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# Manufacturing and economic growth in Uganda: A test of Kaldor's first law

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## Abstract

Manufacturing has served as the main catalyst for economic growth and development ever since the Industrial Revolution. The significance of the manufacturing sector for economic growth and development is well supported by both theoretical and empirical data. This study examines the relationship between manufacturing and economic growth in Uganda, using time-series analysis over a period of 1990-2022. The study applies Kaldor's first growth law. The main results show a significant positive relationship between manufacturing growth and GDP growth. The results support Kaldor's first law and hence, "manufacturing as engine of growth" holds, in the case of Uganda. This study offers the following policy implications: (i) policy measures on economic transformation ought to be anchored on industrialisation, with an emphasis on the addition of value in the manufacturing sector, (ii) the goal of policy initiatives should be to leverage the manufacturing sector's ability as a source and resource for trade, investment, and employment, and (iii) the goal of policy measures should be to optimise the manufacturing sector's current potential and position it as a growth engine for the Ugandan economy.

**Keywords:** Economic Growth; Manufacturing; Sector; Uganda

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## 1. Introduction

Since the early 1960s, when Uganda gained independence from British colonial rule, a long-drawn-out civil war plagued the country to such an extent that the national economy was severely damaged by conflicts and chaos. Following President Yoweri Museveni's election to office in the mid-1980s, the economy transitioned from recovery to growth. Uganda's economic growth increased steadily at a pace of roughly 7% from the year 2000, until 2012, when the rate of expansion had somewhat decreased. The country is now more confident in its efforts to achieve economic take-off as a result of the strong growth (Lin and Xu, 2016).

To strengthen and accelerate this process of growth, the Ugandan government set a vision in 2007 to transform the country from a peasant to a modern and prosperous one, within 30 years. The vision statement "Uganda Vision 2040", outlines development paths and strategies for transforming Uganda from a peasant, low-income nation into a competitive, upper-middle-income country (Ibrahim et al., 2020; Lin and Xu, 2016).

Manufacturing has served as the main catalyst for economic growth and development ever since the Industrial Revolution (Attiah, 2019). In Uganda, the major industrial sector is manufacturing which contributes 7% to 9% of the country's GDP. The industry is still relatively small, despite growth, and is dominated by subsidiaries of multinational corporations. Numerous obstacles beset the industry, including high electricity costs and fierce competition from imports (Eyaa et al., 2021; Shinyekwa et al., 2016).

The significance of the manufacturing sector for economic development is well supported by both theoretical and empirical data. For instance, the manufacturing industry facilitates capital accumulation (Grozdic et al., 2020) as it provides opportunities for economies of scale that are not as prevalent in services or agriculture (Attiah, 2019); offers opportunities for technological advancement (Nanhong, 2023), and has a strong backward and forward linkage with the rest of the economy (Ncube and Tregenna, 2022).

The mechanisms underlying economic growth and its causes have long been a topic of discussion among economists. The fundamental tenet of Kaldor's growth approach is that economic growth in a contemporary economy is driven by the manufacturing sector. The premise of this argument is that dynamic economies of scale dominate the manufacturing sector. In contrast to the supply-side focus of typical neoclassical growth analysis, Kaldor's analysis of growth centres on the demand side of the economy (Mongale and Maraswa, 2018; Pacheco-López and Thirlwall, 2014).

The first law of Kaldor, sometimes known as "the engine of growth" hypothesis, asserts a positive relationship between the growth of GDP and that of the manufacturing sector of the economy.

The manufacturing sector drives growth, since along with low productivity and excess labour in non-manufacturing sectors, the sector creates demand for the products and services offered by non-manufacturing sectors. Furthermore, rapid expansion in the manufacturing sector may result in a flow of exports that propel economic growth (Keho, 2018; Oburota and Okoi, 2017).

There is ongoing disagreement in many emerging nations about the most effective strategy for promoting economic growth. Then, the question of whether manufacturing should continue to be the main focus of industrial policy in emerging nations, especially in Africa, emerges. This research aims to answer this question by examining how Uganda's manufacturing sector contributes to economic growth. Uganda has many opportunities to grow its industrial base. This study adds to the body of literature in the following way. There has not been any research done to test the theory how Uganda's economic growth and the expansion of the

manufacturing sector are correlated using Kaldor's first law. Given the significant position that manufacturing plays in an economy, the paper will examine the validity of Kaldor's first law for Uganda.

## 2. Literature on sector

Long before Adam Smith wrote his famous 1776 treatise "The Wealth of Nations", economists were concerned with the nature and causes of economic growth (Sheehan, 2000). Manufacturing has traditionally been the primary driver of economic growth and development (Szirmai and Verspagen, 2015). In any economy, the manufacturing sector is thought to be essential to achieving economic growth and development (Egbiku, 2018; Moyo and Jeke, 2019).

The manufacturing sector has grown in significance, as the primary generator of economic growth in both developed and developing countries (Oburota and Okoi, 2017). However, for more than three decades, the sub-Saharan African countries have been deindustrialising. During the same period, economic growth has been trending upward. Increased macroeconomic stability and the surge in commodity prices have been the main drivers of the high growth rates (Clark, 2019; Moyo and Jeke, 2019).

According to the first growth law proposed by Kaldor, the rate of growth of an economy and the growth rate of its manufacturing sector are positively related. This first law of growth highlights the significance of manufacturing output in determining economic growth. This link has been the subject of numerous studies (see Table 1) employing a broad range of data sets and econometric techniques since the 1960s (Karaki, 2023; Keho, 2018).

Other studies have called into question the manufacturing sector's continued significance for economic growth (Szirmai and Verspagen, 2015). This begs the question: Does supporting the manufacturing sector lead to more robust and long-term economic growth and a decrease in unemployment? This study examines the relationship between manufacturing and economic growth in Uganda by applying Kaldor's first growth law. The findings offer insightful information that could aid decision-makers with strategies and policies that will promote Uganda's economic growth.

**Table 1.** Literature on manufacturing sector contributions to economic growth

Author	Objective	Sample/Country	Methodology	Contribution
(Pandian, 2017)	To examine if manufacturing is still important for economic growth in a globalised world.	Developed and underdeveloped countries Period: 1970-2010	Difference models	Employment in the manufacturing sector positively impacts economic growth.
(Oburota & Okoi, 2017)	To investigate whether manufacturing output and economic growth are related.	Nigeria Period: 1981-2013	Kaldor's first law of growth and Endogenous growth model	Capital, manufacturing output, and technology are primary drivers of economic growth.

Table 1. Cont.

Author	Objective	Sample/Country	Methodology	Contribution
(Gabriel, 2019)	Investigating the long-term relationship between manufacturing and economic expansion.	115 developing countries Period: 1990 - 2011	Panel Vector Autoregression (PVAR)	In emerging countries, the manufacturing sector can function as an "engine of growth."
(Elahinia et al., 2019)	To investigate how manufacturing affected the deindustrialization-era economic growth in European economies.	European economies Period: 1995 - 2016	Neoclassical growth model and Kaldor's first law of growth	Manufacturing, labour force participation, and technology are all strongly positively correlated with economic growth.
(Sallam, 2021)	The contribution of the manufacturing sector to Saudi Arabia's economic growth.	Saudi Arabia Period: 1980-2018	Cointegration and VECM approaches	A bidirectional causal relationship exists between economic growth and the manufacturing sector.
(Alici et al., 2022)	To determine the link between economic growth and the manufacturing sector.	Turkey Period: 1980-2020	Least Squares (OLS)	Exports from the manufacturing sector have a favourable impact on economic growth.
(Lakew, 2023)	To determine the contribution of exports of manufacturing and services to Ethiopia's economic growth.	Ethiopia Period: 1995 -2018	Autoregressive distributed lag (ARDL)	Economic growth is driven by manufactured exports.
(Rweyemamu et al., 2023)	Investing the nexus between economic growth and manufacturing exports.	Tanzania	Autoregressive Distributed Lags (ARDL)	-Long-term economic growth is impacted by manufacturing exports. - Exports of manufactured goods drive economic growth, and not vice-versa.

### 3. Methods

#### 3.1. Model specification

The premise of Kaldor's first law, sometimes known as "the engine of growth" hypothesis, holds that GDP growth is positively associated with the growth of manufacturing output (Marconi et al., 2016). The manufacturing sector is a driver of growth, due to low productivity and surplus labour in non-manufacturing sectors. Also, it generates more demand for the products and services that the non-manufacturing sectors offer. Furthermore, a rapidly expanding manufacturing sector has the potential to generate a steady flow of exports that stimulate economic growth (Olamade and Oni, 2016; Pacheco-López and Thirlwall, 2014).

The econometric model below is used to test this law.

$$\ln(GDP)_t = \alpha_1 + \alpha_2 \ln(MNF)_t + \mu_{1t}, \alpha_2 > 0 \quad (1)$$

where  $\ln GDP$  represents the natural log value of GDP growth,  $\ln MNF$  denotes the natural log of manufacturing output,  $t$  is the time trend, and  $\mu_{1t}$  is the error term presumed to be normally, uniformly, and autonomously distributed.

To eliminate the "share effect of manufacturing", it is crucial to regress the growth of non-manufacturing output on the growth of manufacturing. The "share effect of manufacturing" holds that, the robust association between GDP growth and the growth of manufacturing, is merely the result of the manufacturing sector taking an increasingly bigger proportion in an economy as economic development progress. Thus

$$\ln(NMNF)_t = \alpha_3 + \alpha_4 \ln(MNF)_t + \mu_{2t} \quad (2)$$

where  $\ln NMNF$  represents the natural log of the non-manufacturing sector (agriculture and service), and  $\mu_{2t}$  is the error term. Support for the first law is seen in the positive sign of the coefficient  $\alpha_4$  and its statistical significance since it indicates that the growth of the manufacturing sector positively impacts the growth of the non-manufacturing sectors of an economy.

This study estimates equation (2) offers more evidence in favour of the first law. The approach addresses the spurious regression criticism that stems from the manufacturing sector's significance to GDP contribution.

### 3.2. Data sources

The data for this study is time series (1990-2022) obtained from the World Development Indicators (WDI). WDI is a database of global economic conditions. The World Bank compiles the database and includes reliable data on past and present economic development. The choice of this time frame was made because Uganda's economy moved from recovery to growth after a regime change in the mid-1980s. Furthermore, the availability of WDI data extended only until 2022. The implications of this timeframe on the results are that it is easy to see how the variables change over time and to understand the factors influencing the study variables during the chosen time frame.

The choice of the study variables is based on the literature review and the fact that these comprise the major economic sectors of Uganda. Furthermore, these variables matter when applying Kaldor's first law of growth. Finally, these present Uganda with an excellent opportunity to embark on its development path and economic transformation strategies as outlined in the "Uganda Vision 2040."

### 3.3. Definition of the variables

- *GDP per capita (GRPC)*: GDP per capita (proxy for economic growth) is a measure of economic output of each person in a country. The aggregates are expressed in US dollars and are based on constant 2015 prices. GDP is the total gross value added by all producers who are residents of the country, plus any product taxes and minus any subsidies that are not factored into the product value.
- *Agriculture sector*: is proxied by agriculture, value added (% of GDP). It also goes by the name "primary sector." It includes livestock production and cultivation of crops in addition to fishing, forestry, and

hunting. In many countries, agriculture has a significant impact on socioeconomic development. A study by Arifien et al. (2020) indicates that the agriculture sector impacts the pace of economic growth. The variable was chosen as a proxy because agriculture value added represents the net output of the agriculture sector.

- *Manufacturing sector*: is proxied by manufacturing, value added (% of GDP) measures the proportion of a country's economy that contributes to the manufacturing output. Value added is the net output of the manufacturing sector, determined by deducting the intermediate inputs from the total output. It is computed without accounting for the depletion and deterioration of natural resources or the depreciation of fabricated assets. The variable was chosen as a proxy because it represents the net output of the manufacturing sector.
- *Service sector*: is proxied by exports of goods and services (% of GDP). It represents the total of both exported goods and other market services, such as the value of freight, license fees, insurance, merchandise, royalties, travel, and transport, plus other services like business, construction, communication, financial, government services, information, and personal. It does not include transfer payments, investment income, or employee compensation. The variable was chosen as a proxy because it represents the net output of the service sector.

### 3.4. Unit root test

In this study, the unit root test is carried out using the Augmented Dickey-Fuller (ADF) test. Dickey and Fuller devised a method for determining if a variable follows a random walk or has a unit root (Moffatt, 2023; Syed et al., 2021). The ADF test is part of the set of tests known as "Unit Root Tests," which are the appropriate way to determine whether a time series is stationary. A time series is considered non-stationary if it has a unit root.

$$\Delta Y_t = \beta_0 + \beta_1 t + \beta_2 Y_{t-1} + \sum_{i=1}^k \alpha_i \Delta Y_{t-i} + \varepsilon_t \quad (3)$$

where  $\Delta$  is the difference operator, and  $\beta_s$  and  $\alpha_i$  are estimated coefficients and  $k$  represents the number of lags.

## 4. Results and discussions

### 4.1. Descriptive statistics

This section discusses the characteristics of the data before discussing the empirical results. According to the variable summary statistics, among the sectors between 1990 to 2022, the agriculture sector had the greatest mean GDP growth, followed by the service and manufacturing sectors. Also, there are no variations in any of the variables, as demonstrated by a comparison of the mean and the standard deviation (see Table 2).

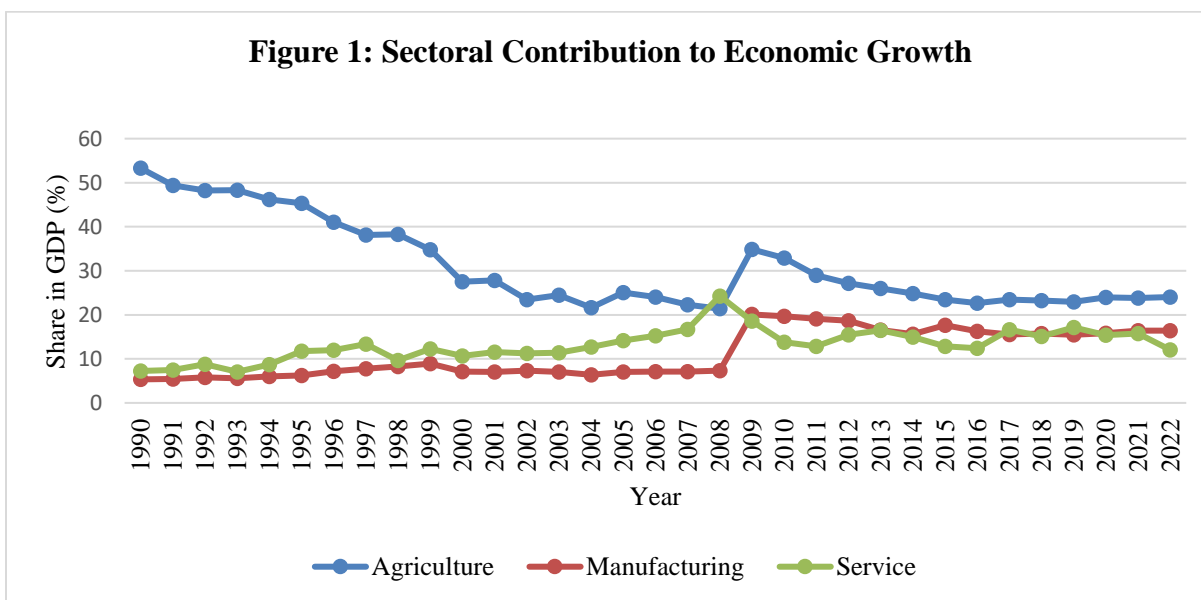
Figure 1 depicts the sectoral contribution to economic growth in Uganda from 1990 to 2022. Comparatively, the agriculture sector has contributed the largest share to economic growth, then the manufacturing and service sectors. Over time, the agriculture sector's average contribution to GDP growth is 31 per cent.

**Table 2.** Descriptive statistics

	<b>GRPC</b>	<b>AGRI</b>	<b>MNF</b>	<b>SERV</b>
Observations	33	33	33	33
Mean	658.81	31.00	11.18	13.21
Std.Deviation	196.19	9.84	5.28	3.60
Maximum	934.34	53.28	20.10	24.28
Minimum	369.49	21.38	5.34	7.06

GRPC = GDP per capita (constant 2015 US\$)/ (proxy for economic growth), AGRI= Agriculture sector, MNF= Manufacturing sector, SERV= Service sector Source: Author's own findings

The contribution of the service sector to GDP growth was large and greater than that of the manufacturing sector between 1990 and 2009. After that, a decline was experienced. A study by Shinyekwa et al. (2016), attributes this decline to foreign direct investment (FDI) that entered the industrial sector of Uganda between 1991 and 2009. This foreign direct investment represents 45% of all FDI that entered Uganda, with 33% going towards the manufacturing sector. In addition, the manufacturing sector's contribution indicates a modest growth, accompanied by occasional swings. Over the years, its average contribution to GDP growth is 11.18%.



**Figure 1.** Sectoral Contribution to Economic Growth (Source: Authors Computation based on World Development Indicators (WDI) data. <https://data.worldbank.org/indicator>)

The service sector's contribution to GDP peaked in 2008, after which it began to fall. This fall is attributed to the global financial crisis, which had varying effects on low-income nations and developed economies. In the

case of Uganda, travel accounts for the majority of service exports, and at that time, earnings from tourism had significantly decreased.

The low contribution of manufacturing to economic growth can be attributed to a number of factors, such as high infrastructure costs, a shortage of technical and managerial skills, and a lack of funding, particularly long-term finance (Olwor, 2023). The following strategies could help overcome these barriers and increase manufacturing's contribution to economic growth. Firstly, investing in infrastructure should be prioritised, and growing the manufacturing sector should be given more attention since it can lead to faster growth in the future. Secondly, manufacturing firms in the relevant industrial sector ought to choose to provide their employees with the necessary training in order to help them grow and perform better. Lastly, it is imperative that the government promotes the creation of sustainable funding sources and novel financing approaches like public-private partnerships.

These findings imply that Uganda is gradually shifting its focus from agriculture to low-end services rather than manufacturing. Although its share of the GDP has decreased, agriculture nevertheless remains a vital sector of the Ugandan economy. The idea that Uganda is deindustrialising has really arisen from the country's sluggish growth in the manufacturing sector, which accounts for either static or falling GDP growth.

Table 3 displays the unit root test results. A unit root test determines whether the variables in a time series are non-stationary and have a unit root. Time-series data can be tested using unit root tests to see if it need to be first differenced in order to become stationary. The presence of a unit root can result in misleading regressions, which are statistically significant but have no real relevance. All the variables are non-stationary in their levels but eventually are stationary after first differencing. As a result, all variables are unable to reject the unit-root hypothesis at level but are able to do so at first differencing. Differencing induces stationarity, which eliminates the likelihood of having a spurious relationship among the variables. Given that stationarity has been induced, the data set can be used for additional analysis.

Also, a test for serial correlation was performed using the Breusch-Godfrey test for autocorrelation, and the Durbin's alternative test for autocorrelation. Both tests failed to reject the null hypothesis of no serial correlation.

**Table 3.** Unit root test results

Variables	Level		First Difference			
	ADF-Stat	p-value	ADF-Stat	p-value	Order of Integration	Conclusion
GRPC	-0.467	0.898	-8.355	0.000	1	I(1)
AGRI	-2.344	0.158	-5.749	0.000	1	I(1)
MNF	-1.335	0.613	-5.611	0.000	1	I(1)
SERV	-2.558	0.102	-6.018	0.000	1	I(1)

Source: Author's findings



In addition, post-estimation tests indicate that there was no multicollinearity between any two or more independent variables. When there is multicollinearity between the independent variables, the independent effects of each parameter estimate on the dependent variable are difficult to distinguish. If multicollinearity was present, the confidence in any policy prescriptions based on these estimations would be very low.

The model findings are shown in Equation 4 below. Based on the results, the manufacturing sector has a positive and significant effect on the growth of the other non-manufacturing sector at 1% level. According to the marginal effect, if value-added for the manufacturing sector increases by 1%, growth in the non-manufacturing sector is expected to increase significantly. This means that the growth of the manufacturing sector positively impacts the growth of the non-manufacturing sectors of an economy. These results support Kaldor's first law, as seen in the positive sign of the coefficient on manufacturing (0.6698) and its statistical significance. This implies that the manufacturing sector is experiencing increasing returns. Therefore, labour from low-productivity sectors ought to be shifted to the industrial sector, to take advantage of the dynamic economies of scale present in manufacturing. Furthermore, the results align with those of (Marconi et al., 2016; Olamide and Oni, 2016) which demonstrates that growth in the manufacturing sector is positively correlated with economic growth. Therefore, "manufacturing as engine of growth" holds, in the case of Uganda. These findings provide the following contributions to the continuing discussions over the contribution of manufacturing to economic development, especially in Sub-Saharan Africa: Firstly, the manufacturing sector is the ideal industry to propel Africa's development, despite the fact that it still plays a very limited role in the region when compared to other regions. Secondly, the growth of the manufacturing sector remains the main force behind structural transformation and economic diversification.

$$\widehat{NMNF}_t = -0.9962 + 0.6698 MNF_t \quad (4)$$

$$se = (0.5900) \quad (0.2469)$$

$$RSS = 327.233; p\text{-value} = 0.003; r^2 = 0.1970$$

Note: Standard errors appear in parentheses

## 5. Conclusion and policy implications

The purpose of this study is to investigate the hypothesis of whether Uganda's economic growth is positively correlated with the growth of the manufacturing sector. Descriptive study results shows that comparatively, the agriculture sector has contributed the largest share to economic growth, then the manufacturing and service sectors. Furthermore, empirical results show that the manufacturing sector has a positive and significant effect on the growth of the other non-manufacturing sector. This implies that the growth of the manufacturing sector positively impacts the growth of the other non-manufacturing sectors of an economy. The results support Kaldor's first law and hence, "manufacturing as engine of growth" holds, in the case of Uganda.

This study offers the following policy implications. First, as established from the study results, manufacturing plays a key role in the economic growth of Uganda. Thus, policy measures on economic transformation ought to be anchored on industrialisation, with an emphasis on the addition of value in the

manufacturing sector. Manufacturing has strong local forward and backward linkages. Within the manufacturing sector, one area of focus may be light manufacturing, which is characterised by processes, which are labour-intensive and have low capital requirements. Also, targeted investment in certain types of manufacturing, such as agro-processing, which has the potential to drive industrialization.

Second, the manufacturing sector remains essential for the development of all other sectors in an economy. Therefore, the goal of policy initiatives should be to leverage the manufacturing sector's ability as a source and resource for trade, investment, and employment. This can be realised by developing competitive enterprises and innovative capabilities. Also, to encourage long-term employment growth, manufacturing should be deepened and diversified for both domestic and foreign markets.

Third, the goal of policy initiatives should be to optimise the manufacturing sector's current potential and position it as a growth engine for the Ugandan economy. Interventions to boost the performance of the manufacturing sector can result in a broader economic base, as well as bolster the value chain, interlinkages, and interdependencies in the manufacturing sector.

Lastly, manufacturing is a significant employer in an economy, as it generates employment, both directly and indirectly. These policy measures are crucial for employment generation and inclusive and sustainable development.

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The author declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article

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