



MAKERERE UNIVERSITY
MAKERERE UNIVERSITY BUSINESS SCHOOL

**DETERMINANTS OF MANUFACTURING SECTOR GROWTH IN THE EAST
AFRICAN COMMUNITY**

BY

WAKO IBRAHIM KISU

2021/HD10/2784U

+256 786344062

ibrahimkisu@gmail.com

**A DISSERTATION SUBMITTED TO MAKERERE UNIVERSITY BUSINESS
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MASTER OF ARTS
IN
ECONOMIC POLICY AND MANAGEMENT OF MAKERERE UNIVERSITY**

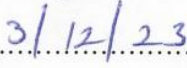
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DECEMBER, 2023

DECLARATION

I, Wako Ibrahim Kisu, hereby declare that this dissertation titled; “***Determinants of Manufacturing Sector Growth in the East African Community***” is my original work and has not been presented to any institution of higher learning for any award of an academic qualification. Where the work of others has been referred to, it has been duly acknowledged.

Signature 

Date: 

WAKO IBRAHIM KISU

2021/HD10/2784U

APPROVAL

This is to certify that this dissertation has been submitted for examination with our approval as supervisors.

DR. ABALIWANO JOYCE

Signature 

Date 5/12/2023

DR. WABUKALA BENARD MUSEKESE

Signature 

Date 04/12/2023

DEDICATION

This dissertation is dedicated to my parents, Ms. Nakintu Zubeda, Hajat Safina Museene (PhD), Mr. Twaha Kisu, and Hajji Aata Muhamad Kisu.

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TABLE OF CONTENTS

DECLARATION	i
APPROVAL	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF ABBREVIATIONS	ix
ABSTRACT	x
CHAPTER ONE	1
INTRODUCTION	1
1.0 Introduction	1
1.1 Background to the study	1
1.2 Statement of the problem	4
1.3 Purpose of the study	4
1.4 Objectives of the Study	4
1.5 Research hypotheses	5
1.6 Scope of the study	5
1.6.1 Subject Scope	5
1.6.2 Time scope	5
1.6.3 Geographic scope	5
1.7 Significances of the Study	6
1.8 Theoretical model	6
CHAPTER TWO	7
LITERATURE REVIEW	7
2.1 Introduction	7
2.2 Theoretical model	7
2.3 Empirical Literature	7
2.3.1 The effect of domestic credit on manufacturing sector growth	7
2.3.2 Foreign direct investment and manufacturing sector growth	8
2.3.3 Lending rates and manufacturing sector growth	10
2.3.4 Effect of inflation on manufacturing sector growth	12
CHAPTER THREE	14
RESEARCH METHODOLOGY	14
3.1 Introduction	14

3.2 Research design	14
3.4 Model Specification.....	15
3.4.1 Specification of the empirical model.....	15
3.5 Pre-estimation diagnostic tests.....	16
3.5.1 Multicollinearity	16
3.5.2 Stationarity test for model variables	16
3.5.3 Serial Correlation	16
3.5.4 Cointegration test for panel data	17
3.5.5 Heteroscedasticity.....	17
3.5.6 Test for Normality.....	17
3.7 Estimation technique.....	17
3.8 Ethical Considerations	18
CHAPTER FOUR.....	19
PRESENTATION AND DISCUSSION OF FINDINGS.....	19
4.1 Introduction.....	19
4.2 Descriptive evidence of the study	19
4.3 Pre-estimation diagnostic tests.....	20
4.3.1 The test for multicollinearity	21
4.3.2 Serial correlation test	22
4.3.3 Heteroscedasticity test	23
4.3.4 Test for Normality of Model Variables	24
4.3.5 Test for stationarity.....	24
4.5 Cointegration test for panel data	25
4.5 Model estimation	25
CHAPTER FIVE	30
SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.....	30
5.0 Introduction.....	30
5.1.1 Effect of inflation on the manufacturing sector growth among EAC member countries.....	30
5.1.2 Effect of domestic credit on manufacturing sector growth among EAC member states.....	30
5.1.3 Effect of lending rates on the manufacturing sector growth among EAC member countries.....	31
5.1.4 Effect of foreign direct investment on the manufacturing sector growth among EAC member countries.....	31
5.2 Conclusions from the Study.....	31

5.3 Recommendations.....	32
5.4 Limitations of the study and areas for further research (One key limitation and possible solution)	32
5.5 Areas recommended for further research.....	33
REFERENCES	34

LIST OF TABLES

Table 1: Data Type and Sources	14
Table 2: Summary Descriptive Statistics of Variables	19
Table 3: Correlation Matrix of Model Variables	21
Table 4: Variance inflation factor for the Model Variables.....	21
Table 5: Wooldridge test for autocorrelation in panel data	23
Table 6: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model	23
Table 7: Results for the Jarque–Bera test.....	24
Table 8: Fisher Panel Unit Root Test results.....	24
Table 9: Pedroni Cointegration Test results	25
Table 10: Results from the FGLS and OLS Estimates.....	26

LIST OF ABBREVIATIONS

ADF	Augmented Dickey-Fuller
CBN	Central Bank of Nigeria
EAC	East African Community
ECM	Error Correction Model
ECOWAS	Economic Community of West African States
EXR	Exchange rate
FDI	Foreign Direct Investment
FE	Fixed Effects
FGLS	Feasible Generalized Least Squares
GDP	Gross Domestic Product
INF	Inflation Rate
MVA	Manufacturing Value Added
OLS	Ordinary Least Squares
OPEN	Degree of openness
RE	Random Effects
SDG	Sustainable Development Goal
TFP	Total Factor Production
UNCTAD	United Nations Conference on Trade and Development
VECM	Vector Error Correction Model
VIF	Variance Inflation Factors
WDI	World Bank Development Indicators

ABSTRACT

This study examines the factors influencing manufacturing sector growth in East African Community (EAC) member states from 2001 to 2021, focusing on inflation, Foreign Direct Investment (FDI), lending rates, and Domestic Credit. Panel data was utilised and the Feasible Generalized Least Squares (FGLS) estimator was applied to address heteroskedasticity and autocorrelation. Results indicate that inflation and lending rates significantly impact manufacturing sector growth, while Domestic Credit and FDI do not show significant effects.

The study highlights the importance of maintaining macroeconomic stability through effective inflation control measures and sound monetary policies to facilitate manufacturing sector growth. The report also stresses the necessity of steady and affordable loan rates for manufacturers, which can be attained through focused interventions and rewards for financial institutions. Attracting FDI to the manufacturing sector remains crucial, and governments should actively pursue such opportunities. Continued research is recommended to deepen our understanding of the complexities surrounding manufacturing sector growth. These actions collectively aim to bolster industrialization and economic growth in EAC member states, ultimately promoting prosperity throughout the region.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

The Manufacturing sector is an engine of economic growth. This study examines the factors influencing manufacturing sector growth in East African Community (EAC) member states from 2001 to 2021, focusing on inflation, Foreign Direct Investment (FDI), lending rates, and Domestic Credit. This section presents the background of the study, the problem statement, the objectives, the scope, and the significance of the study.

1.1 Background to the study

Globally, the manufacturing sector represents a cornerstone of growth among economies, this is because it's a crucial sector to the generation of structural change, productive jobs and sustainable economic growth (Su & Yao, 2016; Herman, 2020). Manufacturing has been and remains instrumental in promoting sustained economic growth (Saba & Ngepah, 2021). No economy across the globe is known to have attained economic progress without investing in the manufacturing sector (Aiginger & Rodrik, 2020). Evidence indicates that developed economies invested much in their manufacturing sector which led to their economic growth and development (UNCTAD, 2020).

The manufacturing sector contributes 17 percent and 23 percent to the global GDP and employment, respectively (World Bank, 2021). Manufacturing success in any country is largely determined by numerous macro-economic variables such as the value of the national currency (exchange rate), the stability of prices of goods and services (inflation), taxation, and the extent to which investors, especially from other countries, are allowed to invest in a particular country. Most countries in Africa, especially in Sub-Saharan Africa, experience challenges related to these four macroeconomic factors as a result of multiple factors such as poverty rates and overall low levels of economic development. Therefore, in attempts to optimize productivity in the manufacturing industry, there is a need to pay equal attention to taxation, exchange rates, inflation, and foreign direct investment as the most important determinants of economic growth (Oduor *et al.*, 2021).

There has been increased attention on Africa from the rest of the world because of Africa's potential to change the production of goods by increasing value addition and improving its

services thus increasing chances of economic growth through improved macroeconomic stability and the commodity price boom (Moyo & Jeke, 2019).

Manufacturing value added as a percentage of GDP has averaged between 5.5 percent to 12 percent among the East African countries for the period since 1960 (World Bank, 2022). This performance is very low compared to the manufacturing value added by some of the world's leading manufacturers whose average is as high as 30 percent (World Bank, 2022).

The manufacturing sector among East African countries is dominated by micro, small and medium enterprises, which make up some 90 percent of the sector generating 80 percent of the manufactured output. These small firms are limited by a number of constraints including the lack of access to high-quality inputs, reliable and cost-effective electricity, and affordable credit. As a result, they struggle to achieve economies of scale and increased productivity (Ramathan *et al.*, 2017).

The relationship between domestic credit and the efficiency of Nigeria's manufacturing sector. An econometric model was developed retrospectively, utilizing industrial production as the dependent variable and domestic credit, rate of interest, and foreign exchange rate as explanatory variables. The annual series of time data from the Nigerian Central Bank Statistical Bulletin from 1981 to 2017 was evaluated using the dynamic OLS technique. The manufacturing sector in Nigeria experienced significant improvements in efficiency due to domestic credit and interest rates, although the exchange rate had a notable adverse effect. The research indicates that Nigeria's manufacturing sector performance is positively impacted by domestic finance (Nwabuisi *et al.*, 2020).

The study investigates the effect of bank lending and economic growth on the manufacturing output in Nigeria. Times series data covering a period of 36 years (1973-2009) were employed and tested with the cointegration and vector error correction model (VECM) techniques. The findings of the study show that manufacturing capacity utilization and bank lending rates significantly affect manufacturing output in Nigeria. However, the relationship between manufacturing output and economic growth could not be established in the country. These results, therefore, call for a concerted effort by the government, manufacturers and the lending institutions to review the lending and growth policies and provide the appropriate

macroeconomic environment, to encourage investment-friendly lending and borrowing by the financial institutions.(Obamuyi *et al.*, 2012).

The exogenous growth theory advanced by Solow (1956) and extended by Mankiw *et al.* (1992) has been criticized by other scholars on growth (e.g. Jones 1995, Romer, 1986, Lucas, 1988, among others) on the grounds of the rigid assumptions of constant return to scale and the notion of convergence. The neoclassical growth model predicted long-run growth to be dependent on the exogenous rate of technical progress without explaining the determinants of the exogenous rate. For instance, Romer (1986) argues that externalities cause variations in technological progress, and Lucas (1988) notes that technological progress depends on human capital. It is generally assumed that endogenous growth theories are superior because of their underlying optimization models based on the microeconomic foundations (Coad & Rao, 2008). From the review of different theories, this study will focus on variables from this theory to assess their impact on manufacturing sector growth and also add more variables like exchange rate (Kenny, 2019).

the endogenous growth paradigm suggests that economic development can be improved by implementing policies that promote capital formation, openness, foreign direct investment, competition, innovation, and change. As per Grossman and Helpman's (1991) research, advocates of endogenous growth theory suggest that there is a positive correlation between an improvement in productivity and overall production. Most of the studies that have looked at growth have emphasized the GDP of different economies and have used the endogenous growth theory to establish the determinants of economic growth as a whole. Foreign direct investments, inflation, trade openness, and lending interest rates were shown to be the most influential variables in the rise of manufacturing sector production among EAC member states out of a large sample of productivity indicators analyzed (Musiita *et al.*, 2023).

Therefore, this study will help to apply the endogenous growth model in establishing the impact of the determinants of manufacturing sector growth among East African Community member states.

1.2 Statement of the problem

A competitive manufacturing sector is an engine of economic growth and a better way to transform an economy since it increases economies of scale and integrates global production networks by enhancing the utilization of human capital and economic institutions (Forrest *et al.*, 2021). It further enhances value addition on exports and reduces unemployment among the citizens (Shahzad *et al.*, 2021). The EAC Industrialization Strategy (2012-2032) commits members to diversify their manufacturing bases and raise their manufacturing value added to 40 percent by 2032 (EAC, 2012). Despite the sector's importance to economic growth and employment, the sector's share of overall GDP in East Africa is very small. It ranges from 7 percent in Uganda to about 12 percent in Kenya (World Bank, 2021). In contrast, agriculture accounts for about 40 percent in Burundi, and 24 percent in Uganda (World Bank, 2021).

If this problem is left unattended, the slow growth in manufacturing will retard the overall growth of the region and thus making EAC member states fail to achieve the SDGs by 2030 and their development agenda by 2032. Therefore, this study seeks to investigate, the impact of the determinants of manufacturing sector growth among East African Community member states for the period 2001 to 2021 where data for the variables was available compared to other determinants in the region.

1.3 Purpose of the study

To examine the impact of the determinants of manufacturing sector growth among East African Community member states.

1.4 Objectives of the Study

- i. To examine the effect of inflation on the manufacturing sector growth among EAC member countries
- ii. To assess the effect of domestic credit on the manufacturing sector growth among EAC member countries
- iii. To examine the effect of lending rates on the manufacturing sector growth among EAC member countries
- iv. To assess the effect of foreign direct investment on the manufacturing sector growth among EAC member countries

1.5 Research hypotheses

H₀: Inflation has no impact on manufacturing sector growth among EAC member states

H₁: Inflation has an impact on manufacturing sector growth among EAC member states

H₀: Domestic credit has no impact on manufacturing sector growth among EAC member states

H₂: Domestic credit has an impact on manufacturing sector growth among EAC member states

H₀: Lending rate has no impact on manufacturing sector growth among EAC member states

H₃: Lending rate has an impact on manufacturing sector growth among EAC member states

H₀: Foreign direct investment has no effect on manufacturing sector growth among EAC member states

H₄: Foreign direct investment has an effect on manufacturing sector growth among EAC member states

1.6 Scope of the study

1.6.1 Subject Scope

The study was limited to determinants of manufacturing sector growth from the endogenous growth theory which includes inflation, lending rates, domestic credit and foreign direct investment.

1.6.2 Time scope

The data for this study was collected for a period of 21 years from 2001 to 2021. This period mostly depended on the availability of data for the independent variables.

1.6.3 Geographic scope

The study covered East African Community members who signed the East African industrialization strategy of 2021 to 2032. That is Uganda, Kenya, Tanzania, Rwanda and Burundi.

1.7 Significances of the Study

Most of the studies that looked at growth emphasized the GDP of different economies and used the endogenous growth theory to establish the determinants of economic growth as a whole. Therefore, the study applied the endogenous growth model in establishing the impact of the determinants of manufacturing sector growth among East African Community member states.

A general conceptual model provided basic guidelines to scholars and academicians and it would act as a source of reference for future researchers who may be interested in carrying out a similar study.

Thirdly, this study provided useful information that facilitated the development of policies and programmes for the manufacturing sector. Particularly, it provided empirical evidence on possible changes required in identifying the required inputs that could increase the growth of the sector, since the manufacturing sector is the engine of growth.

1.8 Theoretical model

The augmented endogenous growth model in explaining manufacturing sector growth is specified as used by Musiita *et al.*, (2023):

$$MSOV = \alpha_0 + \alpha_1 INF + \alpha_2 DOMCRED + \alpha_3 LR + \alpha_4 FDI + \varepsilon$$

Whereby:

- i. **MSOV** is Manufacturing Value Added as a percentage of GDP
- ii. **INF** is Inflation, GDP deflator (annual %)
- iii. **DOMCRED** is Domestic credit to the private sector by banks (% of GDP)
- iv. **LR** is lending interest rate percentage
- v. **FDI** is Foreign direct investment (net inflows percentage of GDP)

On a priori grounds , $\alpha_1 < 0$, $\alpha_2 > 0$, $\alpha_3 < 0$, $\alpha_4 > 0$

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents and discusses the literature of the study. The chapter begins with theoretical footings for the study and then later discusses the empirical deductions.

2.2 Theoretical model

According to Bernanke & Gürkaynak (2001) The exogenous growth theory advanced by Solow (1956) and extended by MRW (Bernanke & Gürkaynak, 2001), has been criticized by other scholars on growth for example (Jones 1995, Romer, 1986, Lucas, 1988) among others on the grounds of the rigid assumptions of constant return to scale and the notion of convergence. The neoclassical growth model predicted long-run growth to be dependent on the exogenous rate of technical progress without explaining the determinants of the exogenous rate. For instance, Romer (1986) argues that externalities cause variations in technological progress and Lucas (1988) notes that technological progress depends on human capital.

It is generally assumed that endogenous growth theories are superior because of their underlying optimization models based on the microeconomic foundations (Rao, 2006).

The growth model is specified as:

$$MSG = \alpha_0 + \alpha_1 INF + \alpha_2 DOMCRED + \alpha_3 LR + \alpha_4 FDI + \varepsilon$$

Where: **INF** is the Inflation, GDP deflator, **DOMCRED** is domestic credit, **LR** is the lending interest rate, **FDI** is the foreign direct investment and ε is the error term.

2.3 Empirical Literature

2.3.1 The effect of domestic credit on manufacturing sector growth

Essentially, several empirical literature abound on the study of domestic credit and the manufacturing sector. These literatures differ in terms of time, space, setting and methodology. Bigsten (2003) did a panel study of whether firms in Africa's manufacturing sector are credit-constrained. Using direct evidence on whether firms have a demand for credit and the degree to which this demand was satisfied by the formal credit market, the study found that while banks allocate credit based on expected profits, micro or small firms are much less likely to get loans than large firms. It found out that debt is positively related to obtaining further lending.

Tawose (2012) investigated the effect of bank loans and advances on industrial performance in Nigeria between 1975 and 2009. Long-run relationships and adjustment to shocks and dynamics were checked using co-integration and error correction techniques. The results showed that industrial performance co-integrated with all the identified explanatory variables. The study showed that the behavior of real GDP contributed by the industrial sector in Nigeria was significantly explained by the commercial banks' loans and advances to the industrial sector within the period under study. Ogar *et al.* (2014) examined how commercial bank credit can influence the manufacturing sector in Nigeria using time series data for a sample period of 1992-2011. The study utilized ordinary least squares multiple regression analysis and discovered that commercial bank credit had a significant relationship with the manufacturing sector in Nigeria.

Ebere and Iorember (2016) examined the effect of commercial bank credit on the manufacturing sector output in Nigeria from 1980 to 2015 using the Cochrane-Orcutt method. The study discovered that the inflation rate and interest rate have a negative effect on manufacturing sector output while loans and advances and broad money supply have a positive effect on manufacturing sector output in Nigeria. Olanrewaju *et al.* (2015) empirically investigated the effect of banking sector reforms on the output of the manufacturing sector in the Nigerian economy between 1970 and 2011 to examine the extent of the impact of banking sector reforms on the manufacturing sector. The result revealed that Bank assets, Lending rate, Exchange rate (EXR) and Real interest rate have a low and positively significant effect on manufacturing output while financial deepening and interest rate have negative and significant impact on the output growth of the manufacturing sector in Nigeria.

2.3.2 Foreign direct investment and manufacturing sector growth

Foreign direct investment has attracted great attention in developing countries since the development of the manufacturing sector is inclined towards investment in capital and technology (Eze *et al.*, 2019). As per Chen (2007), foreign direct investment is the interest in which a firm secures a considerable controlling enthusiasm for an outside firm (over 10 percent offer) or sets up an auxiliary in an outside nation.

Osisanwo (2013) analyzed the impact of foreign direct investment on manufacturing sector output growth in Nigeria between 1970 and 2011. He used an econometric model and log of foreign direct investment (FDI), first lag of real manufacturing output level (MAN_{t-1}), degree

of openness (OPEN), investment in human capital development (INV), and inflation rate (INF) in Nigeria during the review period. The ordinary least square (OLS) method was adopted and the results revealed that the first lag of real manufacturing output level (MAN_{t-1}) and inflation (INF) were significant factors influencing the growth rate of the Nigerian manufacturing industry while manufacturing output was insignificant and inelastic of foreign direct investment in Nigeria.

Okoli and Agu (2015) assessed the impact of foreign direct investment flow on the performance of the manufacturing firms in Nigeria using OLS and VECM to check for both short and long-run relationships. Using data from CBN Statistical Bulletin and the National Bureau of Statistics spanning 40 years, the researchers found that FDI inflows have a long-run impact on the manufacturing sector and therefore recommends that the government should sustain and encourage policies that support FDI inflows into Nigeria, especially in the manufacturing sector. Aysha *et al.* (2011) examined the impact of foreign direct investment on manufacturing output growth during 2006-2010 and they used the Dougherty model. Moreover, a paired t-test was employed for comparison. Regression results showed an insignificant impact of foreign direct investment on manufacturing output growth. Patience (2011) examined the impact of foreign direct investment on the manufacturing sector output growth of West Africa. The study was conducted across the Economic Community of West African States (ECOWAS) which is the most popular regional economic community in Africa. Data was collected from banks' annual reviews. It was found that foreign direct investment contributed to manufacturing output growth in West Africa.

Joshua, Wubon, Arastus, and Owolabi (2021) examined the influence of capital (Foreign Direct Investments inflows) and labor (domestic labor) on the production of Nigeria's industrial segment. The mixed order of integration derived from the unit root test influenced the selection of ARDL for this investigation. According to the findings, capital meaningfully influenced industrial segment output in Nigeria, whereas labor significantly influenced industrial segment performance. In addition, the data indicated that the influence of labor was elastic, implying that a little change in labor would result in a substantial change in the manufacturing sector's production level. In general, capital drove the manufacturing sector rather than labor. In order to raise worker productivity, a proposal was made addressing the necessity for systematic human capital development through improved education and training systems. Second, because

FDI inflows had a substantial beneficial impact, the relevant authority needed to establish policies that would encourage more FDI inflows into the industry to boost productivity. These policies included tax vacations, stable currency rates, fair interest rates to provide investors access to cash in the local economy, and general macroeconomic stability to facilitate the flow of investment.

2.3.3 Lending rates and manufacturing sector growth

Adebiyi (2011) defines lending rate as the price which equates the supply of credit or savings plus the net increase in the amount of money in the period, to the demand for credit or investment plus net hoarding in the period. This definition implies that the lending rate is the price of credit which like other prices is determined by the forces of demand and supply; in this case, the demand and supply of loanable funds. Theoretical and empirical studies have investigated the role of lending rates on manufacturing sector performance and these include; Adesanya (2010) studied the impact of interest rates on the performance of the manufacturing sector in Nigeria (1970-2008). The study used secondary sources of data as sources of information on the structural and behavioral trends of interest rates and some other macroeconomic variables and how they affected the manufacturing sector during the period. This study employed the ordinary least squares (OLS) multiple regression as the technique of statistical analysis to determine the impact of interest rates on the performance of the manufacturing sector in Nigeria. The result shows a weak and negative relationship between the explanatory variables; interest rate, inflation rate and dependent; the average manufacturing capacity utilization. This shows that the interest rate and the inflation rate are statistically insignificant factors influencing manufacturing capacity utilization during the period 1970-2008.

Bawuah *et al.* (2014) investigated the effects of interest rates on manufacturing firms' access to funds and their financing decision in Wa municipality of Ghana. A multiple research method and descriptive survey were employed to permit the study to make use of both quantitative and qualitative data collection techniques and data analysis procedures. Evidence from the analysis shows that the majority of manufacturing firms have resorted to the use of equity financing for their operations. This was attributed to several factors of which interest rate was the leading cause. Rasheed (2010) used the error correction model (ECM) to investigate the impact of interest rates and other macroeconomic factors on manufacturing performance in Nigeria using

co-integration and an error mechanism (ECM) technique with annual time series covering the period between 1970 and 2002. The study revealed that interest rate spread and government deficit financing have a negative impact on the growth of the manufacturing sub-sector in Nigeria.

Tomola *et al.* (2012) employed co-integration and vector error correction model (VECM) techniques to determine the link between bank lending, economic growth and the manufacturing sector in Nigeria. The finding of the study revealed that manufacturing capacity utilization and bank lending rates have a significant effect on manufacturing output in Nigeria. Horgan (2014) examined the impact of interest and foreign exchange rates on the manufacturing sub-sector in Nigeria during the period 1980-2012. The study adopted the OLS techniques. Data on the index of manufacturing sector output, interest rate, and government expenditure on the manufacturing sector were utilized. The study revealed that interest rate in the long run does not impact manufacturing output but government expenditure does.

Odior (2013) investigated empirically the impact of macroeconomic factors on manufacturing productivity in Nigeria over the period 1975-2011. The analysis starts with examining the stochastic characteristics of each time series by testing their Augmented Dickey-Fuller (ADF) test and estimate error correction mechanism model. The findings establish the presence of a long-term equilibrium relationship among the variables as indicated by the co-integrating equation of the VECM. The results also indicate that credit to the manufacturing sector in the form of loans and advances can sharply increase the level of manufacturing output in Nigeria. The study concluded that the high cost of borrowing is due to wide interest rate spread and a cut in margin between lending and deposit rate was recommended.

Nwokoro (2017), carried out a study on the relationship between foreign exchange, interest rates, and manufacturing sector output in Nigeria. He employed the ordinary least square (OLS), stationary, co-integration, together with error correction modeling. The results showed a negative but significant relationship between Nigeria's foreign exchange rate, interest rate and manufacturing output.

2.3.4 Effect of inflation on manufacturing sector growth

Dauda (2006) who regresses capacity utilization, inflation rate, index of openness, real exchange rate, real gross fixed capital formation, and real per capita income on the manufacturing value added found out that contrary to apriori expectation, manufacturing capacity utilization and real per capita income have significant negative effects on the growth of the performance of the manufacturing sector. Akinlo (2006) carried out a study on factors that affect total factor productivity in sub-Saharan African countries; his econometric results showed that external debt negatively and significantly relates to TFP.

Dotsey and Stark (2005), both of United States origin, conducted an empirical study investigating the relationship between inflation rate and capacity utilization. Their empirical research using the Granger causality test suggests that up to the mid-1980s, capacity was modestly useful in helping to predict the behavior of inflation. However, the relationship between capacity utilization and inflation is found not to be a stable one. Adamu, Iyoha and Kouassi (2007) use three different techniques: the structural vector autoregressive (SVAR) model, the Hodrick-Prescott Filter and the linear time trend models to estimate Nigeria's potential output level and the output gap. The study found that, apart from the trend model, the measure of output gap obtained from the SVAR is likely to provide the most reliable predictor for inflation in Nigeria. Trupkin (2008), using a stochastic general equilibrium framework, concludes that the impulse experiments show that inventories and the rate of capacity utilization are mostly complements, while inventories and the rate of labor utilization are mostly substitutes.

Inflation is referred to as a persistent increase in the general price level of goods and services over a period of time (Judith and Chijindu, 2016). Ahlgrim and D'Arcy (2012) defined inflation as changes in the overall level of prices within an economy, which consequently leads to a fall in the value of the domestic currency. The effect of inflation on the manufacturing sector has attracted attention in the literature over the years as a result of the important role of the manufacturing sector in the economic development of a country (Siyakiya, 2014). Theoretically, many reasons account for the effect of inflation on the manufacturing sector output (Nyanga *et al.*, 2013; Damiyano *et al.*, 2012). However, most findings of empirical works indicate that inflation negatively influences manufacturing sector output; Chaudhry, Ayyoub and Imran (2013) study established a significant negative effect of inflation on the

manufacturing sector of Pakistan for the period 1972 to 2010. The findings are in support of Siyakiya's (2014) study that reported that hyperinflation negatively reduces manufacturing sector output in Zimbabwe for the period 2000-2009 since the economy is highly monetized and has depreciating assets.

Doguwa (2012) re-examined the issue of the existence and the level of inflation threshold in the relationship between inflation and growth in Nigeria, using different approaches that provide appropriate procedures for estimating the threshold level and inference. The results revealed a two-threshold point model with 11.2 percent and 12.0 percent as the appropriate inflation threshold points. These results suggested that the threshold level of inflation above which inflation is detrimental to growth is estimated at 10.5-12 percent for Nigeria. Shuaib *et al.* (2015) examined the impact of the inflation rate on the economic growth in Nigeria, exploring secondary data for the period from 1960 to 2012. The empirical result of the test showed that for the period covered by the study, there was no co-integrating relationship between Inflation and economic growth for Nigeria data. Moreover, the Granger causality test showed that there was no causal relationship between inflation and economic growth.

Emmanuel & Oladiran (2015) analyzed the relationship between inflation and economic growth in Nigeria from 2000 to 2009, using the OLS technique of analysis. The findings indicate that there is a strong relationship between inflation and economic growth in Nigeria, the exchange rate exerts a positive impact on economic growth and a high-interest rate is shown to be negatively related to growth. Some findings indicate that inflation positively influences manufacturing sector output and these include; Adaora (2013) who reported a significant positive effect of inflation on the manufacturing sector for the period 1981 to 2011. Osinowo (2015) also reported that the manufacturing sector has a positive relationship with all the determinant variables, while the inflation rate has negatively influenced the output growth of the various sectors except the manufacturing sector. Osuala *et al.* (2013) found a statistically significant positive relationship between inflation and economic growth in Nigeria, but no causality between inflation and growth.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Chapter three presents a full description of how the study was carried out, beginning with the selection of a suitable research design and data collecting and analysis procedures.

3.2 Research design

The study employed a quantitative research design. The justification was that manufacturing sector growth and its determinants are quantitative. In particular, the study utilised panel data analysis because, as opposed to time series and cross-sectional data, panel data assessments provided additional degrees of freedom and helped to manage heterogeneity and multicollinearity in data from various cross-sectional units (Moyo and Jeke 2019).

3.3 Data type and sources

The data used in this study was sourced from the World Bank's database on World Bank Development Indicators (World Bank, 2022), specifically relying on secondary data for the period 2001 to 2021 (21 years). The determinants listed in **Table 1** were measured as used in studies by Musiita et al. (2023).

Table 1: Data Type and Sources

Variables	Measurement	Reference
Manufacturing Sector Growth	Added value to GDP from the sector of manufacturing	Musiita et al. (2023)
Rate of Inflation	GDP deflator (%) measured annually	Nyanga et al., 2013; Damiyano et al., 2012
Domestic credit	Resources in form of finances given by financial corporations to the business sector and households. These are in form of purchases of security and loans, non-equity, trade credits, and receivable accounts. (% of GDP)	Ogar et al. (2014), Ebere and Iorember (2016)
Lending rate	The rate at which debtors borrow money from commercial banks.	Adesanya (2010)
Foreign Direct Investment	Direct investment from a foreign country to a domestic country	Osisanwo (2013), Aysha et al. (2011)

3.4 Model Specification.

3.4.1 Specification of the empirical model.

The study adopted an augmented endogenous growth model as used by Musiita et al. (2023) focusing on identifying the key determinants of manufacturing sector growth by utilizing empirical in explaining literature while treating the capital and labour inputs as control variables.

$$y_{it} = \alpha + x'_{it}\beta + u_{it} \quad i = 1, N = 1, T \dots \dots \dots (1)$$

Where: y_{it} is the variable under investigation (i.e., manufacturing sector growth), i represents the country (Uganda, Kenya, Tanzania, Burundi, Rwanda) and t represents the time period. The two indexes i and t indicate the cross-section component and the time-series component, respectively. α is the scalar, β is the gradient coefficient of the regression variables, and x'_{it} denotes the stimulus variables in the model.

The empirical model of the study is specified as follows:

$$MSG_{it} = \alpha_0 + \alpha_1 INF_{it} + \alpha_2 DOMCRED_{it} + \alpha_3 LR_{it} + \alpha_4 FDI_{it} \dots \dots \dots (2a)$$

The data was normalised by taking natural logs as stated in Equation (2b):

$$\ln MSG_{it} = \alpha_0 + \alpha_1 \ln INF_{it} + \alpha_2 \ln DOMCRED_{it} + \alpha_3 \ln LR_{it} + \alpha_4 \ln FDI_{it} \dots \dots \dots (2b)$$

Where:

lnMSG stands for the sector growth of manufacturing

lnINF stands for GDP deflator (annual %)

lnDOMCRED stands for domestic credit.

lnLR stands for lending interest.

lnFDI stands for Foreign Direct Investment.

ε is the error term.

On a priori grounds , $\alpha_1 < 0$, $\alpha_2 > 0$, $\alpha_3 < 0$, $\alpha_4 > 0$

3.5 Pre-estimation diagnostic tests

The data was subjected to parametric assumption tests, regression-based panels, to confirm that it was well-behaved and suitable for further analysis, thus yielding unbiased findings. VIF and tolerance tests were used to test for multicollinearity, unit root tests for the panel were carried out, co-integrating tests for the panel were also performed, and causality data based on the panel was among the tests to be applied. Prior to regression analysis, these tests were carried out.

3.5.1 Multicollinearity

This test was crucial because stimulus variables with high linear correlations are undesirable and might lead to spurious regression estimations. First, pairwise correlations for all regressors were calculated and evaluated to determine if they were high and significant (p-value 0.05, more than ± 0.8) (Li, Yeung, Cherny, and Sham, 2012). A pairwise correlation of more than 0.8 is considered evidence of multicollinearity Rendón (2012), implying that a linear regression model has redundant regressors.

3.5.2 Stationarity test for model variables

The study conducted a Unit root test. The unit root test for panel data was very critical in the regression model to ensure that variables were stationary, which was required for co-integration (Galadima and Aminu, 2020). The tests revealed the sequence in which variables are integrated, such as whether they are integrated into $I(0)$ levels i.e. when the probability value is less or equal to 0.05 or they are integrated in $I(1)$ i.e. after the first or more differences and that when the probability value is greater than 0.05.

3.5.3 Serial Correlation

Autocorrelation/Serial correlation is the relationship between a given variable and a lagged version of itself over various time intervals. Serial correlations are often found in repeating patterns when the level of a variable affects its future level. Autocorrelation also known as serial correlation or lagged correlation is used to determine the strength of the relationship of a variable with its past and present values, in other words, it can be explained as the correlation of the error term in the present with the error term in the past (Penzin & Oladipo, 2021). Autocorrelation can happen whether in the time series data or cross-sectional data. To test the autocorrelation problem, the Wooldridge test was applied to the panel and it has the null of no autocorrelation (Gautam *et al.*, 2022)

3.5.4 Cointegration test for panel data

Cointegration was a crucial test to determine whether or not the empirical model has long-run equilibrium connections. The panel Pedroni test for the co-integration test approach as suggested by (Gallagher & Taylor, 2002) was used in this study because it allowed the running of a panel model of five (5) or more variables. The null (H_0) is accepted no Cointegration once the AugmentedDickey–Fuller (ADF) t-statistic test probability value (p-value) is equal or lower than 0.05.

3.5.5 Heteroscedasticity

A heteroscedasticity test was done to examine whether the variance of the residuals is constant. The Modified Wald test was used to detect heteroscedasticity in the residuals of a fixed-effect regression model. This helps to examine whether the variance of the residuals was constant. The Ordinary Least Square (OLS) assumption is that the variance of the residuals is constant. The test examines the null hypothesis that there is no Heteroscedasticity. The null hypothesis cannot be rejected if the p-value exceeds the 5% significance level (Rahim *et al.*, 2018).

3.5.6 Test for Normality

A normality test was done to examine whether the error term in the estimated model is normally distributed in the model. The study employed the Shapiro-Wilk Test to check for the distribution of residuals in the model. Shapiro-Wilk test is the most powerful test for all types of distribution and sample sizes (Razali and Wah, 2011). The Ordinary Least Square (OLS) assumption is that the residuals should be normally distributed. The null hypothesis in the test is Normality. If the chi-square value, as well as the skewness and kurtosis values, are not significant at a 5% significance level, the null hypothesis cannot be rejected, else it is rejected (Bal *et al.*, 2016).

3.7 Estimation technique

Fixed effect models have several advantages over traditional regression models that only include fixed effects. For example, they can handle unobserved heterogeneity that would otherwise lead to omitted variable bias (Gelman and Hill, 2006). Fixed random effects models can also be more efficient than traditional regression models since they can estimate both the fixed and random effects simultaneously (Pinheiro and Bates, 2000).

Furthermore, fixed random effects models can be used to estimate the effects of categorical variables on the dependent variable while controlling for unobserved individual or group-level variation. This is important because the effects of categorical variables can be confounded by unobserved heterogeneity that is specific to certain individuals or groups. By including both fixed and random effects in the model, fixed random effects models can help to mitigate this confounding (Long and Freese, 2006).

Fixed random effects models provide a flexible and powerful framework for analyzing complex datasets with both categorical and continuous variables. By accounting for both fixed and random effects, these models can help researchers to better understand the underlying patterns and variability in the data and make more accurate and reliable predictions.

One area where fixed random effects models have been particularly useful is in the analysis of longitudinal or panel data, where repeated measures are taken on the same individuals over time. In such cases, fixed random effects models can be used to model both within-individual and between-individual variation over time (Molenberghs and Verbeke, 2000).

In conclusion, fixed random effects models are a powerful tool for analyzing complex datasets with both categorical and continuous variables. By accounting for both fixed and random effects, these models can provide a more complete picture of the underlying patterns and variability in the data, helping researchers to better understand the complex relationships between different variables and make more informed decisions.

Given the fact that there was the presence of heteroskedasticity and first-order autocorrelation, I used the Feasible generalized least squares (FGLS) estimator to account for those issues. The FGLS estimator was used to estimate panels with heteroskedasticity and contemporaneously correlated error matrix.

3.8 Ethical Considerations

The study was conducted in a way that all information obtained was handled without biases. The results from this study too, will be available to the public.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents the results of the study and their interpretations. Descriptive as well as inferential analyses are presented following the objectives of the study as earlier stated.

4.2 Descriptive evidence of the study

Descriptive statistics (**Table 2**) provide a general account of the data characteristics. This was done to check that the data was good for estimation otherwise it would produce misleading results. In particular, a summary of the mean, minimum, maximum and standard deviation values within the countries, across and overall, were computed. The Data was processed and analyzed using the STATA statistical package, version 15.

Table 2: Summary Descriptive Statistics of Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
MANUFACTURING SECTOR GROWTH	100	10.098	3.104	6.365	20.078
INFLATION	105	7.804	9.502	-5.228	85.353
DOMESTIC CREDIT	94	17.824	7.501	4.114	36.699
LENDING RATE	101	16.722	2.773	11.996	26.15
FDI	105	1.985	1.657	-0.001	6.657

The number of observations for some variables specifically Domestic credit for the period of 2001 to 2010 and lending rate for the period 2019 to 2021 for Uganda, Domestic credit for 2021 and lending rate for 2021 for Tanzania and Manufacturing Sector Growth for the period 2017-2021 for Burundi was missing.

Source: Researcher's computation using secondary data.

From the results in **Table 2**, the following can be deduced:

i. Manufacturing Sector Growth

The average growth rate of the manufacturing sector in the East African Community is approximately 10.098%. This indicates a positive growth trend on average. The standard deviation of 3.104 suggests that the growth rates vary around the mean by about 3.104 percentage points. This indicates a relatively moderate level of variability in growth rates.

ii. Inflation

The average inflation rate in the East African Community is around 7.804%. This provides an insight into the general price level increase in the region. With a high standard deviation of 9.502, there is a substantial variation in inflation rates, indicating potential economic instability or fluctuation in prices.

iii. Domestic Credit

The mean domestic credit stands at approximately 17.824%. This represents the average amount of credit available for various economic activities, including manufacturing. A standard deviation of 7.501 implies notable variability in the availability of domestic credit, which could impact manufacturing growth due to varying funding opportunities.

iv. Lending Rate

The average lending rate is around 16.722%. This is the interest rate at which banks provide loans to borrowers, and it influences borrowing costs for manufacturing activities. The relatively low standard deviation of 2.773 indicates that lending rates are relatively stable, suggesting potential consistency in borrowing costs for manufacturers.

v. Foreign Direct Investment (FDI)

The average FDI is approximately 1.985%. This represents the average amount of foreign investment flowing into the manufacturing sector of the East African Community. With a standard deviation of 1.657, there is moderate variability in the amount of FDI, implying potential fluctuations in foreign investment levels.

Overall, from these descriptive statistics, we can gather that the manufacturing sector growth has an average positive trend, but with some variation. Inflation rates are quite variable, which might indicate economic uncertainty. The availability of domestic credit and lending rates show varying levels of stability, and foreign direct investment also varies, potentially impacting manufacturing growth in the region. It's important to conduct further statistical analyses to understand the relationships between these variables and manufacturing sector growth more comprehensively.

4.3 Pre-estimation diagnostic tests

Pre-estimation diagnostics are statistical tests carried out before model estimation to ensure that the selected variables are fit to be included together in the model to be estimated.

4.3.1 The test for multicollinearity

Multicollinearity is an econometric problem that exists whenever an independent variable is highly correlated with one or more of the other independent variables in a multiple regression equation. The presence of multicollinearity in a model undermines the statistical significance of the affected variables. To test for multicollinearity, this study generated a correlation matrix between the independent variables and used it to interpret the strength of association between the variables. The results are indicated as follows;

Table 3: Correlation Matrix of Model Variables

Variables	1	2	3	4
1	1.000			
2	-0.048	1.000		
3	-0.174	-0.333	1.000	
4	-0.095	-0.381	0.319	1.000

1= Inflation; 2= Domestic Credit; 3=Lending Rate; 4=FDI

Source: Researcher's computation using secondary data

Table 4: Variance inflation factor for the Model Variables

	VIF	1/VIF
DOMCRED	1.248	.801
FDI	1.221	.819
LEND	1.194	.838
INF DEF	1.075	.93
Mean VIF	1.185	

Source: Researcher's computation using secondary data

The inflation rate is weakly correlated with the Domestic Credit, with a correlation coefficient of -0.048 suggesting that an increase in inflation rates results in a decrease in domestic credit. However, this is a weak linear relationship between domestic credit and the inflation rates.

Lending rates have a very weak negative correlation with the Inflation rate of -0.174 indicating that an increase in inflation rates is accompanied by a decrease in the lending rates even though the relationship is not statistically significant.

FDI has a weak negative relationship with inflation rates of about -0.095 implying that an increase in the inflation rates results in a decrease in the FDI. However, this relationship is statistically insignificant.

FDI (Foreign Direct Investment) has a moderately negative correlation with Domestic Credit (-0.381) and a moderately positive correlation with the lending rate (0.319). There's also a weak negative correlation with inflation (-0.095) which are all statistically insignificant.

Variance Inflation Factor (VIF)

VIF values measure how much the variance of the estimated regression coefficients is increased due to multicollinearity. Generally, a VIF value above 10 is a sign of potential multicollinearity concerns.

From **Table 4**, DOMCRED has a VIF of 1.248, indicating a relatively low level of multicollinearity. FDI has a VIF of 1.221, also indicating a low level of multicollinearity. LEND has a VIF of 1.194, suggesting low multicollinearity. INF_DEF has a VIF of 1.075, indicating the lowest level of multicollinearity among these variables. The mean VIF of 1.185 across all variables further suggests that multicollinearity might not be a substantial concern in this model.

Interpretation

Based on the correlation matrix and VIF results, while there are some correlations between the variables, the VIF values are generally low, indicating that multicollinearity is not a major issue in this regression model. However, the moderate correlations between LEND and both DOMCRED and FDI suggest some potential shared variance, which should be carefully considered when interpreting the regression results to avoid misinterpreting the effects of these variables on manufacturing sector growth.

4.3.2 Serial correlation test

The study carried out the Wooldridge test for autocorrelation in panel data. The null hypothesis under this test is no first-order autocorrelation.

H_0 : No first-order autocorrelation

H_a : First-order autocorrelation

Table 5: Wooldridge test for autocorrelation in panel data

F(1, 4)	Prob>F
9.889	0.0347

Source: Researcher's computation using secondary data

Since the p-value is $0.0347 < 0.05$, I shall reject the null hypothesis and conclude that there is first-order autocorrelation at a 5% level of significance.

To mitigate first-order autocorrelation, a panel data model was employed by applying the "xtreg" command while incorporating fixed effects within the dataset. This approach was chosen based on statistical analysis indicating the presence of first-order autocorrelation.

4.3.3 Heteroscedasticity test

The study carried out The Modified Wald test for group-wise Heteroskedasticity in the fixed effect regression model.

$H_0: \sigma(i)^2 = \sigma^2$ for all i

Table 6: Modified Wald test for groupwise heteroskedasticity in fixed effect regression model

Chi ² (5)	Prob>chi ²
89.34	0.000

Source: Researcher's computation using secondary data

Since the p-value is $0.000 < 0.05$, I shall reject the null hypothesis and conclude that there exists heteroscedasticity within the data set since the variance is not the same for all the error terms.

To address the econometric issues of both heteroscedasticity and autocorrelation, a robust panel data regression model was applied to the previously mentioned regression model.

4.3.4 Test for Normality of Model Variables

We also applied the Jarque–Bera test (**Table 7**) which is theoretical and the skewness–kurtosis test (empirical) to test for normality. Jarque–Bera test is a goodness-of-fit test to estimate whether the data have the skewness and kurtosis matching a normal distribution.

H_0 : the dataset is normal

H_a : the dataset is not normal

Table 7: Results for the Jarque–Bera test

Chi(2)	
0.1335	4.027

Source: Researcher’s computation using secondary data

Given that the p-value is 0.1335, which exceeds the significance level of 0.05, I do not have sufficient evidence to reject the null hypothesis. Therefore, I shall conclude that, at the 5% level of significance, the dataset does not deviate significantly from a normal distribution.

4.3.5 Test for stationarity

H_0 : Non stationary

H_a : Stationary

The study conducted stationarity tests on the model variables using the Fisher type unit root test, to ascertain the level of integration of the variables as shown in **Table 8**: Fisher Panel Unit Root Test results.

Table 8: Fisher Panel Unit Root Test results

	Variable in Levels	Variable in First Difference
Manufacturing Sector Growth	0.8729	0.000
Domestic Credit	0.5780	0.000
Lending Rate	0.01650	0.000
Inflation	0.0000	-
FDI	0.0170	0.000

Source: Researcher’s computation using secondary data.

The panel unit root results in **Table 8** show that Manufacturing Sector Growth, Domestic Credit, Lending Rate and FDI have p-values greater than 0.05. I don’t have enough evidence to reject the

null hypothesis and I concluded that they contained a unit root at the 5% level of significance. To address this issue, I applied first-order differencing of the transformed Manufacturing Sector Growth, Domestic Credit, Lending Rate and FDI as shown in the third column in **Table 8**. The First differencing on the non-stationary variables resulted in them becoming stationary which indicates that they are integrated of order one 1(1) thus the study concluded that the model variables were 1(1) variables. On the other hand, Inflation has a p-value less than 0.05 which means that it's stationary in levels, suggesting that they are integrated of order zero.

4.5 Cointegration test for panel data

H_0 : No cointegration

H_a : Existence of cointegration

Table 9: Pedroni Cointegration Test results

Augmented Dickey-Fuller t	P-value
-4.1286	0.0000

Source: Researcher's computation using secondary data

The Augmented Dickey-Fuller t-statistic of the Pedroni co-integration test shown in **Table 9** rejects the null hypothesis of no co-integration at a 5 percent level of significance. The co-integration test results provided evidence for the presence of long-run equilibrium relationships between Manufacturing sector growth and its determinants.

4.5 Model estimation

The study used the FGLS model to estimate the results given the presence of two econometric problems and the results are presented in **Table 10**;

Table 10: Results from the FGLS and OLS Estimates

MAN	FGLS			POOLED OLS		
	Coef.	Std. err	P-value	Coef.	Std. err	P-value
Inflation Rate	0.09891**	0.03693	0.007	0.04	0.034	0.04
Domestic Credit	0.04667	0.03011	0.121	-0.114	0.042	-0.114
Lending Rate	0.73669**	0.08402	0.000	0.177	0.075	0.177
FDI	-0.09984	0.14668	0.496	0.048	0.161	0.048
Cons.	-3.57700	1.72133	0.038	8.683	1.099	8.683

Source: Researcher's computation using secondary data. *** $p < .01$, ** $p < .05$, * $p < .1$

The findings presented in the analysis using the FGLS offer valuable insights into the relationships between various independent variables and manufacturing sector growth in East Africa, while also assessing their statistical significance.

Firstly, the analysis reveals that, on average, a one percent increase in inflation is associated with an increase of approximately 0.098 percent in manufacturing sector growth. This positive relationship suggests that higher inflation tends to coincide with higher values of manufacturing sector growth. This could be explained by the need for firms to access funds for capital investment to purchase machinery, technology, and infrastructure, which enhances production capacity and efficiency. Inflation is statistically significant at the conventional 5 percent level ($p\text{-value} = 0.007 < 0.05$). This implies that, in the presence of other variables, inflation exerts a statistically significant impact on the dependent variable. Consequently, it can be inferred that inflation does significantly affect manufacturing sector growth in East Africa.

Consistent with the insights gleaned from prior research, the analysis confirmed that inflation significantly affects manufacturing sector growth. The prevailing economic wisdom, as underscored by scholars such as Dauda (2006) and Siyakiya (2014), suggested that elevated inflation rates can exert detrimental consequences on productive activities and capital investment vital for the manufacturing sector. The empirical findings resonate with this perspective, revealing a statistically significant relationship between inflation and manufacturing sector growth ($p\text{-value} = 0.007$) (Dauda, 2006; Siyakiya, 2014).

Secondly, the analysis indicates that a one percent increase in domestic credit is linked to an increase of approximately 0.046 percent in manufacturing sector growth. This could be explained by the need for firms to access funds for capital investment to purchase machinery, technology, and infrastructure, which enhances production capacity and efficiency. However, it's worth noting that the coefficient for domestic credit is not statistically significant at the conventional 5 percent level ($p\text{-value} = 0.121 > 0.05$). This suggests that domestic credit might not have a noteworthy impact on manufacturing sector growth in East Africa.

In contrast to the literature's emphasis on the pivotal role of domestic credit, the empirical investigation yielded a divergent outcome. The academic discourse, led by scholars like Bigsten (2003) and Tawose (2012), underscored the critical importance of credit accessibility, especially for micro and small enterprises, in influencing manufacturing performance. However, the empirical analysis uncovered that domestic credit, while positively associated with manufacturing sector growth, lacked statistical significance ($p\text{-value} = 0.121$). This disparity underscores the complexity of the factors shaping manufacturing growth within the East African context.

In the broader context of East Africa, where access to credit and financial resources can be a critical factor for economic development, the non-significant relationship between Domestic Credit and manufacturing sector growth raises important questions. It suggests that simply increasing domestic credit availability may not be sufficient to drive meaningful growth in the manufacturing sector.

Furthermore, the results demonstrate that, on average, a one percent increase in the lending rate corresponds to an increase of approximately 0.737 percent in manufacturing sector growth. The coefficient for the lending rate is statistically significant at the 5 percent level since the $p\text{-value} = 0.000$ which is less than 0.05. Higher lending rates indicate a strong economy, prompting manufacturers to borrow for investments in new technologies, infrastructure, or expansion of production capacity. This borrowing can facilitate the growth of the manufacturing sector. This indicates that the lending rate may have a discernible impact on manufacturing sector growth in East Africa.

Both empirical findings and the established literature converged on recognizing the potential significance of lending rates in driving manufacturing sector growth. While the scholarly discourse presented a mix of evidence regarding the relationship between interest rates and industrial performance, the empirical results indicated a statistically significant positive correlation between lending rates and manufacturing sector growth ($p\text{-value} = 0.000$). This convergence underscores the nuanced nature of the connection between lending rates and manufacturing growth, warranting further investigation (Adesanya, 2010; Bawuah et al., 2014).

Considering the intricacies of East Africa's economic landscape, characterized by challenges in accessing affordable credit and fostering industrial growth, the significant relationship between lending rates and manufacturing sector growth introduces a layer of complexity. It suggests that lending rates might play a role, albeit a nuanced one, in shaping the sector's trajectory. Nevertheless, a cautious approach is warranted, as the significance implies that a multitude of other factors likely contribute significantly to manufacturing growth dynamics.

Additionally, the analysis reveals that a one percent increase in foreign direct investment (FDI) is linked to a decrease of approximately 0.0998 percent in manufacturing sector growth. However, the coefficient for FDI is not statistically significant at a 5 percent level of significance since the $p\text{-value} = 0.496$ which is greater than 0.05. This suggests that FDI does not exert a statistically significant impact on manufacturing sector growth among East African countries.

The academic literature and empirical analysis converged in their recognition of FDI as a potential catalyst for manufacturing sector growth. Various studies, including those by Okoli and Agu (2015) and Joshua et al. (2021), have suggested that FDI could positively influence industrial output. However, the empirical findings demonstrated a negative relationship between FDI and manufacturing sector growth in East Africa and it lacked statistical significance ($p\text{-value} = 0.496$). This could be attributed to the high FDI inflows to sectors in the economy like Education, Health and Social empowerment programmes in the East African Countries that don't yield production competitiveness on the global market. The expensive and unreliable power supply, and poorly developed infrastructure in general; limited access to finance especially for small-scale processing companies; limited value addition and product

transformation; resource-based production patterns using low technology; high cost of labour; relatively low productivity compared to emerging economies; and a high number of burdensome regulations and multiple regulatory institutions with overlapping mandates leading to high administrative costs negatively affect the manufacturing sector growth even when there is FDI inflow to the East African countries (Tralac, 2017).

Lastly, the constant term, with a value of -3.577, represents the model's intercept when all independent variables are set to zero. This constant is statistically significant at a 5 percent level of significance, with a p-value of 0.038 which is less than 0.05. The constant signifies the baseline value of the dependent variable when none of the independent variables are present. In this context, it implies that manufacturing sector growth among East African countries is estimated to be increasing at approximately 3.577 percent when all the independent variables in the model are held at zero.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Introduction

This chapter of the study summarizes the findings in the previous chapter and makes conclusions based on the objectives. The chapter also gives policy recommendations from the study findings and areas recommended for further research

This study set out to achieve four major objectives that were to be achieved through the testing of four hypotheses. The objectives of the study were to establish the individual effects of inflation, domestic credit, lending rates, and foreign direct investment on manufacturing sector growth among EAC member countries. The hypotheses were tested by looking at the associated p-values of the respective parameter estimates.

A summary has been drafted on each of the objectives of the study as presented below.

5.1.1 Effect of inflation on the manufacturing sector growth among EAC member countries

Objective one of this study was to establish the effect of inflation on manufacturing sector growth among EAC member countries.

The study results show a positive relationship between inflation and Manufacturing sector growth with a one percent increase in inflation associated with a modest increase of approximately 0.098 percent in manufacturing sector growth. This positive relationship suggests that higher inflation tends to coincide with higher values of manufacturing sector growth. Inflation is statistically significant at the conventional 5 percent level ($p\text{-value} = 0.007 < 0.05$).

5.1.2 Effect of domestic credit on manufacturing sector growth among EAC member states

Objective two of the study was to establish the effect of Domestic credit on manufacturing sector growth among EAC member states. It was observed that a one percent increase in domestic credit is linked to an increase of approximately 0.07 percent in manufacturing sector growth. However, it's worth noting that the coefficient for domestic credit is not statistically significant at the conventional 5 percent level ($p\text{-value} = 0.121 > 0.05$). This suggests that

domestic credit might not have a noteworthy impact on manufacturing sector growth in East Africa.

5.1.3 Effect of lending rates on the manufacturing sector growth among EAC member countries

Objective three of the study was to establish the effect of lending rates on the manufacturing sector growth among EAC member countries. A one percent increase in the lending rate corresponds to an increase of approximately 0.737 percent in manufacturing sector growth. The coefficient for the lending rate is statistically significant at the 5 percent level since the p-value = 0.000 which is less than 0.05. This suggests that the lending rate may have a noticeable impact on the manufacturing sector growth in East Africa.

5.1.4 Effect of foreign direct investment on the manufacturing sector growth among EAC member countries

The fourth objective of the study was to examine the effect of Foreign Direct Investment (FDI) on manufacturing sector growth within East African countries. The analysis reveals that a one percent increase in foreign direct investment (FDI) is linked to a modest decrease of approximately 0.0998 percent in manufacturing sector growth. However, the coefficient for FDI is not statistically significant at a 5 percent level of significance since the p-value = 0.496 which is greater than 0.05. This suggests that FDI does not exert a statistically significant impact on manufacturing sector growth among East African countries.

5.2 Conclusions from the Study

In this comprehensive study on manufacturing sector growth within the East African Community (EAC) member countries, a thorough exploration of the effect of inflation rates, lending rates, domestic credit and foreign direct investment (FDI) on manufacturing sector growth. The FGLS was used in the study given the presence of heteroscedasticity and autocorrelation, and it offers valuable insights into the relationships between various independent variables and manufacturing sector growth in East Africa, while also assessing their statistical significance. The study observed that inflation and lending rates had an impact on manufacturing sector growth while domestic credit and foreign direct investment (FDI), the empirical evidence did not establish a significant relation between the two variables and

manufacturing sector growth. This study's synthesis of empirical findings and existing literature provides valuable insights into the determinants of manufacturing sector growth in East Africa, offering a foundation for policymakers and researchers to develop more targeted strategies to foster manufacturing sector growth in the region.

5.3 Recommendations

The study makes the following recommendations;

Policymakers in East African Community (EAC) member countries should prioritize macroeconomic stability by implementing effective inflation control measures and maintaining sound monetary policies. This will create a favorable environment for manufacturing sector growth, despite varying levels of statistical significance found in the study. Additionally, ensuring stable and reasonable lending rates for manufacturers through targeted interventions and incentives for financial institutions is crucial.

A context-specific approach is essential, considering factors like infrastructure and regulatory environments in each EAC member country when formulating policies. Governments should persist in attracting foreign direct investment (FDI) to the manufacturing sector, and ongoing research should deepen our understanding of the complexities involved in manufacturing sector growth. These actions collectively aim to boost manufacturing sector growth, fostering prosperity in the region.

5.4 Limitations of the study and areas for further research (One key limitation and possible solution)

The study focuses exclusively on EAC member states, potentially limiting the generalizability of the findings to other regions or countries with differing socio-economic contexts. To enhance the external validity of the study, it could be valuable to engage in cross-country comparisons with regions exhibiting similar characteristics or to extend the analysis to other regional economic communities. This expansion of scope would enable a more comprehensive understanding of the complex determinants of manufacturing sector growth within a broader context.

5.5 Areas recommended for further research

In the pursuit of advancing the empirical understanding of manufacturing sector dynamics in the EAC region, future research could also consider investigating the potential interactions and spillover effects between the identified variables. Exploring how factors like inflation, domestic credit, lending rates, and FDI might jointly influence manufacturing growth could provide a deeper grasp of the intricate mechanisms at play.

REFERENCES

- Aiginger, K., & Rodrik, D. (2020). Rebirth of Industrial Policy and an Agenda for the Twenty-First Century. *Journal of Industry, Competition and Trade*, 20(2), 189–207. <https://doi.org/10.1007/S10842-019-00322-3/TABLES/2>
- Bal, D. P., Dash, D. P., & Subhasish, B. (2016). The effects of capital formation on economic growth in India: Evidence from ARDL-bound testing approach. *Global Business Review*, 17(6), 1388–1400.
- Bernanke, B. S., & Gürkaynak, R. S. (2001). Is Growth Exogenous? Taking Mankiw, Romer, and Weil Seriously. *NBER Macroeconomics Annual*, 16(1). <https://doi.org/10.1162/088933601320224829>
- Coad, A., & Rao, R. (2008). Innovation and firm growth in high-tech sectors: A quantile regression approach. *Research Policy*, 37(4), 633–648. <https://doi.org/10.1016/J.RESPOL.2008.01.003>
- The EAC Industrialization Strategy (2012-2032) *commits members to diversifying their manufacturing bases and raise their manufacturing value added to 40 percent by 2032* - Google Search.
- Emmanuel, F. O., & Oladiran, O. I. (2015). Effect of Government Capital Expenditure on Manufacturing Sector Output in Nigeria. *Business and Economic Research*, 5(2), 136. <https://doi.org/10.5296/ber.v5i2.8241>
- Forrest, J. Y. L., Liu, J., Martorell, G., Xu, L., & Liu, Y. (1 C.E.). Role of Manufacturing Sector in the Forthcoming National Industrial Transformations. *Https://Services.Igi-Global.Com/Resolvedoi/Resolve.Asp?Doi=10.4018/IJSKD.2021040109*, 13(2), 153–167. <https://doi.org/10.4018/IJSKD.2021040109>
- Gallagher, L. A., & Taylor, M. P. (2002). The stock return-inflation puzzle revisited. *Economics Letters*, 75(2), 147–156. [https://doi.org/10.1016/S0165-1765\(01\)00613-9](https://doi.org/10.1016/S0165-1765(01)00613-9)
- Gautam, R. S., Rastogi, S., & Rawal, A. (2022). Study of Financial Literacy and Its Impact on Rural Development in India : Evidence Using Panel Data Analysis. *Iconic Research And Engineering Journals*, 5(9). <https://www.researchgate.net/profile/Rahul-Gautam-21/publication/361815316>

- Gelman, A., & Hill, J. (2006). *Data analysis using regression and multilevel/hierarchical models*. Cambridge University Press.
- Herman, E. (2020). Labour Productivity and Wages in the Romanian Manufacturing Sector. *Procedia Manufacturing*, 46, 313–321. <https://doi.org/10.1016/J.PROMFG.2020.03.046>
- Kenny S, V. (2019). *Determinants of Manufacturing Sector Performance and Its Contribution To Gross Domestic Product In Nigeria*.
- Mohd Razali, N., & Bee Wah, Y. (2011). Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests. *Journal of Statistical Modeling and Analytics*, 2(1), 13–14.
- Molenberghs, G., & Verbeke, G. (2000). A model for Longitudinal Data. *Linear Mixed Models for Longitudinal Data*, 19–29.
- Moyo, C., & Jeke, L. (2019). *Manufacturing Sector and Economic Growth: A Panel Study of Selected African Countries*.
- Musiita, B. ., Jeke, L. ., Turyareeba, D. ., Kenneth, M. ., Boyi, B. ., Kisaalita, T. ., Richard Mwesige, R. ., & Kahangane, G. . (2023). (2023). Productivity Factors and the Growth of the Manufacturing Sector among the East African Community Members States: Testing the adequacy of the Endogenous Growth Hypothesis. *American Journal of Economies*, Vol. 7(Issue 1), pp 33 – 52. <https://doi.org/10.47672/aje.1512>
- Nwabuisi, O. F., Oke-Bello, A. M., Oyewole, A. S., Toriola, A. K., Folami, R. A., & Afolabi, A. O. (2020). The effect of bank credit on the performance of the manufacturing sector in Nigeria. *BizEcons Quarterly*, 9, 18–29.
- Obamuyi, T. M., Edun, A. T., & Kayode, O. F. (2012). Bank lending, economic growth and the performance of the manufacturing sector in Nigeria. *European Scientific Journal*, 8(3), 19–36.
- Penzin, D. J., & Oladipo, O. S. (2021). Domestic Debt and Private Investment: The Case of a Small Open Economy. *The Journal of Developing Areas*, 55(4), 249–267. <https://doi.org/10.1353/jda.2021.0089>
- Pinheiro, J. C., & Bates, D. M. (2000). Linear mixed-effects models: basic concepts and

examples. *Mixed-Effects Models in S and S-Plus*, 3–56.

- Rahim, N., Maryam, , & Munir, B. (2018). The Sustainable Growth Rate of Firm in Malaysia: A Panel Data Analysis Kadar Pembangunan Firma di Malaysia: Analisis ke Atas Data Panel. *SAINS ISLAM MALAYSIA. Journal of Islamic Social Sciences and Humanities* .80–69, 16,
- Ramathan, G., Musekese, W. B., & Ntayi, J. (2017). Economic development and industrial policy. In *Friedrich-Ebert-Stiftung* (Issue 1). [https://doi.org/10.1016/0143-6228\(95\)90025-x](https://doi.org/10.1016/0143-6228(95)90025-x)
- Saba, C. S., & Ngepah, N. (2021). ICT Diffusion, Industrialisation and Economic Growth Nexus: an International Cross-country Analysis. *Journal of the Knowledge Economy* 2021, 1–40. <https://doi.org/10.1007/S13132-021-00795-W>
- Shahzad, U., Doğan, B., Sinha, A., & Fareed, Z. (2021). Does Export product diversification help to reduce energy demand: Exploring the contextual evidences from the newly industrialized countries. *Energy*, 214, 118881. <https://doi.org/10.1016/J.ENERGY.2020.118881>
- Su, D., & Yao, Y. (2016). *ADB Working Paper Series Manufacturing as the Key Engine of Economic Growth for Middle-Income Economies Asian Development Bank Institute*.
- Tawose, J. O. B. (2012). Effects of bank credit on industrial performance in Nigeria. *International Business and Management*, 4(2), 158–168.
- Tralac. (2017). *Eastern Africa's manufacturing sector: Promoting technology, innovation, productivity and linkages - tralac trade law centre*. <https://www.tralac.org/news/article/8618-eastern-africa-s-manufacturing-sector>.
- UNCTAD. (2020). *Trade And Development Report 2020 From Global Pandemic To Prosperity For All: Avoiding Another Lost Decade*.
- World Bank. (2021). *World Statistics: Manufacturing Sector Contribution to GDP and Employment*.
- World Bank. (2022). *World Development Indicators | DataBank*. <https://databank.worldbank.org/source/world-development-indicators>