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Original Research Article

Industrialization and Economic Growth in Tanzania: The Influence of High-Tech Exports, Manufacturing Value Addition, and Export Composition

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Abstract: This study examines the relationship between high-tech exports, medium-tech manufacturing value addition, and export composition on economic growth in terms of Gross Domestic Product (GDP) per capita in Tanzania. Employing regression analysis revealed statistically significant influences of these variables on GDP per capita. Findings reveal a negative relationship between high-tech exports and GDP per capita, unlocking challenges in technology adoption. Also, the negative impact of medium-tech manufacturing value addition implied inefficiencies in the sector. Moreover, manufacturing exports positively contribute to GDP per capita. This study aligns with global Sustainable Development Goals (SDGs), particularly Goals 8 and 9, while providing a framework for developing countries to improve industrialization for sustainable economic growth in terms of GDP per capita, contributing to the global dialogue on industrialization and its societal impacts.

Keywords: Economic Growth, Export Composition, GDP per Capita, High-Tech Exports, Industrialization and Manufacturing Value Addition.

INTRODUCTION

Exports are a significant contributor to GDP, Duran *et al.,* (2028) argued that, success in export composition specifically in high-tech exports seen as a measure of the economic growth of the countries (Duran, 2018; Costantiello, 2022). Also, Zapata (2024) argued that high-tech exports goods, manufacturing value, and manufactured exports emerge with greater concern to assess the industrial sector's performance regarding GDP per capita growth (Zapata, 2024). Irshad (2022) examined the role of domestic demand in the development of export supply from Pakistan, using the autoregressive distributed lag (ARDL) model (bound testing). This study employed annual data from 1971 to 2014 in which findings recognized, that domestic demand pressure has a negative and significant effect on the supply of manufactured exports in both the long- and short-run periods (Irshad, 2022).

Furthermore, Irshad (2022) contributed to this current study by showing that, the low-rate export of manufactured products in one country is not influenced by domestic demand pressure. Hereafter, the need for Indigenous products is not the reason for the low rate of manufactured exports rather than other factors, this paper was not focused on Indigenous high-tech manufactured products and their impact on GDP per capita, as the gap this current study will address. Also, Demena (2018) argued quantity of manufactured exports in the aggregate merchandise trade sector to Gross Domestic Product

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(GDP) across the East African Community (EAC) member states remains below 8 percent (Demena, 2018).

While Gamariel (2019) highlighted that, improving the foreign direct investment EAC suggested an advantageous path toward a low percentage of manufactured exports in the aggregate merchandise trade sector (Gamariel, 2019). Ngoma (2022) suggested that enterprises within EAC made significant growth in the production and delivery of goods (Ngoma, 2022). Sahin (2021) examined the relationship between high-tech export and economic growth: A panel data approach for 20 high-tech exporter countries such as Belgium, Canada, China, Czech Republic, France, Germany, India, Ireland, Italy, Japan, Korea, Malaysia, Mexico, Netherlands, Poland, Singapore, Switzerland, Thailand, the UK, and the USA in which data were collected from 2007 to 2018.

Findings exposed high technology exports and increased economic growth more than agricultural exports (Şahin, 2021). This study made a foundation that, economic growth is positively influenced by high-tech exports rather than agriculture exports, regardless of expressive perception Sahin (2021) does not exactly address which part of economic growth was increased with increases of high-technology exports, this remains the area in which this currently study will focus on how high-tech export will influence GDP per capita.

Moreover, Erkişi (2019) explored high-technology export products and economic growth: A panel data analysis for European Union-15 countries from 1998-2017, this study includes the following variables as the gross domestic product (GDP), high-technology exports, labor force, and gross fixed capital formation. Erkişi (2019) uses causality and co-integration inferential analysis. Finding realized that in the short-term there is a bidirectional causal rapport between gross domestic product (GDP) and high-technology exports, while unidirectional causality from high-technology exports to the gross fixed capital formation (Erkişi, 2019).

This work directly addresses the pressing issue of economic growth in Tanzania, a country striving to achieve sustainable development and improve the quality of life for its citizens while examining the relationships between high-tech exports, manufacturing value addition, and export composition (Estmann, 2022). This study provides a practical understanding of how industrialization needs to be optimized to foster economic growth in terms of GDP per capita. These findings are not only relevant to policymakers and stakeholders in Tanzania but also contribute to the global dialogue on industrialization and its impacts on realizing sustainable development.

This study valued previous collective efforts to improve society since it identifies both opportunities and challenges in Tanzania's industrialization journey. The positive effect of manufacturing exports on GDP per capita revealed the potential of local manufacturing industries to drive economic growth (Adam, 2017). Furthermore, the negative effects of high-tech exports and medium-tech manufacturing value addition highlight structural inefficiencies that need to be addressed. Revealing these dynamics equips policymakers with the knowledge needed to design targeted interventions to maximize the benefits of industrialization. This aligns with global efforts to achieve the United Nations Sustainable Development Goals (SDGs), particularly Goal 8 (Decent Work and Economic Growth) and Goal 9 (Industry, Innovation, and Infrastructure).

This study revealed social importance, both for the people of Tanzania and globally at large. For Tanzanians, the study provides a roadmap for improving individual economic well-being by identifying sectors for inclusive growth. The findings emphasize the need for investments in innovation and education to increase the productivity of high-tech and medium-tech manufacturing sectors. Globally, this study contributes to a better understanding of how developing countries can manage to steer industrialization in a way that promotes sustainable economic growth. It serves as a case study for other nations facing similar challenges of stagnant economic growth, thus strengthening its societal impact beyond Tanzania's borders.

This work potentially leads to significant societal impacts, addressing and withdrawing adverse economic trends such as the negative relationship between high-tech exports and GDP per capita. Furthermore, addressing inefficiencies in medium-tech manufacturing will unlock its potential as a driver of economic growth (Avenyo, 2022; Fonkam, 2023). With the focus on these variables, the study provides a framework for achieving beneficial societal impacts, such as reducing poverty, creating jobs, and fostering innovation. While the aim of this study is grounded in the practical realities of Tanzania's economic setting, it also reflects the global agenda through SGDs number 1,2, 8, and 9.

METHODOLOGY

Before assessing the effect of productivity in terms of high-tech export goods, manufacturing value, and manufactured export on GDP per capita gaps within the United Republic of Tanzania, the researcher checked for stationarity of the variables to

avoid spurious results, these variables included High-technology exports (% of manufactured exports), Medium and high-tech manufacturing value added (% manufacturing value added) and Manufactures exports (% of merchandise exports) as independent variables while GDP per capita (constant LCU) stayed as dependent variable.

Hypotheses

- H0: Variables have unit root or not stationary
- H1: Variables do not have a unit root or are stationary

Table 1: Unit Root Result Table for the study variables

Variables	Lag	Option	Test Statistic Value	5% Critical Value	p-value for Z(t)	Remarks
High-technology exports (% of manufactured exports)	1	drift	-3.14	-1.699	0.0019	HO Rejected
Medium and high-tech manufacturing value added (% manufacturing value added)	1	drift	-2.618	-1.699	0.007	HO Rejected
Manufactures exports (% of merchandise exports)	1	drift	-3.227	-1.701	0.0016	HO Rejected
GDP per capita (constant LCU)	5	drift	-2.562	-1.725	0.0092	HO Rejected

Source: Researcher Findings (2025)

As presented in Table 1, results show that all the variables such as High-technology exports (% of manufactured exports), Medium and high-tech manufacturing value added (% manufacturing value added), manufacturing exports (% of merchandise exports), and GDP per capita (constant LCU) are stationary, as the hypothesis (H0) having a unit root is rejected for all variables at the 5% significance level. This is evidenced by the test statistic values being more negative than the 5% critical values and the p-values being less than 0.05. Hence, performing stationarity tests was crucial before performing further analysis, such as regression, because non-stationary data leads to spurious results.

Furthermore, a simple regression analysis model is developed to analyze the relationship between independent and dependent variables and, hence, examine the causality effects. The formulated linear regression model is written as follows:

$$GDP\ per\ capita_t = \beta 0 + \beta 1 HTE + \beta 2 MVA + \beta 3 MEM + \Sigma_t \ldots\ldots (1)$$

Where GDP per capita is the dependent variable, Σ_t is a random error term, and β1, β2, and β3, are parameters estimated and HTE stands for High Technology Exports, MVA stands for Manufacturing Value Added, and MEM stands for Manufacturers' Exports Merchandise.

RESULTS AND DISCUSSION

The regression analysis presented in Table 2 examines the relationship between GDP per capita and three independent variables such as high-technology exports (% of manufactured exports), medium and high-tech manufacturing value added (% manufacturing value added), and manufactured exports (% of merchandise exports).

Table 2: Regression Result Table

Overall Model Result		**[F-value = 6. 13]; [P-value = 0.0023]**			
GDP per capita (current LCU)	**Coef.**	**Std. Error**	**t**	**P>|t|**	**[95% Conf. Interval]**
High-technology exports (% of manufactured exports)-HTE	-0.1820874	0.0839758	-2.17	0.038	-0.3538372 -0.0103376
Medium and high-tech manufacturing value added (% manufacturing value added)-MVA	-0.1806107	0.0566912	-3.19	0.003	-0.2965573 -0.0646642
Manufactures exports (% of merchandise exports)-MEM	0.2273935	0.1090197	2.09	0.046	0.0044232 0.4503638
_cons	6.147443	0.1376180	44.67	0.000	5.865982 6.428903

Source: Research Finding (2025)

In the empirical analysis, authors tried to analyze the impact of High-technology exports (% of manufactured exports)-HTE, Medium and high-tech manufacturing value added (% manufacturing value

added)-MVA and manufactures exports (% of merchandise exports)-MEM on GDP per capita growth. Mathematically shown in equation (1).
$GDP\ per\ capita_t = 6.147 - 0.182HTE - 0.181\ MVA + 0.227MEM + \Sigma_t$ … (2)

The model is statistically significant, as indicated by the F-statistic (6.13) and its associated p-value (0.0023), implying that the independent variables have a statistically significant influence on GDP per capita growth in Tanzania.

High-technology exports (% of manufactured exports) and GDP per capita (current LCU)

Also, the coefficients of the independent variables provide individual effects on GDP per capita. High-technology exports regardless of having statistical significance (p = 0.038) have a negative coefficient (-0.1821).

Table 3: Regression Result for the high-technology exports and GDP per capita.

GDP per capita (current LCU)	Coef.	Std. Error	T	P>|t|	[95% Conf. Interval]
High-technology exports (% of manufactured exports)-HTE	-0.1820874	0.0839758	-2.17	0.038	-0.3538372 0.0103376
_cons	6.147443	0.1376180	44.67	0.000	5.865982 6.428903

Source: Research Findings (2025)

$GDP\ per\ capita_t = 6.147 - 0.182HTE + \Sigma_t$ … (3)

The result from the table above implies that an increase in high-technology exports is associated with a decrease in GDP per capita, this aligned with the economic setting of developing countries in the case of Tanzania depending much on low-tech manufacturing such as agriculture manufacturing exports, which remain as the hindrance for the positive contribution of high-tech export which has a small portion of the total export, hence investing in high-tech will not bring immediate impact on GDP per capita due high dependence of low-tech manufacturing.

The finding above, aligned with a study conducted in Serbia, Hungary, and Romania by Marjanovic (2022) which found that there is no substantial positive relationship between high-tech exports and GDP growth, this implies that the benefits of high-tech trade is not universally applicable to all countries (Marjanović, 2022). Furthermore, countries such as Sweden, and Finland revealed negative relationships between high-tech exports and GDP per capita (Auzina-Emsina, 2023).

To comment above, the negative relationship between high-technology exports and GDP per capita, as observed in Tanzania from developing countries as the case study, also (Marjanovic, 2022; (Auzina-Emsina, 2023) provides evidence from developed countries. For Tanzania, this negative relationship between high-technology exports and GDP per capita is influenced by low-technology exports. In developed countries, a negative relationship between high-technology exports and GDP per capita is the outcome of technology industries to dedicate more on export products rather than domestic value-generation products leading to a potential difference in income distribution and insufficient domestic economic multipliers. This addresses that, regardless of the statistical significance of high technology exports on GDP per capita still investment in technology is more important but also exporters need to balance export and domestic value generation for sufficient economic multipliers.

Medium and high-tech manufacturing value added (% manufacturing value added) and GDP per capita (current LCU)

Furthermore, medium and high-tech manufacturing value added also has a negative and significant coefficient (-0.1806, p = 0.003), implying that higher contributions from this sector are linked to lower GDP per capita regardless of its statistical significance (t-value = -3.19, p = 0.003).

Table 4: Regression result table

GDP per capita (current LCU)	Coef.	Std. Error	t	P>|t|	[95% Conf. Interval]
Medium and high-tech manufacturing value added (% manufacturing value added)-MVA	-0.1806107	0.0566912	-3.19	0.003	-0.2965573 -0.0646642
_cons	6.147443	0.1376180	44.67	0.000	5.865982 6.428903

Source: Research findings (2025)

$GDP\ per\ capita_t = 6.147 - 0.181\ MVA + \Sigma_t$ … (4)

From the result of table 4, regardless of statistical significance (t-value = -3.19, p = 0.003) of medium and high-tech manufacturing value added (% manufacturing value added) to GDP per capita (current LCU), the finding revealed a negative relationship between medium and high-tech manufacturing value added (% manufacturing value added) to GDP per capita (current LCU). This stated that a one-unit increase of medium and high-tech manufacturing value added (% manufacturing value added) led to a decrease of 0.1806 units in GDP per capita while holding other factors constant.

This finding supported by Okpala (2023) examined the effect of manufacturing sub-sector performance on productivity in Nigeria using Granger causality analysis. This study found a negative relationship between manufacturing value added and labor productivity, this suggested that, regardless of the increased manufacturing value-added, still there is no actual value added in the sector in Nigeria (Okpala, 2023). This emphasizes regardless of the significant importance of medium and high-tech manufacturing value added (% manufacturing value added) to GDP per capita (current LCU), labor productivity is of the greater concern to influence GDP per capita in developing countries.

Manufactures exports (% of merchandise exports) and GDP per capita (current LCU)

While, manufacturing exports as a percentage of merchandise exports have a positive and significant coefficient (0.2274, p = 0.046), implying that an increase in manufacturing exports is linked with higher GDP per capita.

Table 5: Regression result table for manufactures exports (% of merchandise exports) and GDP per capita (current LCU)

GDP per capita (current LCU)	Coef.	Std. Error	t	P>|t|	[95% Conf. Interval]
Manufactures exports (% of merchandise exports)-MEM	0.2273935	0.1090197	2.09	0.046	0.0044232 0.4503638
_cons	6.147443	0.1376180	44.67	0.000	5.865982 6.428903

Source: Research Findings (2025)

$GDP\ per\ capita_t = 6.147 + 0.227MEM + \Sigma_t$ … (5)

Table 5 result highlights, the statistical significance (t-value = 2.09, p = 0.046) of manufactures exports (% of merchandise exports) to explain GDP per capita (current LCU). This implies that one unit increase in manufacturing exports (% of merchandise exports) leads to a 0.2273 unit increase of GDP per capita (current LCU). Also, the coefficient of manufactures exports (% of merchandise exports) which is 0.2273 positive revealed a positive relationship between manufactures exports (% of merchandise exports) and GDP per capita (current LCU).

While findings revealed significant implications for economic growth in terms of GDP per Capita, a negative relationship between high-technology exports, medium and high-tech manufacturing value added and GDP per capita exposes economic dependence on low-tech manufacturing and an indication of a low constituent of high-tech export from the total exports. This finding reveals challenges in technology adoption as a wake-up call for technology literacy aimed to increase economic growth through GDP per capita (Vázquez-López, 2023). Furthermore, the positive relationship between manufacturing exports and GDP per capita highlights the importance of local manufacturing industries in driving economic growth in terms of GDP per Capita.

CONCLUSION AND RECOMMENDATION

Henceforth, this regression analysis provides vital factors influencing economic growth in Tanzania in terms of GDP per Capita. While manufacturing exports appear to be a key driver of GDP per capita, the negative effects on high-technology exports and medium-tech manufacturing address the need for targeted interventions to address sector-specific challenges. This raises an immediate call to explore these challenges by incorporating additional variables even adopting a pragmatic worldview rather than post-positivist assumptions employed, this will help a researcher to capture in detail Tanzania's economic setting. Thus, it is recommended that developing countries with a case study of Tanzania focus on increasing the efficiency and productivity of its high-technology and medium-tech manufacturing sectors.

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