising plastic trade can exacerbate pollution, contaminate water and soil, and damage ecosystems especially where disposal and recycling systems are weak. In Tanzania's context, the growing volume of plastic exports must be matched by improvements in domestic waste management capacity. Without adequate investment in recycling systems, environmental regulation, and public awareness, the long-term ecological costs may outweigh short-term economic gains. Therefore, while plastic exports contribute positively to growth, integrating environmental safeguards and strengthening waste management systems is essential to ensure sustainability.

The study finds that FDI has a statistically significant and positive impact on economic growth in Tanzania, with a coefficient of 0.0900 ($p = 0.0025$). This suggests that each unit increase in FDI contributes approximately \$0.0900 million to GDP, highlighting FDI's role in not only boosting capital inflows but also enhancing productive capacity, a key driver of growth in developing economies. These results align with Zhang (2021), who found that FDI promotes exports of manufactured goods such as ceramics, plastics, and iron and steel by improving competitiveness. Similarly, Mwaitete and Magai (2023) and Asajile (2014) confirm FDI's positive effect on economic development, particularly through its contribution to industrial expansion and structural transformation. However, the extent of these benefits depends heavily on the domestic policy environment and the strength of linkages between foreign investors and local firms. A supportive investment climate characterized by political stability, investor-friendly regulations, and reliable infrastructure is essential to attract and retain quality FDI. Equally important are policies that encourage local content, technology transfer, and skills development, which enable FDI to generate wider spillover effects across the economy. Thus, while FDI is a valuable source of growth, its developmental impact is maximized only when it is embedded in a policy framework that promotes sustainable integration with local industries.

The results show that the exchange rate has a negative coefficient (-0.0230) and is statistically insignificant ($p = 0.5375$), indicating that exchange rate fluctuations do not have a meaningful impact on the growth of Tanzania's manufactured exports. This suggests that exchange rate movements alone may be insufficient to improve export performance, likely due to deeper structural challenges or market rigidities that limit the responsiveness of the manufacturing sector to price signals. This finding is consistent with Sandoyan and Galstyan's (2020) study on Armenia, which found that unfavorable exchange rates constrained the country's ability to realize

its full export potential. Similarly, Tanzania's manufacturing sector may require more than currency adjustments to enhance competitiveness such as increased investment in production capacity, value addition, and improved access to export markets. From a policy perspective, this implies that exchange rate interventions, while relevant, should be complemented by broader structural reforms. A mix of stable macroeconomic management, targeted industrial support, and improved trade facilitation is likely needed to achieve sustained growth in Tanzania's manufactured exports.

In summary, the study's results largely support the Export-Led Growth model in sectors like ceramics, plastics, and FDI-driven manufacturing, but also reveal important context-specific limitations where structural weaknesses undermine the expected outcomes of ELG and H-O theories particularly in capital-intensive sectors like iron and steel. These insights underscore the need for tailored policy interventions that account for factor endowments, sector-specific dynamics, and environmental sustainability to fully realize the benefits of an export-driven development strategy.

Conclusion and Implications

This study reinforces Tanzania's commitment to an export-led (ELG) growth strategy by demonstrating that manufacturing exports, especially ceramics and plastics are key drivers of economic growth. The positive contribution of these exports aligns with the ELG hypothesis, which posits that expanding trade, particularly in high-potential sectors, stimulates domestic production, employment, and income. By linking observed outcomes to both the Heckscher-Ohlin model and ELG theory, the study provides theoretical grounding for promoting sectors where Tanzania holds a comparative advantage, notably in labour and resource-intensive industries like ceramics. Furthermore, the emphasis on sector-specific bottlenecks, such as the underperformance of iron and steel, provides actionable insights. The identification of import dependence, low investment, and technological gaps as limiting factors offers strategic direction for industrial policy supporting the national agenda to deepen value addition and build productive capacities under Tanzania's industrialization and export promotion frameworks. Calling for targeted investments in infrastructure, technology, and workforce development, the study informs not just short-term export expansion but long-term structural transformation. The call for integrating environmental sustainability, particularly in the context of plastic exports, also aligns with Tanzania's growing emphasis on green industrial policy, ensuring that growth is both inclusive and ecologically responsible.

The study's implications suggest that the Tanzanian government should prioritize support for manufacturing sectors with high export potential by creating a more conducive environment for sustained growth and innovation. This could involve providing targeted incentives to enhance the competitiveness of high-growth industries like ceramics and plastics, which have demonstrated strong export performance. Increasing investments in domestic production capacity, coupled with tax incentives and access to capital, could stimulate further growth within these sectors. Additionally, implementing environmentally conscious policies for industries with significant ecological impacts, such as plastics, can ensure that economic gains do not compromise long-term environmental sustainability. By adopting a comprehensive approach that integrates economic and environmental priorities, Tanzania can strengthen its manufacturing sector's contribution to sustainable, long-term growth. In doing so, the country can leverage its

manufacturing potential to improve economic resilience, reduce dependence on imported goods and achieve a more diversified and sustainable economic trajectory.

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