

**A STUDY OF THE ROLE OF THE MANUFACTURING SECTOR IN ZAMBIA'S
ECONOMIC GROWTH – A QUANTITATIVE APPROACH**

BY

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A Dissertation submitted to the University of Zambia in partial fulfilment of the requirements for the award of the Degree of Master of Business Administration Finance.

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LUSAKA

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DECLARATION

I, **Rhoda Mayawa**, do hereby declare that this work is my original work achieved through personal reading and research. This work has never been submitted to the University of Zambia or any other Universities. All sources of data used and literature on related works previously done by others, used in the production of this Dissertation have been duly acknowledged. If any omission has been made, it is not by choice but by error.

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APPROVAL

This Dissertation by **Rhoda Mayawa** is approved as a partial fulfilment of the requirements for the award of the Degree of Master of Business Administration Finance.

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ABSTRACT

Zambia has embraced Vision 2030 making it a middle-income nation as a project delivery method. The country faces constraints that have made this provision a challenge. The Manufacturing sector plays a role in contributing to this challenge. The purpose of this study was to understand the contribution of each sector identified as key economic sectors in the Vision 2030 towards economic growth, with a bias towards understanding the contribution of the manufacturing sector to economic growth. The study used E-Views software and made use of quarterly time-series quantitative secondary data from 2014Q1 to 2021Q4 that was analysed using the ARDL model through regression analysis. The study found a long-run relationship that exists between the dependent and the independent variables using the ARDL bounds testing approach. The study has found that there is no statistically significant relationship between Economic growth and manufacturing sector output in the long run. However, the study shows that there is a short-run positive effect of manufacturing sector output on Economic Growth in the current period and with a lag of two periods. Therefore, manufacturing sector output is a short-run determinant of economic growth. This, however, is argued to be not ideal as Vision 2030 promotes long-term growth. This is because the manufacturing sector coupled with exports have the potential to accelerate sustainable economic growth in developing countries like Zambia. This Study has established the need for aligning gaps in the manufacturing sector. Therefore, it is proposed that there is a need for sustained relevant investment in the manufacturing sector for it to yield long-term positive effects. Economic growth is very essential for all economies and the role of the manufacturing sector can help achieve this goal.

KEY WORDS: Economic Growth, Manufacturing, Economic Drivers, Key Sectors, Sustainable Growth.

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DEDICATION

I dedicate this Dissertation to my mother, Rosemary Kaponda for the moral support she rendered to me throughout my period of study and above all, the fear of God she instilled in me. To my Husband, Jack K'rayp, I say thanks a million times for cheering me on, for believing in me, and for the unconditional love. I further dedicate this dissertation to my siblings (Kay, Sharon, and Richard), my family members, and my friends for teaching me endurance, hard work, humility, and honesty. I thank them for giving me time to be alone even when they needed to be around me as I pursued this achievement. To my classmate, Felistus thanks for all the group study discussions, for all the support and encouragement, and for pushing me to the finishing line.

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LIST OF ACRONYMS

ARDL	-	Autoregressive Distributed lag model.
Covid-19	-	Coronavirus pandemic
GDP	-	Gross Domestic Product
GNP	-	Gross National Product
GMM	-	Generalized Method of Moments
GRZ	-	Government of the Republic of Zambia
MOU	-	Memorandum of Understanding
OECD	-	Organization for Economic Cooperation and Development
SDG	-	Sustainable Development Goals
UNCTAD	-	United Nations Conference on Trade and Development
UNIDO	-	United Nations International Development Organization
UNWTO	-	United Nations World Trade Organization
WDI	-	World Development Indicators
ZamStats	-	Zambia Statistical Agency

TERMINOLOGY

Manufacturing - is argued to be an integral and huge part of the economy. It is said to involve the processing and refinement of raw materials, such as ore, wood, and foodstuffs, into finished products, such as metal goods, furniture, and processed foods (Kenton, 2022).

Economic growth - process by which a nation's wealth increases over time. Traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), with alternative metrics sometimes used (World Bank Group, 2019).

Gross Domestic Product (GDP) – is an indicator which refers to the total gross value added by all resident producers in the economy (World Bank Group, 2019).

Gross National Income (GNI) per capita - this is said to be the sum of total domestic and foreign value added claimed by residents divided by the total population (World Bank Group, 2019).

CHAPTER 1

RESEARCH BACKGROUND

1.0 Introduction

Economic growth is the process by which a nation's wealth increases over time. It is noted that although the term is often used in discussions of short-term economic performance, in the context of economic theory it generally refers to an increase in wealth over an extended period. Therefore, growth can best be described as a process of transformation (Britannica, 2022). Others add that economic growth is an increase in the production of economic goods and services in one period of time compared with a previous period. Economic growth can be measured in nominal or real terms which is adjusted to remove inflation. Therefore, it is outlined that traditionally aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP) with alternative metrics used sometimes. Hence, it can be concluded that economic growth is an increase in the production of goods and services in an economy (Kenton, 2022).

Kenton (2022) outlines that manufacturing is an integral and huge part of the economy. Manufacturing involves the processing and refinement of raw materials, such as ore, wood, and foodstuffs, into finished products, such as metal goods, furniture, and processed foods. Hence, converting these raw materials into something more useful adds value. This added value is said to increase the price of finished products, making manufacturing a very profitable part of the business chain. Furthermore, it is outlined that manufacturing involves any industry that makes products from raw materials by the use of manual labor or machinery and that is usually carried out systematically with a division of labor (Britannica, 2022). The term manufacturing refers to the processing of raw materials or parts into finished goods through the use of tools, human labor, machinery, and chemical processing. Scholars argue that there is a link between economic growth and output in the manufacturing sector as it is argued to be a driving force. Therefore, it is important to consider the manufacturing sector in Zambia.

The manufacturing sector in Zambia is said to account for nearly 8% of the country's GDP and has been consistently growing due to growing investment in the sector. Currently, the main manufacturing activities in Zambia are the food and beverages sub-sector; the textile and leather Industries; Wood and Wood Products and the Paper and Paper Products sub-sector. The other

major sub-sectors further include Chemicals, Rubber and Plastic Products, Non-metallic mineral products; basic metal products; and Fabricated metal products (Zambia Development Agency, 2022). In 2013, the Zambian government was said to be in the process of promoting the establishment of multi-facility economic zones by providing fiscal incentives and modern infrastructure (Common Wealth Network, 2020). It has been argued that sustainability of the manufacturing sector in Zambia has been threatened in recent years due to the sector's continued deterioration.

According to the World Bank Development Indicators, manufacturing value added contribution to Gross Domestic Product (GDP) has fallen from 30.9% in 1989 to 8% in 2018. In addition, the growth rates of the manufacturing sector have also fallen over the years, from 37% in the 1980s to 2% in 2019 (Zambia Association of Manufacturers, 2020). They further outline that the deterioration of the sector raises concerns because a slowdown in the manufacturing sector has significant impacts on the rest of the economy and the sector's contribution to growth, employment and consumer welfare. Furthermore, it is outlined that the manufacturing sector has been threatened by a number of factors, including but not limited to policy inconsistency and incoherence, unavailability of relevant skills and the high cost and lack of consistently available energy, illicit trade, high cost of borrowing and high cost of doing business among others. It is further highlighted that aside from the aforementioned factors that are somewhat out of the control of the manufacturers, the constraints caused by a lack of developed economic linkages between the manufacturing sector and other sectors presents are argued to be resolvable (Zambia Association of Manufacturers, 2020).

Manufacturing sector in many countries is in a state of transition. It is noted that the sector is growing in emerging economies and shrinking but becoming more productive in advanced economies (CIMA, 2010). It is outlined that the new manufacturing giants with low wage economies tend to compete on cost, the established players prefer to move up the manufacturing value chain to compete on technology and innovation. Further, lean manufacturing techniques which are said to control costs and improve quality are outlined to be pervasive. Further, it is argued that many policy makers in western economies argue for the need to rebalance economies from an over reliance on services, particularly financial services. Manufacturing is therefore seen as a source of stronger and more sustainable growth. However, the manufacturing sector is faced

with several significant challenges such as currency volatility, a shortage of lending, fears over the sustainability of supply chains and downward pressure on prices. It is noted that there has been a global shift in manufacturing from West to East. The manufacturing sector has been growing rapidly in India and China and has reduced in most advanced economies of the West (CIMA, 2010). It is notable that western companies have progressively downsized over the past decades, which has resulted in increases in manufacturing productivity; with lean manufacturing techniques being almost universally adopted. Emerging markets are said to concentrate on mass manufacturing and competing on price, while manufacturers in the West have moved up the value chain to concentrate on more technically advanced industries or products (CIMA, 2010). UNIDO (2022) outlines that the most recent data on global manufacturing production, covering the fourth quarter of 2021, confirms the recovery of the world economy and its manufacturing sector, albeit with seasonal, regional and sectoral differences from the adverse effects of the Covid-19 pandemic. It is noted that high technology industries had a better production performance and, therefore, recovered faster. Therefore, it is argued to be clear from the data that the economic situation keeps improving as many countries gradually phase out economic and social restrictions, although new trends in the pandemic are argued to have the capacity to still jeopardize the fragile recovery (UNIDO, 2022).

1.1 Background of the Study

1.1.1 Vision 2030 Key Sectors

Garidzirai and Muzindutsi (2020) highlights that emerging economies promote sustainable growth through sectors that are considered to be key in contributing to economic development in specific areas of the economy. Key economic sectors such as mining, manufacturing, tourism and agriculture are used in most developing countries. Therefore, they further outline that the identification of such key sectors necessitates a thorough analysis of the productivity of each sector. Challenges may be faced due to structural variations that require shifting the factors of production from traditional sectors to modern sectors that are considered high productivity sectors (Todaro & Smith, 2006). Humavindu and Stage (2013) therefore argue that the primary concern with strategic sector analysis is the identification of economic activities that display the largest amount of interdependence with the rest of the economy. In line with this discourse, the Zambian government through its long-term plan which is the Vision 2030 and subsequent medium term and

short-term plans have outlined four key sectors that would further economic growth and promote the diversification of the economy (GRZ, 2006). These key sectors include the manufacturing sector, the agricultural sector, mining sector and the tourism sector (GRZ, 2019). These sectors are considered to not only promote diversification of the economy away from copper production which Zambia has been heavily dependent on but also the creation of jobs for the population.

The four key sectors highlighted in the Vision 2030 not only have potential to ensure sustainable development for Zambia, they also have the capacity to ensure development in Southern Africa as a whole. Awolusi (2016) outlines that in the past few decades, Southern Africa's mining sector has played a crucial role in attracting foreign investments into the region. Consequently, investments in mineral resources have grown into a major source of development finance, contributing to the economic growth of many Southern African economies according to UNCTAD (2015) and Kostad and Soreide (2009). The agricultural sector on the other hand has been reported to have had mixed performance over the last thirty years from 2013 (LéautierF & Hanson, 2013). They further add that this sector however simply based on its size employs more than half a billion people. Further, the contribution of tourism sector to economic growth and development is reflected in the form of exports since it represents 40 percent of all exports of services, which makes it one of the largest categories of international trade (UNWTO, 2006). They further add that in 2005 the tourism sector accounted for 3 percent to 10 percent of the GDP of developing countries (UNWTO, 2005). Therefore, it is not unexpected that the tourism sector can be considered a viable export-oriented economic growth approach for job creation and development to the people and help in the reduction of abject poverty. The last sector, and that is of interest is the manufacturing sector.

1.1.2 Manufacturing sector and Economic Growth

It is important to understand the channels through which manufacturing growth has an impact on economy-wide growth and employment in particular as it can mobilize higher growth and employment creation. (Zalk, 2014). It is further outlined that Nicholas Kaldor developed a set of hypotheses or stylized facts to explain the central role of manufacturing in the process of economic development. His argument was that manufacturing demonstrates a unique characteristic which is that it has the capacity to generate dynamic increasing returns. Thirlwall (1983) highlights that manufacturing not only has the potential to increase its output more than proportionate to the

increase in inputs, and also the faster the rate of growth of output in manufacturing, the faster the rate of growth of both manufacturing and economy-wide productivity being dynamic increasing returns. Some of the advantages of the manufacturing sector include its ability to employ large numbers of low-to-medium skilled workers and that the processes in the manufacturing sector can be easily standardized and scaled, which complements economic clustering in cities (International Growth Centre, 2019). Another advantage is outlined to be that the sector benefits from technological change and productivity growth, thus exhibiting positive learning and process development opportunities. Furthermore, it is added that the manufacturing sector is tradable, allowing developing countries to tap into global value chains as well as new markets for buying and selling goods.

Attiah (2019) outlines that there is numerous theoretical and empirical evidence that support the assertions on the importance of industrialization for economic development through the manufacturing sector. It is outlined that the manufacturing sector offers special opportunities for capital accumulation. Szirmai (2009) highlights that capital accumulation is one of the aggregate sources of growth, with an argument that it is much lower in services and agriculture. Therefore, increasing the share of contribution of the manufacturing sector is argued to have a higher contribution to economic growth. Attiah (2019) further argues that the manufacturing sector offers special opportunities for economies of scale as compared to other key sectors identified in various economies.

Cornwall (1977) further added that the manufacturing sector does offer special opportunities for technological progress. This is argued to be because technological advance is concentrated in the manufacturing sector and diffuses from there to other economic sectors such as the service sector. Furthermore, its noteworthy that the capital goods that are employed in other sectors are produced in the manufacturing sector. Therefore, these linkage and spillover effects are argued to have direct backward and forward linkages between different sectors and subsectors, hence creating positive externalities to investments in given sectors (Attiah, 2019). This is further supported by Herman (2016) who outlines that the manufacturing sector has the multiplier effects which is closely related to the other sectors of the economy.

1.2 Statement of the Problem

Several studies have shown that the Manufacturing sector has high ability to promote stronger inter industry and inter sectoral linkages, firm productivity, technological development and innovation since the manufacturing sector can employ more people, produce higher income and has greater output multipliers in comparison to agriculture and service sectors (Zambia Association of Manufacturers, 2020). Studies also show that the growth of the manufacturing sector has the ability to upgrade and diversify agriculture through agro-processing, as well as drive demand for higher value-added services. Once a growth pattern is strategically undertaken and effectively implemented, the manufacturing sectors competitiveness can be accelerated leading to the achievement of sustainable and inclusive development in the country. However, for the purpose of this study, the paper will focus on the manufacturing sector and its contribution to attaining the Vision 2030. Despite agriculture and mining having a larger contribution to GDP, this study proposes to focus on the manufacturing sector as a small manufacturing sector indicates low intra-regional trade.

Furthermore, the manufacturing sector has the capacity and ability, once well developed, to support both the agricultural and mining sectors and further economic growth through enhanced production. Therefore, the aim of this study is to understand the contribution of each sector identified as key economic sectors in the Vision 2030 towards economic growth, with a bias towards understanding the contribution of the manufacturing sector in this regard. This analysis will validate the assertion and further provide information if there is a need to further efforts to enhance productivity in these sectors.

1.3 Research Objectives

Main Objectives

To establish the effect of Manufacturing Sector output to Zambia's economic growth.

Specific Objectives

- i. To analyze the effect of Manufacturing Sector output to Zambia's economic growth.
- ii. To determine the effect of Inflation on Zambia's economic growth.
- iii. To find out the effect of Investment on Zambia's economic growth.

1.4 Research Questions

- i. What is the effect of Manufacturing Sector output to Zambia's economic growth?
- ii. What is the effect of Inflation on Zambia's economic growth?
- iii. What is the effect of Investment on Zambia's economic growth?

1.5 Scope of study

The study will look at how the progress Zambia has made in attaining middle-income status by considering data from the World Bank (2022) World Development Indicators. The study will further consider the relationship between the manufacturing sector and economic growth for the period 2014Q1 to 2021Q4 with data obtained from Zamstats (2022), with the limitation of the study being due to limited data availability of certain key variables that would have been considered.

1.6 Significance of Study

The Zambian government through its long-term plan which is the Vision 2030 and subsequent medium term and short-term plans identified key sectors in order to further development and create decent jobs. However, there is a lack of studies that have been done to assess the progress of the Vision 2030 to ascertain the effectiveness of projects and policies that have been implemented especially with regards to the manufacturing sector. Therefore, the findings of this study will be able to inform policy as well as add to the limited studies done on this topic using updated and recent data on the key economic sectors in Zambia, especially on the contribution of the Manufacturing Sector to Economic growth in Zambia.

1.7 Thesis Outline

This thesis is divided into six chapters as follows:

Chapter One: This section contains the study's framework. This includes an introduction, background of the study, research challenges, research objectives and questions, the study's importance and the scope.

Chapter Two: This review examines several literature publications by diverse writers on the Manufacturing Sector and Economic Growth. It will also contain the study's critiques and lessons learnt.

Chapter Three: This chapter contains the study's Theoretical and Conceptual framework. It explains the theoretical and conceptual framework upon which the study is built. In the conceptual framework, the theories that underpin the study to be conducted as well as variables to work with.

Chapter Four: This chapter explains the study's research methodology, including the study's design, model, sample size and analysis approach for analyzing the research data.

Chapter Five: This section explains how data will be collected and evaluated. I will also show the scope and limitations of some key research topics.

Chapter Six: Chapter five gives conclusions on the effect of the manufacturing sector output to Zambia's economic growth and gave recommendations to the various stakeholders directly linked to the Manufacturing Sector on how they can contribute to Zambia's future economic growth.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter will give an overview of the Manufacturing sector outlining its definition, components and indicators. The chapter will then consider Economic growth showing the various indicators of economic growth and further link the manufacturing sector to economic growth. This is so by reviewing empirical literature. The chapter then highlights a critique of the studies reviewed, lessons learnt from the previous studies and conclude with the summary of the chapter.

2.1 Overview of Manufacturing Sector

Manufacturing is argued to be an integral and huge part of the economy. It is said to involve the processing and refinement of raw materials, such as ore, wood, and foodstuffs, into finished products, such as metal goods, furniture, and processed foods. Furthermore, converting these raw materials into something more useful adds value. This added value is said to increase the price of finished products, making manufacturing a very profitable part of the business chain. It is noted that some people specialize in the skills required to manufacture goods, while others provide the funds that businesses need to purchase the tools and materials (Kenton, 2022).

Manufacturing is argued to be any industry that makes products from raw materials by the use of manual labor or machinery and that is usually carried out systematically with a division of labor. Furthermore, in a more limited sense, manufacturing is said to denote the fabrication or assembly of components into finished products on a fairly large scale. It is noted that among the most important manufacturing industries are those that produce aircraft, automobiles, chemicals, clothing, computers, consumer electronics, electrical equipment, furniture, heavy machinery, refined petroleum products, ships, steel, and tools and dies (Britannica, 2022). Its further added therefore that the term manufacturing refers to the processing of raw materials or parts into finished goods through the use of tools, human labor, machinery, and chemical processing. Manufacturing allows businesses to sell finished products at a higher cost than the value of the raw materials used. Further, large-scale manufacturing allows for goods to be mass-produced using assembly line processes and advanced technologies as core assets (Britannica, 2022). Further, efficient

manufacturing techniques are said to enable manufacturers to take advantage of economies of scale, producing more units at a lower cost.

There are several means that are considered as indicators of manufacturing. These included value addition, manufacturing output to GDP and industrial production index. The industrial production index (IPI) is said to measure levels of production in the manufacturing, mining (including oil and gas field drilling services), electrical and gas utilities sectors. It is said to also measures capacity, an estimate of the production levels that could be sustainably maintained; and capacity utilization, the ratio of actual output to capacity. Industrial production and capacity levels are argued to be expressed as an index level relative to a base year. Therefore, in other words, they do not express absolute production volumes or values, but the percentage change in production relative to the base year. It is noted that the source data is varied, including physical inputs and outputs such as tons of steel; inflation-adjusted sales figures; and, in some cases, hours logged by production workers. Further, at the same time, IPI is said to differ from the most popular measure of economic output gross domestic product (GDP) (Kenton, 2021).

Another indicator used is manufacturing Value Added. Manufacturing value added of an economy is said to be the total estimate of net-output of all resident manufacturing activity units obtained by adding up outputs and subtracting intermediate consumption. Measurement of this indicator requires appropriate demarcation of the type of economic activity and of the territory in which the activity takes place (UNIDO, 2022). ZamStats (2022) also outlines another measure which will be used in this study. This indicator is the contribution of Manufacturing output to GDP. This value is expressed in absolute terms and as a percentage growth.

Attiah (2009) highlights that since the industrial revolution, manufacturing has acted as the primary engine of economic growth and development. It is outlined that Great Britain was the first industrialized country and became the technological leader in the world economy. After Great Britain, it is noted that manufacturing then diffused to other European countries such as Belgium, Switzerland, and France and later to the United States. It is noted that they followed a radically different path towards industrialization based on primary exports, abundance of land and natural resources, and scarcity of labor (Attiah, 2019). Further, it is noted that historically, manufacturing has played a key role in the economic development of developing countries. It is noteworthy to consider that the experience of countries like India, which invested in services, and the failure of

industrialization in Africa and Latin America have led to skepticism about the effectiveness of manufacturing to foster development (Attiah, 2019). Conversely, the African Development Bank Group (2021) argued that low levels of industrial manufacturing are hampering economic growth and development in several African countries. They outline that the African continent has abundant natural resources, oil, gas, minerals, metals, agricultural and forest products, and the blue economy. However, they note that Africa's massive natural resources have not translated into wealth. Furthermore, the low level of industrial manufacturing is said to be at the core of the slow structural transformation of African economies. They add that it represented a race to the bottom characterized by rising poverty, export of jobs, volatile commodity prices, and import dependency (African Development Bank Group, 2021).

2.2 Economic growth and its indicators

Economic growth is said to be the process by which a nation's wealth increases over time. It is noted that although the term is often used in discussions of short-term economic performance, in the context of economic theory it generally refers to an increase in wealth over an extended period. Therefore, it is noted that Economic growth can best be described as a process of transformation. It is argued that whether one examines an economy that is already modern and industrialized or an economy at an earlier stage of development, one finds that the process of growth is uneven and unbalanced (Britannica, 2022). It is outlined that economic historians have attempted to develop a theory of stages through which each economy must pass as it grows. Early writers are outlined to often stress the resemblance between the evolutionary character of economic development and human life. Later writers, such as the Australian economist Colin Clark, have been said to have stressed the dominance of different sectors of an economy at different stages of its development and modernization. It is noted that Clark viewed development as a process of successive domination by primary (agriculture), secondary (manufacturing), and tertiary (trade and service) production. The American economist W.W. Rostow is said to argue that growth proceeds from a traditional society to a transitional one in which the foundations for growth are developed, to the "take-off" society in which development accelerates to the mature society. Therefore, it is noteworthy that several theories have been advanced to explain the movement from one stage to the next of growth in an economy. Entrepreneurship and investment are argued to be the two factors most often singled out as critical (Britannica, 2022).

It is noted that economic growth is usually distinguished from economic development, with the latter term being restricted to economies that are close to the subsistence level. Hence, the term economic growth is applied to economies already experiencing rising per capita incomes (Britannica, 2022). Potters and Munichello (2021) argue that economic growth is an increase in the production of economic goods and services in one period of time compared with a previous period. They note that it can be measured in nominal or real terms as it is adjusted to remove inflation. They add that traditionally, aggregate economic growth is measured in terms of gross national product (GNP) or gross domestic product (GDP), with alternative metrics sometimes used. Therefore, economic growth is an increase in the production of goods and services in an economy. Increases in capital goods, labor force, technology, and human capital are said to all contribute to economic growth. Economic growth is further commonly measured in terms of the increase in aggregated market value of additional goods and services produced, using estimates such as GDP. The four phases of economic growth are outlined to be expansion, peak, contraction, and trough (Potters & Munichello, 2021). They further note that tax cuts are generally less effective in spurring economic growth than increases in government spending. It is noted that if the rewards of economic growth go only to an elite group, then it is unlikely that the growth will be sustainable.

Boldeanu and Constantinescu (2015) outline that the determinants of economic growth are inter-related factors influencing the growth rate of an economy. They note that there are six major factors that determine growth with, four of them grouped under supply determinants and the other two are efficiency and demand. The four supply factors are said to be natural resources, capital goods, human resources and technology and they have a direct effect on the value of good and services supplied. Its added that economic growth measured by GDP means the increase of the growth rate of GDP, noting further that what determines the increase of each component is very different. It is noted that public expenditure, capital formation, private or public investment, employment rates, exchange rates and other factors have different impacts on economic growth and it should be considered that these determinants have different implications if the economies are developed or not. Furthermore, it is noted that there are also socio-political factors and events that have a major influence on the economic advancement of a country.

Additionally, there are also differences between economic and non-economic determinants. Economic determinants are said to refer to factors like capital accumulation, technological progress, labor; while non-economic sources refers to factors like government efficiency, institutions, political and administrative systems, cultural and social factors, geography and demography (Boldeanu & Constantinescu, 2015).

Various scholars have highlighted various determinants of economic growth, taking into consideration different variables and theories to support their assertions and findings. Barro (1996) shows that empirical findings for a panel of around 100 countries from 1960 to 1990 strongly support the general notion of conditional convergence. He argues that for a given starting level of real per capita GDP, the growth rate is enhanced by higher initial schooling and life expectancy, lower fertility, lower government consumption, better maintenance of the rule of law, lower inflation, and improvements in the terms of trade. Further, for given values of these and other variables, its outlined that growth is negatively related to the initial level of real per capita GDP. Political freedom further was found to have only a weak effect on growth but there is some indication of a nonlinear relation (Barro, 1996).

Boldeanu and Constantinescu (2015) argues that the main factors that can determine the economy range from public expenditure, openness and foreign direct investment or non-economic factors. They further clarify that there are many more determinants that are refined and disaggregated to use into new and advanced models of economic growth. However, it should also be noted that empirical studies based on different countries based on the data find different results.

Chirwa and Odhiambo (2017) highlight that the key macroeconomic determinants that are significantly associated with economic growth in Zambia include, amongst others, investment, human capital development, government consumption, international trade and foreign aid. Chizonde (2016) argued that in the long-run, economic growth is determined by physical capital, exchange rate, inflation, crude oil price, government spending and agricultural productivity. He further outlines that international copper prices only influence growth in the short-run. However, Zambia's Vision 2030 which is Zambia's long-term plan as has been mentioned outlines four sectors of interest, these being Manufacturing, Agriculture, Tourism and Mining. Given that Keho (2018) argues alongside several scholars that manufacturing is a core driver of economic growth, the paper therefore considers how the manufacturing sector acts as a determinant of GDP growth.

It is noted that as countries produce goods and services, and consume these domestically or trade internationally, economic indicators are used to measure levels and changes in the size and structure of different economies, and identify growth and contractions (World Bank Group, 2019). They note that economic indicators include measures of macroeconomic performance, such as the gross domestic product (GDP), consumption, investment, and international trade, and stability reflected by the central government budgets, prices, the money supply, and the balance of payments.

Furthermore, it is argued to include broader measures of income and savings adjusted for pollution, depreciation, and depletion of resources. It is noted from many economic indicators from the World Development Indicators (WDI) that they are used in tracking progress toward SDG Goal 8 which is to promote decent work and economic growth and SDG Goal 2, which encourages sustainable consumption and production. It is therefore noted that measuring economic activity in a country or region provides insights into the economic well-being of its residents. Gross Domestic Product (GDP) which is a widely used indicator refers to the total gross value added by all resident producers in the economy. Growth in the economy is measured by the change in GDP at constant price (World Bank Group, 2019). They note that another widely used indicator in assessing a country's wealth and capacity to provide for its people is Gross National Income (GNI) per capita. This is said to be the sum of total domestic and foreign value added claimed by residents divided by the total population. GNI per capita is said to also be used to classify economies into four main income groups for analytical purposes: low-income, lower-middle-income, upper-middle-income, and high-income (World Bank Group, 2019).

The Zambian Government identified the manufacturing sector as one of the key sectors in its 8th national development plan, and in addition to expanding trade and increasing private investment, it is also focusing on developing and operating multi facility economic zones and industrial parks (JICA, 2023). The Zambia Development Agency (ZDA) outlines that the manufacturing sector accounts for nearly 8% of the country's GDP and has been consistently growing due to growing investment in the sector (ZDA, 2023). The manufacturing sector in Zambia is also important with regards to employment. In 2020, the projected employment from new investment and re-investment projects was concentrated in the manufacturing sector which accounted for 53 percent of this projected employment (Simuchimba, et al., 2020). They note that the actualized

employment for 2020 was highest in the manufacturing sector that accounted for 43.4 percent of jobs created.

Policy Monitoring and Research Centre (PMRC) argues that the manufacturing sector has been pivotal in the realization of Zambia's economic growth and development, even as it continues to contribute significantly to Zambia's industrialization agenda. They note that the manufacturing sector's value added has grown from about 7.6% in 2010 to 8.1% of the GDP in 2018, with it remaining relatively stable between 2015 and 2019 with an average growth rate of 7.9% (PMRC, 2021). It is however argued that the performance of the sector faced some challenges post 2020 which were worsened by the COVID-19 pandemic which resulted into the sector shrinking by 4.6% in the second quarter of 2020.

Cilliers (2023) argued that Zambia has a small manufacturing sector, which was roughly 11 percentage points smaller than the average portion of GDP in lower middle-income Africa in 2019. In the Manufacturing/Transfers scenario, it is further argued that the contribution from manufactures increases by 0.4 percentage points above the Current Path forecast by ISS African Futures, equivalent to a manufacturing sector that is US\$1.1 billion larger by 2043. It is however noted that despite this improvement, it still reflects poor industrial growth by comparative African standards.

2.3 Manufacturing Sector and Economic Growth – Review of Similar Studies

Hatoongo (2020) in sought to understand the macroeconomic drivers of output growth in the manufacturing and service sectors of Zambia. The study made use of secondary time series data for the period 1970 to 2017. The study regressed manufacturing value-added and service sector value-added on several macroeconomic variables which are identified as potential drivers of output growth in the two sectors. The findings of the study highlight that gross fixed capital formation, employment and net exports are long run drivers of output growth in the two sectors whilst money supply and exchange rate are short run drivers of output growth. The study outlines further that whilst domestic physical capital accumulation is good for an economy, employment is a key player and should be given significant focus in macroeconomic growth prospects and targets.

A study by Afolabi and Laseinde (2019) attempted to examine the impact of manufacturing sector output on economic growth in Nigeria from 1981 to 2016. The study made use of secondary data

sourced from the Central Bank of Nigeria statistical bulletin for Autoregressive Distributed Lag (ARDL) model and the Granger causality techniques on RGDP, manufacturing capacity utilization (MCU), manufacturing output (LMO), government investment expenditure (GINVEXP), money supply (LM2) and interest rate (INR). The results of the study show that MCU had a positive influence on RGDP while LMO also affected RGDP positively. It also showed that GINVEXP had a negative effect on RGDP whereas LM2 influenced RGDP positively. Further, the results indicated a unidirectional causality between RGDP and MCU, LMO and LM2.

Moyo and Jeke (2019) sought to assess the impact of the manufacturing sector on economic growth in 37 African countries. Their study employed the System-GMM Model for the period between 1990 and 2017. This technique was ideal as the number of cross-sectional units was greater than the number of time periods. This technique further also catered for problems of endogeneity and heteroscedasticity. The results of their study showed that manufacturing value has had a positive effect on economic growth in African countries. Therefore, they recommend that policy makers enact measures to boost manufacturing output. Further, the deceleration of economic growth in African countries coupled with high unemployment and poverty levels has brought the issue of re-industrialisation into the spotlight as a possible solution.

Attiah (2019) studies the role of manufacturing and service sectors in economic development in the period (1950-2015). Their study used raw data from 50 countries, 10 advanced economies and 40 developing countries. The results of the empirical analysis were found to be in line with the manufacturing engine of growth hypothesis. The share of manufacturing of GDP is positively related to economic growth and this effect is more pronounced for the poorer countries, no such effects were found for services.

Keho (2018) examined the validity of Kaldor's first law for 11 ECOWAS member countries over the period 1970 to 2014 by employing an Autoregressive Distributed Lag bounds test approach to cointegration and Granger causality tests. The results of their study show that manufacturing output growth causes positively economic growth and non-manufacturing output growth, thereby providing support for Kaldor's first growth law. They further highlight that a policy recommendation from the results of the study is that structural transformation in favor of industrial production activities would help to accelerate economic growth in ECOWAS countries.

Awolusi (2016) in their study investigated the relationship between mineral resource endowment and economic growth in the Southern African economies, using a panel dataset of 14 countries in the Southern African Development Community (SADC) from 1990 to 2014. The empirical methodology involved the use of Ordinary Least Squares (OLS) and Generalized Method of Moments (GMM) as the estimation techniques. Findings showed that real growth in services, real growth of manufacturing, real growth of agriculture, real growth of mining, human capital development, infrastructural development, trade openness, and growth in foreign direct investment are important determinants of economic growth in Southern African economies during the study period. The study argues that to improve economic growth, Southern African countries must improve their macroeconomic policies, institutions and regulatory framework to be able to attract the much-desired strategic investments in the mining sector.

A study by Haraguchi, et al (2016) explored whether the low levels of industrialization in developing countries are attributable to long-term changes in the development characteristics of manufacturing or to the manufacturing sector's general global prospects. Their study findings indicated that the decline in both manufacturing value added and manufacturing employment shares in many developing countries has not been caused by changes in the manufacturing sector's development potential. They further outline that this is primarily caused by the failures of manufacturing development in a large number of developing countries against the backdrop of rapid manufacturing development in a small number of countries, thus resulting in a concentration of manufacturing activities in developing countries.

Azer, et al. (2016) in their study empirically examined the correlation between manufacturing, agriculture, services sectors and GDP per capita. The study used annual data from the year 2000 until 2010. The research methodology incorporated from time series data gathered from Malaysia Economic Statistics 2013 published by Department of Statistics, Malaysia. The paper found that manufacturing and service sectors are related to real GDP per capita while agricultural sector did not show a significant relationship towards GDP per capita.

The paper by Herman (2016) aimed to highlight the place and role of the Romanian industry, especially the manufacturing sector, in the national economy and its impact on employment and sustainable development. The results of their study are outlined to show that Romania has entered a process of deindustrialization for over two decades. They outline that after the year 2000, the

intensity of the deindustrialization process decreased which allowed the manufacturing sector to remain the backbone of the Romanian industry and whole economy. Their study highlights that a real challenge of the Romanian manufacturing sector is the low level of labor productivity and low level of medium and high-technology manufacturing activities.

Dan and Yang (2016) in their study revisited the role of the manufacturing sector during the middle-income stage. The study made use of a large dataset that covers internationally comparable sectoral information, and based on their findings, prove that the manufacturing sector is imbued with three important characteristics. The study highlights that in middle-income economies, manufacturing pulls along services, instead of the other way around. Therefore, a decline in the manufacturing sector growth rate will negatively affect the growth rate of the services sector, in both the short-run and long-run. Secondly, their study found that development in the manufacturing sector not only promotes the incentives of savings, but also accelerates the pace of technological accumulation. Lastly, they outline that increased share of the manufacturing sector in middle-income economies can enhance the utilization of human capital and economic institutions. They conclude that empirical findings indicate that the manufacturing sector is still the key engine of economic growth for middle-income economies.

Cantone, et al (2014) considered manufacturing as an engine of growth, considering which approach would be best. The paper made use of GMM techniques to treat the endogeneity bias and a sample of 80 countries for the period 1980 to 2010. The study applied the LMDI (Log Mean Divisia Index) technique and decomposed the manufacturing sector's growth rate into components of intensive and extensive industrialization. They outline that while intensive industrialization refers to an increase of manufacturing value added based on drivers that strengthen manufacturing industries in terms of productivity and structural change; extensive industrialization is an increase of manufacturing value added based on a driver, total employment, that does not promote a transition in which the manufacturing sector assumes a leading role. Their paper found that intensive rather than extensive industrialization enhances economic growth and that not every dollar for additional industrialization matters for development.

Hussin and Ching (2013) scrutinized the contribution of economic sectors to economic growth in Malaysia and China by using time series data from year 1978 until 2007. There are three economic sectors that were analyzed, which are agricultural sector, manufacturing sector and service sector.

The correlation analysis indicated that agriculture sector, manufacturing sector and service sector had positive relationship with GDP per capita in Malaysia and China.

Similarly, Hussin and Yik (2012) examined the contribution of economic sectors to economic growth in two countries by using time series data from 1978 to 2007. Three economic sectors were analyzed: agricultural sector, manufacturing sector and services sector. In addition, the results of multiple regression analysis show that agriculture, manufacturing and services sectors have positive relationship with GDP per capita in China and India. However, the contribution of economic sectors to economic growth differs in China and India. Manufacturing sector contributes the highest to China’s economic growth while services sector is the highest contributor to India’s economic growth.

Szirmai (2011) examined the theoretical and empirical evidence for the hypothesis that manufacturing is the main engine of growth in developing countries. The study opens with an overview of the main arguments supporting the engine of growth hypothesis and then examines each of the arguments using a mix of statistical analysis of secondary data and secondary literature. The paper therefore concluded that manufacturing will continue to be important in accelerating growth and achieving catch-up in developing countries. They highlight that compared to the past 60 years, market service sectors will become relatively more important as potential sources of growth and catch up.

2.4 Literature Matrix

Scholars	Theme	Methodology	Findings
Hatoongo (2020)	The macroeconomic drivers of output growth in the manufacturing and service sectors	Regression analysis using secondary data	Gross fixed capital formation, employment and net exports are long run drivers of output growth in the two sectors whilst money supply and exchange rate are short run

			drivers of output growth.
Afolabi and Laseinde (2019)	The impact of manufacturing sector output on economic growth	Secondary data analysis using the Autoregressive Distributed Lag (ARDL) model and the Granger causality techniques	Manufacturing capacity utilization had a positive influence on Real GDP while manufacturing output also affected Real GDP positively. Government investment expenditure had a negative effect on Real GDP whereas money supply influenced Real GDP positively. A unidirectional causality between Real GDP and manufacturing capacity utilization, manufacturing output and money supply
Moyo and Jeke (2019)	The impact of the manufacturing sector on economic growth	The study employed the System-GMM Model on data from 37 countries	Manufacturing value has had a positive effect on economic growth in African countries.

Attiah (2019)	The role of manufacturing and service sectors in economic development	Study used raw data from 50 countries, 10 advanced economies and 40 developing countries	The share of manufacturing of GDP is positively related to economic growth and this effect is more pronounced for the poorer countries, no such effects were found for services
Keho (2018)	The relationship between mineral resource endowment and economic growth in the Southern African economies	A panel dataset of 14 countries in the Southern African Development Community (SADC) from 1990 to 2014 using Ordinary Least Squares and Generalized Method of Moments estimation techniques	Real growth in services, real growth of manufacturing, real growth of agriculture, real growth of mining, human capital development, infrastructural development, trade openness, and growth in foreign direct investment are important determinants of economic growth in Southern African economies during the study period
Haraguchi, et al (2016)	The Importance of Manufacturing in	Literature and empirical analysis	The decline in both manufacturing value

	Economic development		added and manufacturing employment shares in many developing countries has not been caused by the failures of manufacturing development in a large number of developing countries against the backdrop of rapid manufacturing development in a small number of countries
Azer, et al. (2016)	Contribution of Economic Sectors to GDP	Regression analysis using secondary data	Manufacturing and service sectors are related to real GDP per capita while agricultural sector did not show a significant relationship towards GDP per capita
Dan and Yang (2016)	The role of the manufacturing sector on the economy	Regression analysis and granger causality analysis of secondary data	In middle-income economies, manufacturing pulls along services. Development in the

			manufacturing sector promotes the incentives of savings and accelerates the pace of technological accumulation.
Cantone, et al (2014)	The role of the manufacturing sector on the economy	GMM techniques on a sample of 80 countries	Intensive rather than extensive industrialization enhances economic growth
Hussin and Ching (2013)	The Contribution of Economic Sectors to Economic Growth	Correlation analysis and multilinear regression analysis of secondary data	The correlation analysis indicated that agriculture sector, manufacturing sector and service sector had positive relationship with GDP per capita in Malaysia and China
Hussin and Yik (2012)	The Contribution of Economic Sectors to Economic Growth	Multiple regression analysis	Manufacturing sector contributes the highest to China's economic growth while services sector is the highest contributor to India's economic grow

Szirmai (2011)	Manufacturing and Economic Development	Statistical analysis of secondary data and secondary literature	Compared to the past 60 years, market service sectors will become relatively more important as potential sources of growth and catch up
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Source: Author (2023)

2.5 Critique of existing Literature

The study by Herman (2016) showed that Roman initially resolved for an initial deindustrialization. However, the study has shown that the manufacturing sector remained the backbone of the economy and therefore advocated that in order to increase the resilience of the Romanian economy in the context of economic globalizations and to assure sustainable economic growth and development a reindustrialization through sustainable and productive manufacturing was necessary. However, this study did not consider the relationship between the manufacturing sector and its contribution to economic growth based on empirical data. Afolabi and Laseinde (2019) in their study disaggregated manufacturing sector and compared this to their relationship with Real GDP. They found that all disaggregated components of the manufacturing sector possessed a positive relationship, with some being found to have a causal relationship. This study however required to take an initial approach to ascertain the effect of aggregated manufacturing sector on economic growth to determine if the sector is beneficial as is.

Moyo and Jeke (2019), Afolabi and Laseinde (2019), Keho (2018) and Awolusi (2016) confirmed the positive effect of the manufacturing sector on economic growth. Attiah (2019) found similar results when considering both developed and developing countries. Haraguchi, et al (2016) outlines that the limited contribution of the manufacturing sector is not due to its development potential, but to the failures of manufacturing development in a large number of developing countries against the backdrop of rapid manufacturing development in a small number of countries. This therefore has resulted in a concentration of manufacturing activities in developing countries. The study by Dan and Yang (2016) confirms that there are positive externalities that are as a result of the growth in the manufacturing sector that cut across different sectors.

There is need also to ascertain the negative externalities that occur as a result of the manufacturing sector. Cantone, et al (2014) further goes on to disaggregate the manufacturing sector into intensive and extensive industrialization. They argue that intensive rather than extensive industrialization enhances economic growth and that not every dollar for additional industrialization matters for development. Hussin and Yik (2012) and Hussin and Ching (2013) in their studies further show that the contribution of the manufacturing sector differs between countries. The study by Hatoongo (2020) concluded that the service sector and the manufacturing sector are key determinants of economic growth in Zambia, therefore considers the factors that drive these two key sectors. There are notable gaps on studies done in Zambia. The studies done in Zambia have concentrated on establishing the manufacturing sector as a determinant of economic growth. However, there is need to build on this as has been done by several studies reviewed that further ascertain the aspects of the manufacturing sector that maybe retrogressive.

Further, there is a gap in literature on Zambia that do not ascertain how the manufacturing sector through positive externalities support other sectors in ensuring growth of the economy. Further, there is a need to ascertain whether intensive or extensive industrialization through the manufacturing are more relevant as a means of economic growth. Therefore, building on this study and other studies done on Zambia, this paper will consider how since the implementation of the Vision 2030 in 2006, the contribution of the manufacturing sector to GDP growth in Zambia.

2.6 Lessons Learnt

A review of similar studies made us learn the following:

It has been shown that largely, there is an expected positive relationship between manufacturing and GDP growth, notably even when the manufacturing sector is disaggregated. However, not all manufacturing sector aggregates have causal relationships to GDP growth. However, despite there being an argument on whether the relationship applies to both developing and developed countries, the studies have shown that indeed the relationship is true for both developed and developing economies. However, it has been found that certain developing economies have limited contribution between GDP growth and manufacturing. It has been shown that in such cases, it is not due to its development potential but to the failures of manufacturing development. Therefore, the means of developing the manufacturing sector is important.

Further, it has been shown that what ensures accelerated economic growth due to the manufacturing sector are the positive externalities that impact and promote other sectors by providing inputs. The review of literature has shown that certain countries tried to move the focus of their development away from industrialization and manufacturing, however this resulted in a slowdown of their development. Therefore, they resolved to reindustrialize which resulted into a sustained level of development. Lastly, it has been highlighted that studies on Zambia have shown that manufacturing is confirmed to be key determinants of economic growth. Several studies reviewed such as by Afolabi and Laseinde (2019), Moyo and Jeke (2019), Attiah (2019), Keho (2018), Hussin and Ching (2013) and Hussin and Yik (2012) have outlined the positive relationship between economic growth and the manufacturing sector.

2.7 Chapter Summary

Chapter Two looked at a review of literature and the fundamentals of the manufacturing sector. Chapter Two then considered the determinants of economic growth and reviewed literature from empirical studies done similar to this study including gaps and lessons learnt. Chapter Three will build on this by outlining the Theoretical and Conceptual framework that will guide this study.

CHAPTER 3

THEORETICAL AND CONCEPTUAL FRAMEWORK

3.0 Introduction

Chapter two looked at literature review by considering the manufacturing sector and reviewing related empirical studies. Chapter three will now look at the theoretical and conceptual framework that guide this study. The theoretical framework that will be considered is that of Verdoorn's and Kaldor's laws of growth. The conceptual framework that will be considered is based on the theoretical framework and will be derived from the determinants of economic growth/ GDP growth.

3.1 Theoretical Framework

This study was based on the following theory of Verdoorn's and Kaldor's Laws of Growth.

3.1.1 Verdoorn's and Kaldor's Laws of Growth

Labor productivity has been outlined to have grown at different rates in similar industries in different countries (Scott, 1991). It is outlined that Verdoorn suggested that this could be explained by faster rates of growth of output leading to economies of scale. However, it should be noted that there are several other explanations and the relation with output growth is argued too not be robust. Kaldor (1960) is said to have found that the rate of growth of total output in different countries was higher, the faster was the rate of growth of manufacturing output from 1953 to 1963, and attributed this to demand factors especially noting exports (Scott, 1991). In the 1960s, Nicolas Kaldor is said to have put forward three laws advocating that the manufacturing industry sector is the main engine of economic growth. These laws are based on an econometric analysis of the output, productivity and employment growth rates of 12 OECD countries over the 1950's and the 1960's.

The first law argues that the growth rate of an economy is positively related to the growth rate of its manufacturing or industrial sector (Keho, 2018). It is argued that this positive relation can be explained by the effects of manufacturing on productivity levels in the whole economy. Further, it was argued that such effects are related to the transfer of labor from low productivity sectors to the industrial sector and to the existence of economies of scale in manufacturing. The second law states that the labor productivity is positively related to the growth rate of manufacturing sector

through increasing returns to scale due to learning by doing processes and efficiency changes (Keho, 2018). The third law is said to establish a positive relationship between productivity growth in the non-manufacturing sector and the growth in manufacturing output. The growth of manufacturing sector is argued to increase productivity in nonmanufacturing sector by drawing surplus labor in these sectors and reducing disguised unemployment (Keho, 2018).

Rocha (2018) summarizes Kaldor's first law of growth as manufacturing being the engine of growth; therefore, suggesting that the faster the growth rate in manufacturing output is, the faster the growth rate of the economy as a whole will be. Moyo and Jeke (2019) argue that the Kaldorian theory concentrates on the demand-supply relationships in the manufacturing sector and explores the importance of industrialization of the manufacturing sector. Further, it is not that aside from labor, the manufacturing sector may absorb goods from other sectors such as agriculture and mining which boosts output in the whole economy. Furthermore, the growth on manufacturing enhances demand for services such banking and insurance thus promoting the tertiary sector (Cantone, et al., 2014).

Moyo and Jeke (2019) add that structuralists provide support for the theory by suggesting that the expansion of the manufacturing sector is crucial for any given economy. This is because the structuralism theory asserts that the manufacturing sector produces capital goods that are used in diverse industrial divisions and subdivisions and is a powerful instrument for diffusing practical change within the economy. Rocha (2018) further emphasizes that the structuralism view stresses that economic development is strongly linked to a radical transformation in the structure of production to suppress obstacles, bottlenecks and other rigidities of underdevelopment. The structuralism literature, therefore, highlights the importance of industrialization as a process of structural change where the manufacturing sector plays a central role (Moyo & Jeke, 2019).

Rocha (2018) further adds that the structuralism strand states that without dynamic industrialization, it is not feasible to increase employment, productivity and income per capita and, consequently, to reduce poverty. This is because development involves a production reallocation from low productivity to high productivity sectors where increasing returns to scale prevail (Moyo & Jeke, 2019).

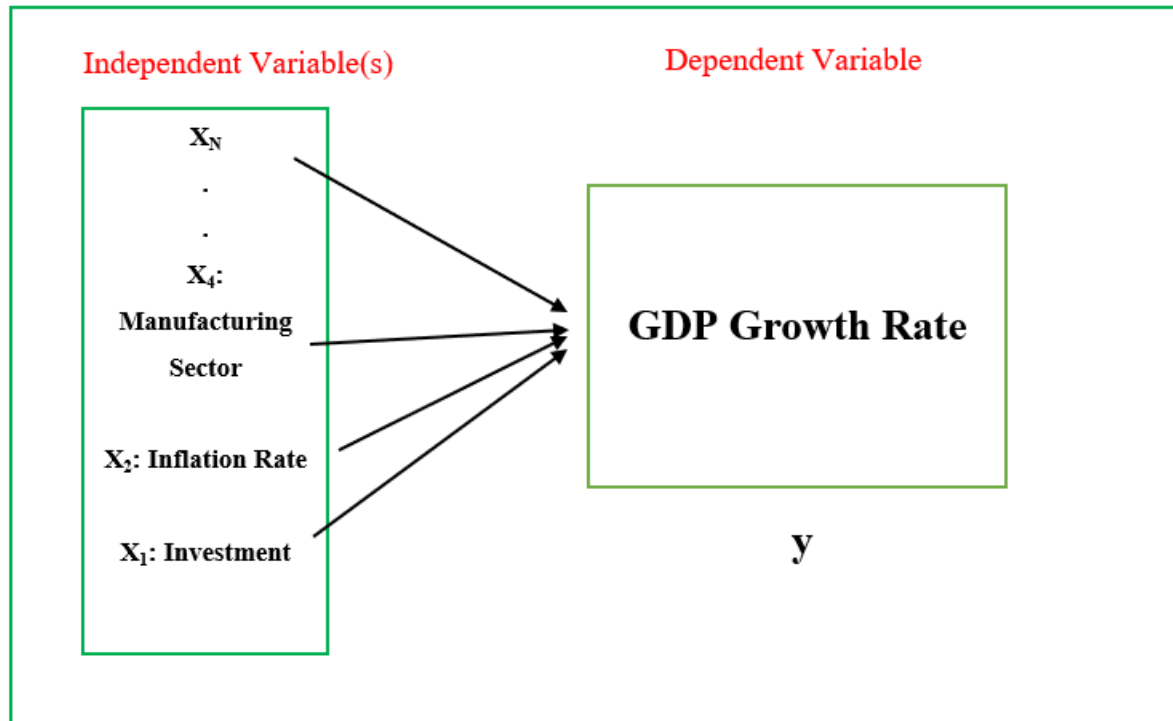
3.1.2 Harrod-Domar model

The Harrod-Domar model is a macroeconomic growth model that highlights the role of investment in promoting economic growth. It was separately developed in the 1930s by Sir Roy Harrod and Evsey Domar. Fundamentally, the model asserts that the productivity of capital investment and the amount of savings influence the growth rate of an economy. It is outlined that according to the Harrod-Domar model, investment levels are the main factor influencing economic growth. Increased capital accumulation from higher investment levels raises economic output and productivity. The capital-output ratio—which shows how much capital is needed to produce a unit of output—plays a critical role in the model. Faster economic growth and higher productivity are implied by a lower capital-output ratio (Greiner, 2010).

It is further highlighted that a significant aspect of the Harrod-Domar model is the notion of the "critical level of investment." An economy will experience negative or sluggish growth if real investment falls below this threshold. On the other hand, breaking through this barrier may result in long-term economic growth. Although the Harrod-Domar model is argued to provide insightful information on the connection between investment and economic growth, some contend that it oversimplifies the complexity of real-world economies and ignores important elements like institutional quality, human capital, and technological advancement (Acemoglu, 2009). The model continues to be a fundamental resource for comprehending the dynamics of economic development and the significance of investment in promoting growth, notwithstanding its flaws.

3.2 Conceptual Framework

Figure 0.1: Conceptual Framework



Source: Author (2022)

Figure 3.1 above outlines the conceptual framework which is the determinants of GDP/ Economic growth within an economy. The interest of the study is to establish which factors are important in ensuring GDP growth. This can be shown using equation below:

$$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_i x_i + \varepsilon_i$$

It has been noted that there are several determinants of economic growth and various factors and theories considered as outlined by Barro (1996) Boldeanu and Constantinescu (2015), Chirwa and Odhiambo (2017) and Dan and Yang (2016). However, in line with the theoretical framework which is based on the Verdoorn's and Kaldor's Laws of Growth, the main factor will be considered will be manufacturing sector. Therefore, the Inflation rate and Investment will be considered as control variables. The argument is that these factors have an impact on the growth of the economy. The study primarily seeks to establish how the manufacturing sector impacts economic growth in Zambia. However, the study notes that the inflation rate and investment have a linked effect on the relationship. Therefore:

Y = GDP Growth

X₁ = Investment

X₂ = Inflation rate

X₃ = Manufacturing Sector

3.3 Chapter Summary

This chapter has built on the previous Chapter by providing the Theoretical framework and the Conceptual framework of the study. The Chapter has shown that Verdoorn's and Kaldor's Laws of Growth is the theoretical framework that will be used to guide the study. This Chapter therefore forms the basis for Chapter that considers the methodology that was adopted in the study.

CHAPTER 4

RESEARCH METHODOLOGY

4.0 Introduction

This chapter outlines the methods and approaches that will be used to achieve the research objectives of the study. The chapter also highlights the data that will be used and how the data will be analyzed. The chapter will further outline the model and the estimation techniques.

4.1 Research Approach

The study made use of a quantitative data analysis approach that by making use of regression analysis to achieve the objectives of the study. Regression analysis was used to ascertain the relationship between economic growth and manufacturing sector output.

4.2 Research Design

This study made use of a descriptive research design that to analyse secondary quantitative data through regression analysis. A descriptive research design was adopted as it aims to accurately and systematically describe a population, situation or phenomenon.

4.3 Model

The research methodology focuses on the contribution of the manufacturing economic sector on the economic growth of Zambia. As has been highlighted, the selection of the key sectors is in accordance with the Government's long-term economic plan, the Vision 2030 (GRZ, 2006). Therefore, this study examined the relationship the manufacturing sector from the implementation of the Vision 2030 and their relation to economic growth in Zambia. Hence, multiple regression analysis was used to scrutinize the relationship between the dependent variable and the independent variables.

The study will follow the first Kaldor Law which describes the relation between the GDP growth rate and the manufacturing growth rate as outlined by Cantone, et al (2014) and shown below:

$$ECG_{it} = \beta_0 + \beta_1 MANF_{it} + Z_t + IC_t + \mu$$

Where ECG is economic growth shown by GDP growth rate and MANF is manufacturing growth rate, Z represents time effects (time-specific effects that can influence the GDP/manufacturing value added relationship over time). Further, its outlined that the most important coefficient in this

equation is β_1 , which is said to represent the variation of GDP growth rate when the manufacturing growth rate varies. Therefore, its outlined that the manufacturing growth rate varies by 1 percent, β_1 signifies the variation of GDP that derives from the respective percentage increase in manufacturing.

The model will therefore be described as below:

$$GDP_t = f(MANF_t, INF_t, INV_t)$$

Following the above-described model, the following econometric model was used for multiple regression analysis as proposed by Hussin and Ching (2013):

$$GDP_{it} = \beta_0 + \beta_1 MANF_{it} + \beta_2 INF_{it} + \beta_3 INV_{it} + \mu$$

Given that,

$$i = 1, 2, \dots, N, t = 1, 2, \dots, T$$

Where:

GDP = Economic Growth; MANF = Manufacturing Sector output; INF = Inflation rate; INV = Investment.

4.4 Data

4.4.1 Date Collection and Sample Size

The study looks at how the progress Zambia has made in attaining middle-income status by considering the contribution of the manufacturing sector to economic growth in Zambia. The study considered the relationship between the manufacturing sector and economic growth for the period 2014Q1 to 2021Q4 with data obtained from Zamstats (2022).

4.4.2 Estimation/ Analysis

In order to analyze the data, the study made use of the model as defined by Hussin and Ching (2013) which is the autoregressive distributed lag (ARDL) model. In order to ensure correct specification of the model, the study began by using a stationarity test to check the level of integration for each variable. The outcome of which was used to determine the econometric model to be used. Thereafter, the research then tested for the presence of a long-run correlation in the model between the variables using the ARDL Bounds test.

4.5 Diagnostic Tests

Heteroscedasticity

An important assumption assumed by the classical linear regression model is that the error term should be homogeneous in nature. Whenever that assumption is violated, then one can assume that heteroscedasticity has occurred in the data (Statistics Solutions, 2022). Therefore, in order to test for heteroscedasticity, the Breusch-Pagan-Godfrey test was used.

Autocorrelation Test

Autocorrelation refers to the degree of correlation between the values of the same variables across different observations in the data. The concept of autocorrelation is most often discussed in the context of time series data in which observations occur at different points in time. This paper made use of the Breusch-Godfrey Serial Correlation Test.

Multicollinearity Test

Multicollinearity is the occurrence of high inter-correlations among two or more independent variables in a multiple regression model. Multicollinearity can lead to skewed or misleading results when a researcher or analyst attempts to determine how well each independent variable can be used most effectively to predict or understand the dependent variable in a statistical model (Hayes, 2020). The study will test for multicollinearity.

Normality test

An assessment of the normality of data is a prerequisite for many statistical tests because normal data is an underlying assumption in parametric testing. There are two main methods of assessing normality: graphically and numerically. This study used both methods to test the normality of the data using the Jarque-Bera test.

4.6 Chapter Summary

The chapter has shown that the paper proposes to consider a quantitative research approach making use of a descriptive research design and an econometric approach using an Error Correction model in which the study will make use of time-series quarterly data.

CHAPTER 5

DATA PRESENTATION AND ANALYSIS

5.0 Introduction

The previous chapter outlined the methodology that was used in analysis of the data. This chapter therefore continues by presenting the analysis of the data and outlines the findings of this analysis. The chapter further goes on to provide an interpretation of the analysis and provides a discussion of these findings.

5.1 Descriptive Statistics

Table 5.1 below highlights the descriptive statistics of the variables from the data that was used in the analysis.

Table 0.1: Descriptive Statistics

	GDP	INV	INF	MANF
Mean	2.483333	114.4570	12.69667	5199.657
Median	3.100000	150.4483	10.10000	3350.550
Maximum	8.400000	681.1294	24.60000	14096.00
Minimum	-5.600000	-1074.828	6.100000	2482.200
Std. Dev.	2.734087	295.0397	6.180363	3398.455
Skewness	-1.066260	-2.002879	0.573181	1.132592
Observations	30	30	30	30

Source: Author (2022)

The descriptive statistics of interest in the table include the mean, the median, the maximum and the minimum. Other measures of Central tendency considered include the Standard Deviation, and the Skewness. The Descriptive statistics also highlight the number of observations considered in the analysis for each variable. The mean value of GDP is outlined to be 2.48, that of INV is outlined to be 114.46, the mean of INF is outlined to be 12.697 while that of MANF is outlined to be 5199.657. This shows the average value for each variable. The median shows the number in the middle of each dataset for each variable. The maximum highlights the largest number in the dataset while the minimum shows the smallest value in the dataset. The standard deviation is the measure of dispersion of a dataset for each variable relative to its mean. The higher the value, the greater

the dispersion of the dataset from its mean. Therefore, INV and MANF have high standard deviations with values 295.04 and 3398.45 respectively.

5.2 Regression Analysis

5.2.1 Test for Stationarity

The Augmented Dickey-Fuller Unit Root Test was used to test for stationarity for each variable in the dataset considered. The importance of this test is that it will determine what econometric model will be used in the analysis of the study based on the stationarity observed in Table 5.2 below. The study made use of observed probability at 5% level of significance.

Table 0.2: Augmented Dickey-Fuller Root Test

Variables	Order of co-integration	t-statistic	Prob.
GDP	I(0)	-2.967767	0.0954
	I(1)	-2.971853	0.0000
INV	I(0)	-2.967767	0.0001
L_INF	I(0)	-2.971853	0.1457
	I(1)	-2.971853	0.0081
L_MANF	I(0)	-2.967767	0.9962
	I(1)	-2.971853	0.0008

Source: Author (2022)

The null hypothesis indicated that there is no unit root. If the observed probability is less than 0.05, the study fails to reject the null hypothesis. Therefore, the analysis shows that the variables are stationary at both level [I(0)] and at first difference [I(1)] indicating the use of the Autoregressive Distributive Lag (ARDL) model.

5.2.2 The Model: Autoregressive Distributive Lag (ARDL) model

Table 0.3: Autoregressive Distributive Lag (ARDL) model

R-squared	0.967307
Adjusted R-squared	0.863781

Source: Author (2022)

Table 5.3 above shows the key statistics from the ARDL model that was used in the analysis. The table highlights the R-squared, the adjusted R-squared and the Observed probability. The

coefficient of determination (R-squared) is a statistical measure in a regression model that is used to determine the proportion of variance in the dependent variable that can be explained by the independent variable. Therefore, this variable outlines the extent to which the data fits the regression model. The adjusted R-squared is a better measure of fitness of data which is a modified version of R-squared. It shows whether adding additional predictors improves a regression model. The model shows that 96.73% and 86.38% of the of variations in the dependent variable are explained by the independent variables for the R-squared and adjusted R-squared respectively.

5.2.3 Test for a long-run Cointegration

An analysis was then done to test for the presence of a long run relationship in the model using the ARDL Bounds Test. The results of this analysis are shown in Table 5.4 below:

Table 0.4: ARDL Bounds Test

Test Statistic	Value	K
F-statistic	13.21892	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
5%	3.23	4.35
CHAPTER 1 1%	4.29	5.61

Source: Author (2022)

The null hypothesis states that no long relationship exists. The test statistic used is the observed F-value at 0.05 level of significance. An observed F-statistic value above the upper bound indicates the existence of a long run relationship which leads to the rejection of the null hypothesis of no long run relationship while an observed F-statistic value below the lower bound indicates that there is no long run relationship which leads to the failure of rejection of the null hypothesis of no long run relationship among the variables. An observed F-statistic value between the Upper and Lower bound will indicate undefined results. The observed F-statistic of 13.21892 results in rejecting the null hypothesis of no long run relationship as it is above the upper bound of 4.35 and 5.61 at both 5% and 1% level of significance.

5.2.4 ARDL Long Run Relationship

The long-run coefficients and effect of the model is shown in Table 5.5 below. The null hypothesis indicates that there is no significant relationship. The test statistic used was the observed probability at 5% level of significance. Therefore, values of the observed probability greater than 0.05 will result in failure to reject the null hypothesis.

Table 0.5: ARDL Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INV	0.019274	0.016293	1.182982	0.2816
L_INF	11.722240	6.080414	1.927869	0.1021
L_MANF	-5.001036	6.137195	-0.814873	0.4463
C	13.143232	44.692779	0.294080	0.7786

Source: Author (2022)

The long-run relationship between the dependent and independent variables is shown in the cointegrating equation below:

$$Cointeq = GDP - (0.0193*INV + 11.7222*L_INF - 5.0010*L_MANF + 13.1432)$$

The analysis of the long run coefficients of the ARDL model has shown that the variables are found to be statistically insignificant in the long run at 5% level of significance. The observed probability of INV is outlined to be 0.2816, that of L_INF is observed to be 0.1021 while that of L_MANF was found to be 0.4463.

5.2.5 ARDL Short Run Relationship

The cointegrating form is used to express the short-run coefficients and effect of the model as shown in Table 5.6 below. The null hypothesis indicates that there is no significant relationship. The test statistic used was the observed probability at 5% level of significance. Therefore, values of the observed probability greater than 0.05 will result in failure to reject the null hypothesis.

Table 0.6: Short run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.292396	0.245133	1.192803	0.2780
GDP(-2)	0.374476	0.222546	1.682689	0.1434

GDP(-3)	1.327787	0.255178	5.203368	0.0020
INV	0.002696	0.001642	1.642152	0.1517
INV(-1)	-0.005123	0.002278	-2.249064	0.0655
INV(-2)	-0.004743	0.002105	-2.253190	0.0652
INV(-3)	0.007081	0.003395	2.085592	0.0821
L_INF	7.947123	2.843808	2.794536	0.0314
L_INF(-1)	3.091930	1.922084	1.608634	0.1588
L_INF(-2)	-2.461281	1.915281	-1.285076	0.2461
L_INF(-3)	-2.837800	1.391772	-2.038983	0.0876
L_MANF	9.493345	2.373091	4.000412	0.0071
L_MANF(-1)	-8.917296	4.539770	-1.964262	0.0971
L_MANF(-2)	14.190278	4.625917	3.067560	0.0220
L_MANF(-3)	-3.872616	2.839896	-1.363647	0.2216
CointEq(-1)	-0.538724	0.191173	-2.817984	0.0304

Source: Author (2022)

It is noted that the error correction term (CointEq(-1)) is used to determine the existence of the equilibrium and to indicate the speed of adjustment to the equilibrium given any deviation in the previous period. It is outlined that a negative coefficient of the error correction term indicates the presence of the equilibrium. The observed probability of the CointEq(-1) is found to be significant as the value is 0.0304 at 5% level of significance. Further, on average the speed of adjustment to the equilibrium in the current period is 53.87%.

Table 5.5 above shows that on the relationship between GDP on GDP, the relationship was found to be significant with a lag of 3 periods with an observed probability of 0.0020 at 5% level of significance. The coefficient of 1.327787 shows a positive relationship and further that on average, a unit in GDP in a lag of three periods will have a 1.328 unit change in GDP in the current period. INV was found to be insignificant at periods up-to a lag of 3 periods as all observed probabilities were greater than 0.05 at 5% level of significance, resulting in failure to reject the null hypothesis.

L_INF in the current period was found to have a significant relationship with GDP in the current period with an observed probability of 0.0314. The relationship was found to be positive given a coefficient of 7.947123. Therefore, on average a percentage increase in inflation will result in a

7.947 unit increase in GDP. L_MANF was found to be significant in the current period and with a lag of 2 periods at 5% with an observed probability of 0.0071 and 0.0220 respectively. The analysis shows that both periods have a positive relationship with coefficients of 9.493345 and 14.190278. Therefore, a percentage change in L_MANF in the current period and with a lag of 2 periods will result in a 9.493 and a 14.190 unit change in GDP in the current period.

5.3 Causality Test

The Pairwise Granger Causality Test was used to check for a causal relationship between the dependent and independent variables as shown in Table 5.7 below:

Table 0.7: Pairwise Granger Causality

Null Hypothesis:	Obs	F-Statistic	Prob.
INV does not Granger Cause GDP	28	2.77374	0.0833
GDP does not Granger Cause INV		4.77397	0.0184
L_INF does not Granger Cause GDP	28	0.26055	0.7729
GDP does not Granger Cause L_INF		4.07597	0.0305
L_MANF does not Granger Cause GDP	28	0.04128	0.9596
GDP does not Granger Cause L_MANF		1.75153	0.1959

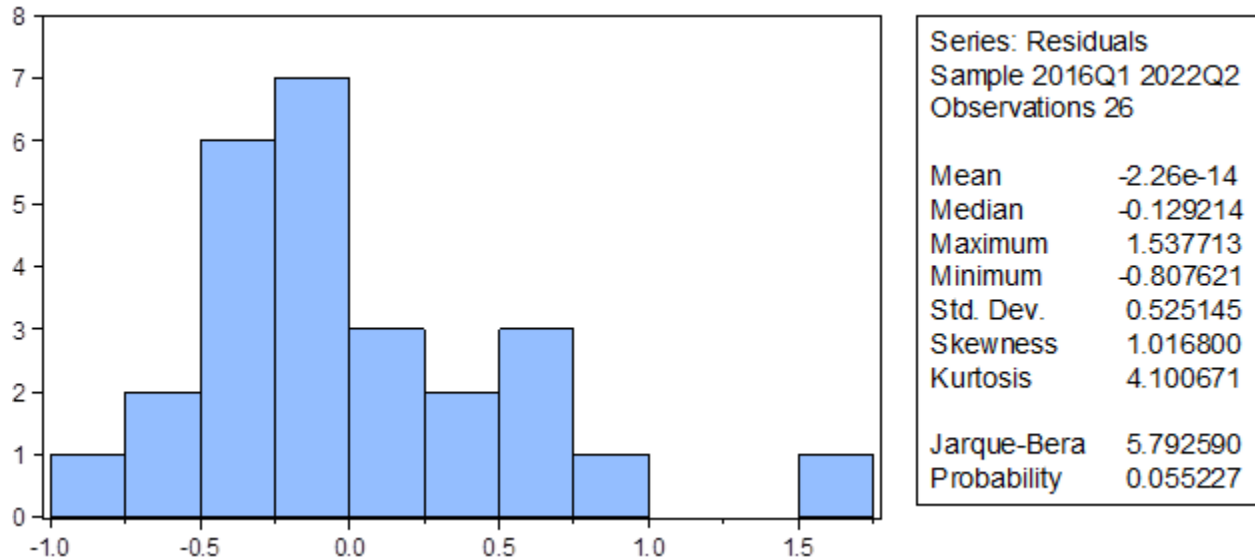
Source: Author (2022)

The null hypothesis indicates that there is granger causal relationship between the variables. The test statistic is the observed probability at 5% level of significance. The analysis shows that there are two unidirectional causal relationships that are significant at 5% level of significance as the observed probability is less than 0.05. There is a unidirectional relationship from GDP to INV and from GDP to L_INF with observed probability of 0.0184 and 0.0305 respectively.

5.4 Diagnostic Tests

5.4.1 Normality Test: Jarque-Bera normality test

Figure 0.1: Normality Test



Source: Author (2022)

The results in figure 5.1 above outlines how the errors are distributed through the Jarque-Bera normality test. The null hypothesis states that the errors are normally distributed. The observed probability of 0.055227 shows that the residuals are normally distributed given that the probability is greater than 5% level of significance. The study fails to reject the null hypothesis that the errors are normally distributed at 5% level of significance.

5.4.2 Test for Serial Relationship

The Breusch-Godfrey Serial Relationship LM Test was used to test for serial relationship as outlined in table 5.8 below:

Table 0.8: Serial Relationship Test

F-statistic	0.460406
Obs*R-squared	4.865274
Prob. F(2,4)	0.6608
Prob. Chi-Square(2)	0.0878

Source: Author (2022)

The null hypothesis states that the errors are not serially correlated in the model. The observed probability of 0.6608 shows that the errors are not serially correlated in the model given the probability being greater than 0.05 at 5% level of significance. The analysis therefore fails to reject the null hypothesis of no serial correlation and concludes that the errors were not serially correlated.

5.4.3 Test for Heteroscedasticity

The Breusch-Pagan-Godfrey test was used to test for Heteroscedasticity in the model as shown in table 5.9 below.

Table 0.9: Test for Heteroskedasticity

F-statistic	0.294353
Obs*R-squared	12.54326
Prob. F(19,6)	0.9810

Source: Author (2022)

The null hypothesis states that the variance of the error term is homoscedastic. The observed probability of 0.9810 shows that there is no heteroscedasticity in the model given the probability being greater than the 0.05 at 5% level of significance. The analysis therefore fails to reject the null hypothesis and concludes that the variance of the error term is homoscedastic.

5.4.4 Test for Correct Model Specification

The Ramsey RESET Test was used to ascertain correct model specification. The results of this analysis are shown in table 5.10 below:

Table 0.10: Test for Correct Model Specification

	Value	Df	Probability
t-statistic	1.949707	5	0.1087
F-statistic	3.801358	(1, 5)	0.1087

Source: Author (2022)

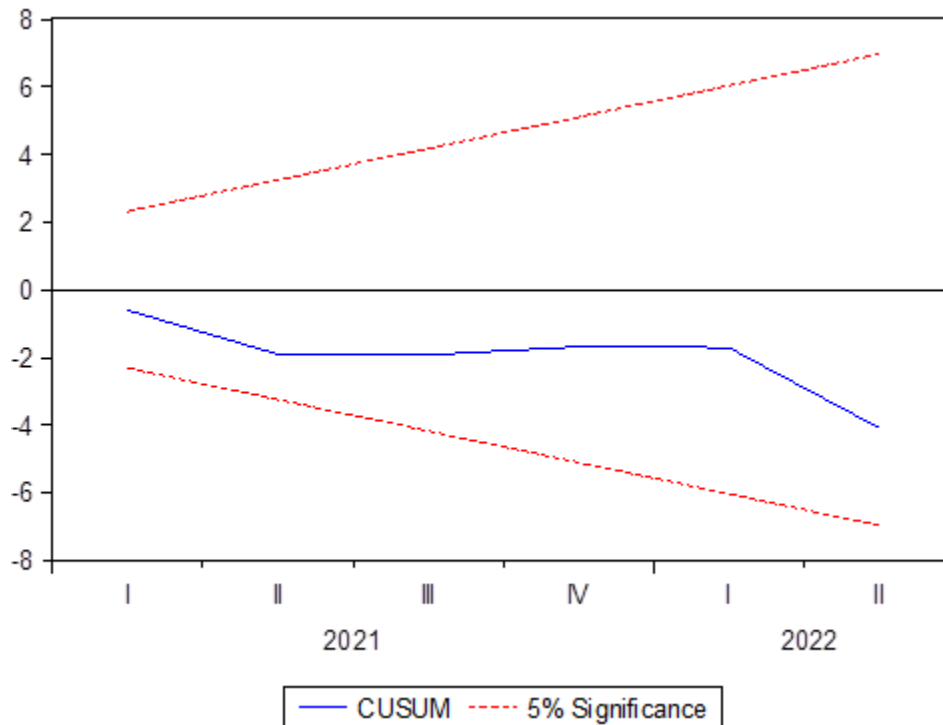
The null hypothesis states that the model is correctly specified. The observed probability of 0.1087 shows that the model is correctly specified given the probability being greater than the 0.05 level

of significance. We therefore fail to reject the null hypothesis and conclude that the model is correctly specified.

5.4.5 Test for Model Stability

The analysis made use of the CUSUM Test to check for model stability. The results of this analysis are shown in Figure 5.2 below:

Figure 0.2: CUSUM Test



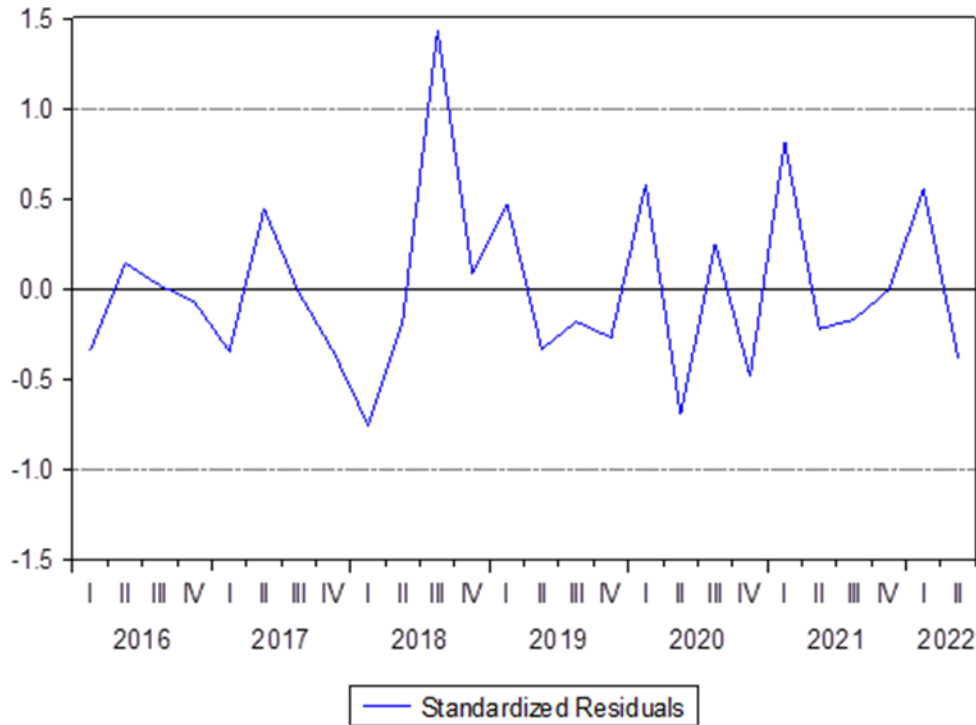
Source: Author (2022)

The results in Figure 5.2 above indicate the stability of the model and show that the model is stable at a 0.05 level of significance since the variation was within the stability bound for the time under consideration.

5.4.6 Test for Error Distribution

The Standardized Errors Test was conducted to check if the errors are randomly distributed.

Figure 0.3: Standardized Errors



Source: Author (2022)

The results in figure 5.3 above show that the errors are randomly distributed given the random fluctuations about 0.

5.5 Discussion of Research Findings

The aim of this study is to understand the contribution of each sector identified as key economic sectors in the Vision 2030 towards economic growth, with a bias towards understanding the contribution of the manufacturing sector in this regard. This analysis will validate the assertion and further provide information if there is a need to further efforts to enhance productivity in these sectors. Therefore, this study attempts to examine the relationship the manufacturing sector from the implementation of the Vision 2030 and their relation to economic growth in Zambia. Hence, multiple regression analysis was used to scrutinize the relationship between the dependent variable and the independent variables. The study has shown that there is a long-run relationship that exists between the dependent and the independent variables through the ARDL bounds test in which the observed F-statistic value of 13.21892 is above the upper bounds of 4.35 and 5.61 at 5% and 1% respectively. The study considered the long-run and short-run effects of the ARDL model between

the dependent and independent variables. The test statistic was the observed probability at 5% level of significance. The study found that in the long-run, INV ($p=0.2816$, $p>0.05$), L_INF ($p=0.1021$, $p>0.05$) and L_MANF ($p=0.4463$, $p>0.05$) were found to be statistically not significant.

In the short-run, the study considered the lag effects of Economic Growth (GDP), investment (INV), inflation (L_INF) and manufacturing sector output (L_MANF) to 3 lags inclusive of the current period. Based on CointEq(-1), the study found the existence of an equilibrium as the error correction term was found to be statistically significant ($p=0.0304$, $p<0.05$). This is confirmed by the negative coefficient of -0.538724 . The analysis has shown that on average the speed of adjustment to the equilibrium in the current period is 53.87% given disequilibrium. The study considered the relationship between GDP in the current period and GDP with a lag of 1, 2 and 3 periods. The study found that GDP(-1) and GDP(-2) are not significant ($p=0.2780$, $p>0.05$) and ($p=0.1434$, $p>0.05$) while GDP(-3) was found to be statistically significant ($p=0.00202$, $p<0.05$). At GDP(-3), the study found a positive relationship with a unit change in GDP in the current period resulting in a 1.327787 unit change in GDP(-3) on average. The study shows that in the short-run the relationship between INV and GDP is statistically insignificant in the current period INV ($p=0.1517$) and the lags INV(-1) ($p=0.0655$), INV(-2) ($p=0.0652$, $p>0.05$) and INV(-3) ($p=0.0821$, $p>0.05$). The relationship between INF and GDP in the current period was found to be statistically significant ($p=0.0314$, $p<0.05$) while the lags of inflation were found to be insignificant as L_INF(-1) ($p=0.1588$, $p>0.05$), L_INF(-2) ($p=0.2461$, $p>0.05$) and L_INF(-3) ($p=0.0876$, $p>0.05$). In the current period, a percentage change in inflation will result in a 7.947123 unit change in GDP on average.

The relationship between GDP and manufacturing sector output is found to be significant in the current period ($p=0.0071$, $p<0.05$) and L_MANF(-2) ($p=0.0220$, $p<0.05$). Both relationships were found to be positive with coefficients of 9.493345 and 14.190278. Therefore, a percentage change in L_MANF in the current period and L_MANF(-2) will result in a 9.493 and a 14.190 unit change in GDP in the current period respectively. The relationship between GDP and the manufacturing sector was found to not be statistically significant at L_MANF(-1) ($p=0.0971$, $p>0.05$) and L_MANF(-3) ($p=0.0220$, $p>0.05$). The study has further found the presence of unidirectional

causal relationships from GDP to Investment ($p=0.0184$, $p<0.05$) and from GDP to inflation ($p=0.0305$, $p<0.05$).

5.6 Theoretical, Empirical and Practical Implications of the Findings of the Study

The study has found that output from the manufacturing sector in Zambia is only statistically significant in the short-run and not in the long-run. Further, the findings have shown the lack of a causal relationship between GDP and the manufacturing sector output. Verdoorn's and Kaldor's Laws of Growth have argued that the rate of growth of GDP can be attributed to the growth in the manufacturing sector and exports. This has been found to be true in line with the argument that the positive relationship that has been found can be explained by the effects of manufacturing on productivity levels in the whole economy via the productivity of the labour force.

Further, it has also been argued that growth in the manufacturing sector is seen to also enhance growth in other sectors as the output is used as inputs (Scott, 1991). However, this study has only confirmed a statistically significant positive relationship in the short-run and not in the long run. The finding of a lack of a relationship in the long run may be justified by the assertions of Boldeanu and Constantinescu (2015) who argue that there is need for several factors to be in sync in order for a sustainable and progressive growth, and hence impact of the manufacturing sector on GDP in the long run.

Studies by Chizonde (2016) and Chirwa and Odhiambo (2017) did not outright classify the manufacturing sector as a key determinant of economic growth. However, this study can be argued to show the potential it has given an increase in investment in the sector which has been outlined by Chizonde (2016) and Chirwa and Odhiambo (2017) to have a positive implication on economic growth. This is supported by Hatoongo (2020) who argued that fixed capital formation would be long-run drivers of economic growth. Afolabi and Laseinde (2019) and Moyo and Jeke (2019) both found that manufacturing sector output has a positive impact on economic growth, however, they argued further that enhanced investment and utilization of manufacturing sector capital will further economic growth. Keho (2018) in their study of ECOWAS countries similarly proposed for structural transformation in favour of industrial production activities, with Attiah (2019) adding that the service industry does not have as positive and significant impacts on economic growth in developing countries. Haraguchi, et al (2016) argue the importance for sustained relevant

investment in the manufacturing sector as failures of manufacturing development in developing countries can be linked to the backdrop of rapid manufacturing development only to few developing countries.

However, in order to have a long-term effect of the manufacturing sector on economic growth, Cantone, et al (2014) argued in favour of intensive rather than extensive industrialization as it enhances economic growth and that not every dollar for additional industrialization matters for development. Hussin and Yik (2012) further support the argument that levels of development of the manufacturing sector would determine its extent and impact on economic growth. The study further finds that GDP has a delayed positive effect on GDP after a lag of three quarters and inflation has a positive effect on GDP in the current period. Both relationships have been found in the short-run, with there being a unidirectional relationship from GDP to inflation.

5.7 Chapter Summary

This chapter presented the results of the data analysis that was proposed in Chapter 4 methodology. This chapter has also discussed the findings of the study based on the ARDL econometric model that was adopted. The chapter has also outlined the steps taken in the determination of the model and the various diagnostic tests that were conducted. After presentation and discussion of the results, the chapter further sought to explain the findings based on the implications according to the theoretical and conceptual frameworks of the study outlined in Chapter 3 and the empirical literature review outlined in Chapter 2 to make inference based on the study.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

The Chapter Five considered the presentation of results of the data analysis, the discussion of the results and the interpretation of the results according to empirical and theoretical literature reviewed in the paper. This Chapter will therefore summaries the findings of the study and will make a conclusion and recommendations for further studies and policy.

6.1 Summary of Findings

The study made use of the ARDL model in its regression analysis which was determined by stationarity of a mix of I(0) and I(1) variables. The ARDL was found to have an Adjusted R-squared of 0.863781, therefore indicating that 86.38% of variations of the dependent variable in the model are explained by the independent variables. The ARDL Bounds Test further found the presence of long-term cointegration between the variables as the observed F-statistic value of 13.21892 was found to be greater than the upper bound of 4.35 and 5.61 at 5% and 1% level of significance respectively. The study found that in the long-run, INV ($p=0.2816$, $p>0.05$), L_INF ($p=0.1021$, $p>0.05$) and L_MANF ($p=0.4463$, $p>0.05$) all the variables were found to be statistically not significant.

In the short-run, the study found the existence of an equilibrium as the error correction term (CointEq(-1)) was found to be statistically significant ($p=0.0304$, $p<0.05$). This was confirmed by the negative coefficient of -0.538724. In the short run, the study found that GDP(-3) was found to be statistically significant ($p=0.00202$, $p<0.05$), INF in the current period was found to be statistically significant ($p=0.0314$, $p<0.05$) and The relationship between GDP and manufacturing sector output is found to be significant in the current period ($p=0.0071$, $p<0.05$) and L_MANF(-2) ($p=0.0220$, $p<0.05$). Both relationships were found to be positive with coefficients of 9.493345 and 14.190278. The study has further found the presence of unidirectional causal relationships from GDP to Investment ($p=0.0184$, $p<0.05$) and from GDP to inflation ($p=0.0305$, $p<0.05$).

6.2 Conclusion

The main aim of the paper was to establish the role of the manufacturing sector in Zambia's economic growth. The focus of the paper was based on the impact that the Vision 2030 which is

Zambia's long-term plan has had on the contribution of the manufacturing sector to economic growth. As the Vision 2030 was introduced in 2006, annual data would provide for a limited scope, therefore the study made use of quarterly data from 2014Q1 to 2021Q4. The study has found that there is no statistically significant relationship between GDP and manufacturing sector output in the long-run.

However, the study has found that there is a short-run positive effect of manufacturing sector output on GDP in the current period and with a lag of two periods. Therefore, the manufacturing sector output is a short-run determinant of GDP. This however, is argued to be not ideal as the Vision 2030 promotes long-term growth. Therefore, studies have shown that the manufacturing sector coupled with exports has the potential to accelerate sustainable economic growth in developing countries like Zambia. Therefore, it is proposed that there is need for sustained relevant investment in the manufacturing sector in order to yield long-term positive effects.

6.3 Recommendations

- i. There is need for the Government to create a conducive environment that allows for the export of manufacturing output from Zambia. This is for the purpose of ensuring long-term sustainable growth as outlined in the study. Therefore, the paper recommends Government to make deliberate efforts through international MOUs to establish trade agreements with neighboring and other countries. This will also have the anticipated effect of further growing the manufacturing sector this will promote investment; given that this sector will be seen as a viable investment.
- ii. Government should seek to ensure a growth in investment in the manufacturing sector both from domestic and international investors by ensuring a conducive environment. Aside from creating an export market for the output from the manufacturing sector, the Government can also continue to foster the creation of policies and laws that favor the growth of the manufacturing sector, appealing to both local and international investors. However, these laws must be made in a deliberate manner in order that they result in long-term profits to the investors, but also have increasing returns towards the growth of the economy.
- iii. The Government should continue to prioritize the growth of the manufacturing sector by also providing a local market for the goods produced in the country. This can be done

through initiatives that promote local products over imported products. This will also have the likely effect of ensuring the long-run positive effect of the manufacturing sector on economic growth in Zambia which the study has found is not statistically significant.

6.4 Limitations of the Study

The study considered the use of annual timeseries data which is readily available. However, since the Vision 2030 was introduced in 2006, there would be insufficient data available for a regression analysis as there is a requirement of a minimum of 30 observations. The study therefore made use of quarterly time series data which was limited based on availability. Further, the study also sought to establish the contribution of exports to GDP according to theoretical literature, however the process of establishing the model required the variable be removed.

6.5 Suggestions for Further Research

- i. There is need to establish how the Agriculture sector and the Tourism sector have contributed to economic growth and GDP in Zambia since the introduction of the Vision 2030.
- ii. There is need to establish the relationship between exports and the manufacturing sector output in Zambia. This is based on the premise that the manufacturing sector and an export market have the ability to drive economic growth in an economy.
- iii. The study has shown that the manufacturing sector has the capacity to drive other sectors to development as its output is used as inputs in these sectors. There is need for a study to ascertain the relationship between the manufacturing sector and other sectors in Zambia.

6.6 Chapter Summary

Chapter Six has summarized the findings of the data analysis and presented a conclusion of this analysis based on the findings and literature reviewed, both empirical and theoretical. The chapter has further outlined the recommendations of the study towards policy and for further studies based on the conclusion and the discussion from Chapter five of the paper.

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APPENDIX A – E-VIEWS OUTPUT

	GDP	INV	INF	MANF
Mean	2.483333	114.4570	12.69667	5199.657
Median	3.100000	150.4483	10.10000	3350.550
Maximum	8.400000	681.1294	24.60000	14096.00
Minimum	-5.600000	-1074.828	6.100000	2482.200
Std. Dev.	2.734087	295.0397	6.180363	3398.455
Skewness	-1.066260	-2.002879	0.573181	1.132592
Kurtosis	4.871032	10.10385	1.782194	3.070193
Jarque-Bera Probability	10.06050 0.006537	83.13845 0.000000	3.496500 0.174078	6.419977 0.040357
Sum	74.50000	3433.709	380.9000	155989.7
Sum Sq. Dev.	216.7817	2524404.	1107.710	3.35E+08
Observations	30	30	30	30

Null Hypothesis: GDP has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=0)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.647499	0.0954
Test critical values:		
1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(GDP)
 Method: Least Squares
 Date: 10/22/22 Time: 23:33
 Sample (adjusted): 2015Q2 2022Q2
 Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	-0.408373	0.154248	-2.647499	0.0134
C	0.979119	0.565325	1.731959	0.0947
R-squared	0.206098	Mean dependent var		-0.020690
Adjusted R-squared	0.176695	S.D. dependent var		2.496766
S.E. of regression	2.265470	Akaike info criterion		4.539914
Sum squared resid	138.5736	Schwarz criterion		4.634210
Log likelihood	-63.82875	Hannan-Quinn criter.		4.569446
F-statistic	7.009249	Durbin-Watson stat		2.016878
Prob(F-statistic)	0.013371			

Null Hypothesis: D(GDP) has a unit root

Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=0)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-6.439794	0.0000
Test critical values:		
1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GDP,2)
Method: Least Squares
Date: 10/22/22 Time: 23:34
Sample (adjusted): 2015Q3 2022Q2
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	-1.227965	0.190684	-6.439794	0.0000
C	0.016674	0.473800	0.035192	0.9722
R-squared	0.614649	Mean dependent var		0.100000
Adjusted R-squared	0.599828	S.D. dependent var		3.961762
S.E. of regression	2.506177	Akaike info criterion		4.744144
Sum squared resid	163.3041	Schwarz criterion		4.839301
Log likelihood	-64.41801	Hannan-Quinn criter.		4.773234
F-statistic	41.47095	Durbin-Watson stat		1.964607
Prob(F-statistic)	0.000001			

Null Hypothesis: INV has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-5.582540	0.0001
Test critical values:		
1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(INV)
Method: Least Squares
Date: 10/22/22 Time: 23:35
Sample (adjusted): 2015Q2 2022Q2
Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INV(-1)	-1.059010	0.189700	-5.582540	0.0000
C	110.8906	59.41459	1.866386	0.0729
R-squared	0.535801	Mean dependent var		-4.657906

Adjusted R-squared	0.518609	S.D. dependent var	432.2633
S.E. of regression	299.9145	Akaike info criterion	14.31134
Sum squared resid	2428614.	Schwarz criterion	14.40564
Log likelihood	-205.5145	Hannan-Quinn criter.	14.34088
F-statistic	31.16475	Durbin-Watson stat	1.990827
Prob(F-statistic)	0.000006		

Null Hypothesis: L_INF has a unit root
 Exogenous: Constant
 Lag Length: 1 (Automatic - based on AIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.419554	0.1457
Test critical values:		
1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(L_INF)
 Method: Least Squares
 Date: 10/22/22 Time: 23:35
 Sample (adjusted): 2015Q3 2022Q2
 Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
L_INF(-1)	-0.266762	0.110252	-2.419554	0.0231
D(L_INF(-1))	0.390447	0.184328	2.118216	0.0443
C	0.656602	0.273948	2.396819	0.0243

R-squared	0.246138	Mean dependent var	0.011144
Adjusted R-squared	0.185829	S.D. dependent var	0.296771
S.E. of regression	0.267780	Akaike info criterion	0.303657
Sum squared resid	1.792657	Schwarz criterion	0.446393
Log likelihood	-1.251201	Hannan-Quinn criter.	0.347293
F-statistic	4.081290	Durbin-Watson stat	2.148044
Prob(F-statistic)	0.029251		

Null Hypothesis: D(L_INF) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.779036	0.0081
Test critical values:		
1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(L_INF,2)
 Method: Least Squares
 Date: 10/22/22 Time: 23:36
 Sample (adjusted): 2015Q3 2022Q2
 Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(L_INF(-1))	-0.730428	0.193284	-3.779036	0.0008
C	0.005247	0.055290	0.094898	0.9251
R-squared	0.354536	Mean dependent var		-0.010732
Adjusted R-squared	0.329711	S.D. dependent var		0.356302
S.E. of regression	0.291709	Akaike info criterion		0.442627
Sum squared resid	2.212443	Schwarz criterion		0.537784
Log likelihood	-4.196778	Hannan-Quinn criter.		0.471718
F-statistic	14.28111	Durbin-Watson stat		1.970552
Prob(F-statistic)	0.000830			

Null Hypothesis: L_MANF has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	1.064587	0.9962
Test critical values:		
1% level	-3.679322	
5% level	-2.967767	
10% level	-2.622989	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(L_MANF)
 Method: Least Squares
 Date: 10/22/22 Time: 23:36
 Sample (adjusted): 2015Q2 2022Q2
 Included observations: 29 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
L_MANF(-1)	0.042578	0.039995	1.064587	0.2965
C	-0.295134	0.334183	-0.883152	0.3850
R-squared	0.040285	Mean dependent var		0.059888
Adjusted R-squared	0.004740	S.D. dependent var		0.116644
S.E. of regression	0.116367	Akaike info criterion		-1.397664
Sum squared resid	0.365614	Schwarz criterion		-1.303367
Log likelihood	22.26612	Hannan-Quinn criter.		-1.368131

F-statistic 1.133345 Durbin-Watson stat 1.998197
 Prob(F-statistic) 0.296491

Null Hypothesis: D(L_MANF) has a unit root
 Exogenous: Constant
 Lag Length: 0 (Automatic - based on AIC, maxlag=7)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.690993	0.0008
Test critical values: 1% level	-3.689194	
5% level	-2.971853	
10% level	-2.625121	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
 Dependent Variable: D(L_MANF,2)
 Method: Least Squares
 Date: 10/22/22 Time: 23:37
 Sample (adjusted): 2015Q3 2022Q2
 Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(L_MANF(-1))	-0.978665	0.208626	-4.690993	0.0001
C	0.060004	0.025316	2.370204	0.0255
R-squared	0.458394	Mean dependent var		0.008723
Adjusted R-squared	0.437563	S.D. dependent var		0.161111
S.E. of regression	0.120826	Akaike info criterion		-1.320180
Sum squared resid	0.379572	Schwarz criterion		-1.225023
Log likelihood	20.48252	Hannan-Quinn criter.		-1.291090
F-statistic	22.00541	Durbin-Watson stat		1.888286
Prob(F-statistic)	0.000076			

Dependent Variable: GDP
 Method: ARDL
 Date: 10/22/22 Time: 23:38
 Sample (adjusted): 2016Q1 2022Q2
 Included observations: 26 after adjustments
 Maximum dependent lags: 4 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)
 Dynamic regressors (4 lags, automatic): INV L_INF L_MANF
 Fixed regressors: C
 Number of models evaluated: 500
 Selected Model: ARDL(4, 4, 4, 4)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.753672	0.172720	4.363555	0.0048
GDP(-2)	0.082080	0.285235	0.287763	0.7832
GDP(-3)	0.953312	0.338169	2.819042	0.0304
GDP(-4)	-1.327787	0.255178	-5.203368	0.0020
INV	0.002696	0.001642	1.642152	0.1517
INV(-1)	0.004903	0.002342	2.093052	0.0813
INV(-2)	0.005123	0.002278	2.249064	0.0655
INV(-3)	0.004743	0.002105	2.253190	0.0652
INV(-4)	-0.007081	0.003395	-2.085592	0.0821

L_INF	7.947123	2.843808	2.794536	0.0314
L_INF(-1)	-3.839227	2.645654	-1.451145	0.1969
L_INF(-2)	-3.091930	1.922084	-1.608634	0.1588
L_INF(-3)	2.461281	1.915281	1.285076	0.2461
L_INF(-4)	2.837800	1.391772	2.038983	0.0876
L_MANF	9.493345	2.373091	4.000412	0.0071
L_MANF(-1)	-10.78715	4.650993	-2.319323	0.0595
L_MANF(-2)	8.917296	4.539770	1.964262	0.0971
L_MANF(-3)	-14.19028	4.625917	-3.067560	0.0220
L_MANF(-4)	3.872616	2.839896	1.363647	0.2216
C	7.080568	23.23351	0.304757	0.7708
R-squared	0.967307	Mean dependent var	2.411538	
Adjusted R-squared	0.863781	S.D. dependent var	2.904387	
S.E. of regression	1.071949	Akaike info criterion	3.048958	
Sum squared resid	6.894445	Schwarz criterion	4.016725	
Log likelihood	-19.63645	Hannan-Quinn criter.	3.327640	
F-statistic	9.343545	Durbin-Watson stat	2.465390	
Prob(F-statistic)	0.005417			

*Note: p-values and any subsequent tests do not account for model selection.

ARDL Bounds Test

Date: 10/22/22 Time: 23:39

Sample: 2016Q1 2022Q2

Included observations: 26

Null Hypothesis: No long-run relationships exist

Test Statistic	Value	k
F-statistic	13.21892	3

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Test Equation:

Dependent Variable: D(GDP)

Method: Least Squares

Date: 10/22/22 Time: 23:39

Sample: 2016Q1 2022Q2

Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.292396	0.245133	1.192803	0.2780
D(GDP(-2))	0.374476	0.222546	1.682689	0.1434
D(GDP(-3))	1.327787	0.255178	5.203368	0.0020
D(INV)	0.002696	0.001642	1.642152	0.1517
D(INV(-1))	-0.002785	0.006348	-0.438660	0.6763

D(INV(-2))	0.002339	0.004815	0.485705	0.6444
D(INV(-3))	0.007081	0.003395	2.085592	0.0821
D(L_INF)	7.947123	2.843808	2.794536	0.0314
D(L_INF(-1))	-2.207150	1.566309	-1.409141	0.2085
D(L_INF(-2))	-5.299081	1.353689	-3.914548	0.0079
D(L_INF(-3))	-2.837800	1.391772	-2.038983	0.0876
D(L_MANF)	9.493345	2.373091	4.000412	0.0071
D(L_MANF(-1))	1.400365	2.691661	0.520261	0.6215
D(L_MANF(-2))	10.31766	3.661682	2.817739	0.0304
D(L_MANF(-3))	-3.872616	2.839896	-1.363647	0.2216
C	7.080568	23.23351	0.304757	0.7708
INV(-1)	0.010384	0.009545	1.087863	0.3184
L_INF(-1)	6.315047	1.498051	4.215509	0.0056
L_MANF(-1)	-2.694176	2.832642	-0.951118	0.3783
GDP(-1)	-0.538724	0.191173	-2.817984	0.0304

R-squared	0.958072	Mean dependent var	0.084615
Adjusted R-squared	0.825298	S.D. dependent var	2.564635
S.E. of regression	1.071949	Akaike info criterion	3.048958
Sum squared resid	6.894445	Schwarz criterion	4.016725
Log likelihood	-19.63645	Hannan-Quinn criter.	3.327640
F-statistic	7.215851	Durbin-Watson stat	2.465390
Prob(F-statistic)	0.010765		

ARDL Cointegrating And Long Run Form

Dependent Variable: GDP

Selected Model: ARDL(4, 4, 4, 4)

Date: 10/22/22 Time: 23:39

Sample: 2015Q1 2022Q2

Included observations: 26

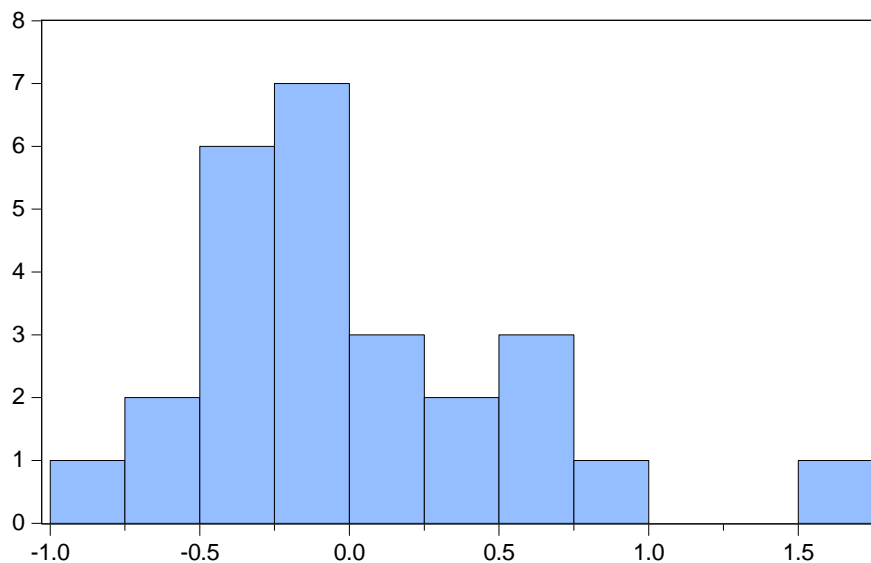
Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GDP(-1))	0.292396	0.245133	1.192803	0.2780
D(GDP(-2))	0.374476	0.222546	1.682689	0.1434
D(GDP(-3))	1.327787	0.255178	5.203368	0.0020
D(INV)	0.002696	0.001642	1.642152	0.1517
D(INV(-1))	-0.005123	0.002278	-2.249064	0.0655
D(INV(-2))	-0.004743	0.002105	-2.253190	0.0652
D(INV(-3))	0.007081	0.003395	2.085592	0.0821
D(L_INF)	7.947123	2.843808	2.794536	0.0314
D(L_INF(-1))	3.091930	1.922084	1.608634	0.1588
D(L_INF(-2))	-2.461281	1.915281	-1.285076	0.2461
D(L_INF(-3))	-2.837800	1.391772	-2.038983	0.0876
D(L_MANF)	9.493345	2.373091	4.000412	0.0071
D(L_MANF(-1))	-8.917296	4.539770	-1.964262	0.0971
D(L_MANF(-2))	14.190278	4.625917	3.067560	0.0220
D(L_MANF(-3))	-3.872616	2.839896	-1.363647	0.2216
CointEq(-1)	-0.538724	0.191173	-2.817984	0.0304

$$\text{Cointeq} = \text{GDP} - (0.0193 \cdot \text{INV} + 11.7222 \cdot \text{L_INF} - 5.0010 \cdot \text{L_MANF} + 13.1432)$$

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INV	0.019274	0.016293	1.182982	0.2816
L_INF	11.722240	6.080414	1.927869	0.1021
L_MANF	-5.001036	6.137195	-0.814873	0.4463
C	13.143232	44.692779	0.294080	0.7786



Series: Residuals	
Sample 2016Q1 2022Q2	
Observations 26	
Mean	-2.26e-14
Median	-0.129214
Maximum	1.537713
Minimum	-0.807621
Std. Dev.	0.525145
Skewness	1.016800
Kurtosis	4.100671
Jarque-Bera	5.792590
Probability	0.055227

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.460406	Prob. F(2,4)	0.6608
Obs*R-squared	4.865274	Prob. Chi-Square(2)	0.0878

Test Equation:

Dependent Variable: RESID

Method: ARDL

Date: 10/22/22 Time: 23:41

Sample: 2016Q1 2022Q2

Included observations: 26

Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP(-1)	0.104536	0.220753	0.473541	0.6605
GDP(-2)	-0.069845	0.332846	-0.209842	0.8440
GDP(-3)	-0.083256	0.383489	-0.217100	0.8388
GDP(-4)	0.159069	0.327268	0.486050	0.6524
INV	-0.000836	0.002086	-0.401050	0.7089
INV(-1)	-0.000690	0.003094	-0.223165	0.8343
INV(-2)	-0.001334	0.003010	-0.443043	0.6806
INV(-3)	-0.000614	0.002507	-0.244762	0.8187
INV(-4)	0.000286	0.003880	0.073807	0.9447
L_INF	-1.211368	3.384447	-0.357922	0.7385
L_INF(-1)	1.397570	3.270593	0.427314	0.6911
L_INF(-2)	-0.052281	2.163923	-0.024160	0.9819
L_INF(-3)	-0.616217	2.242208	-0.274826	0.7971
L_INF(-4)	-0.004322	1.542023	-0.002803	0.9979
L_MANF	1.640918	3.917627	0.418855	0.6968
L_MANF(-1)	-1.630590	5.641121	-0.289054	0.7869
L_MANF(-2)	-0.611166	5.194474	-0.117657	0.9120
L_MANF(-3)	0.674898	5.294793	0.127464	0.9047
L_MANF(-4)	-0.414735	3.852052	-0.107666	0.9194
C	3.890467	28.42427	0.136871	0.8977
RESID(-1)	-0.748153	0.781279	-0.957600	0.3925
RESID(-2)	-0.294360	1.137491	-0.258780	0.8086
R-squared	0.187126	Mean dependent var	-2.26E-14	
Adjusted R-squared	-4.080463	S.D. dependent var	0.525145	
S.E. of regression	1.183672	Akaike info criterion	2.995625	
Sum squared resid	5.604315	Schwarz criterion	4.060168	
Log likelihood	-16.94313	Hannan-Quinn criter.	3.302175	
F-statistic	0.043848	Durbin-Watson stat	2.154727	
Prob(F-statistic)	1.000000			

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.294353	Prob. F(19,6)	0.9810
Obs*R-squared	12.54326	Prob. Chi-Square(19)	0.8611
Scaled explained SS	1.035600	Prob. Chi-Square(19)	1.0000

Test Equation:

Dependent Variable: RESID^2

Method: Least Squares

Date: 10/22/22 Time: 23:41

Sample: 2016Q1 2022Q2

Included observations: 26

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.77087	15.15615	-0.776640	0.4669
GDP(-1)	0.036396	0.112672	0.323027	0.7576

GDP(-2)	-0.071969	0.186070	-0.386786	0.7123
GDP(-3)	-0.132505	0.220601	-0.600654	0.5700
GDP(-4)	0.082903	0.166463	0.498027	0.6362
INV	0.000398	0.001071	0.371341	0.7231
INV(-1)	0.001201	0.001528	0.786232	0.4616
INV(-2)	0.000300	0.001486	0.201598	0.8469
INV(-3)	0.000902	0.001373	0.656881	0.5356
INV(-4)	0.001466	0.002215	0.662030	0.5325
L_INF	-1.202778	1.855130	-0.648352	0.5408
L_INF(-1)	0.307903	1.725866	0.178405	0.8643
L_INF(-2)	-0.028920	1.253853	-0.023065	0.9823
L_INF(-3)	-0.127761	1.249414	-0.102257	0.9219
L_INF(-4)	-0.111981	0.907909	-0.123339	0.9059
L_MANF	-1.569790	1.548063	-1.014035	0.3497
L_MANF(-1)	2.767533	3.034029	0.912164	0.3969
L_MANF(-2)	-2.099737	2.961474	-0.709018	0.5049
L_MANF(-3)	2.250005	3.017671	0.745610	0.4841
L_MANF(-4)	0.433335	1.852578	0.233909	0.8228
<hr/>				
R-squared	0.482433	Mean dependent var	0.265171	
Adjusted R-squared	-1.156529	S.D. dependent var	0.476179	
S.E. of regression	0.699275	Akaike info criterion	2.194580	
Sum squared resid	2.933914	Schwarz criterion	3.162346	
Log likelihood	-8.529535	Hannan-Quinn criter.	2.473261	
F-statistic	0.294353	Durbin-Watson stat	2.366246	
Prob(F-statistic)	0.981046			

Ramsey RESET Test

Equation: UNTITLED

Specification: GDP GDP(-1) GDP(-2) GDP(-3) GDP(-4) INV INV(-1)

INV(-2) INV(-3) INV(-4) L_INF L_INF(-1) L_INF(-2) L_INF(-3) L_INF(-

4) L_MANF L_MANF(-1) L_MANF(-2) L_MANF(-3) L_MANF(-4) C

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.949707	5	0.1087
F-statistic	3.801358	(1, 5)	0.1087

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	2.977751	1	2.977751
Restricted SSR	6.894445	6	1.149074
Unrestricted SSR	3.916694	5	0.783339

Unrestricted Test Equation:

Dependent Variable: GDP

Method: ARDL

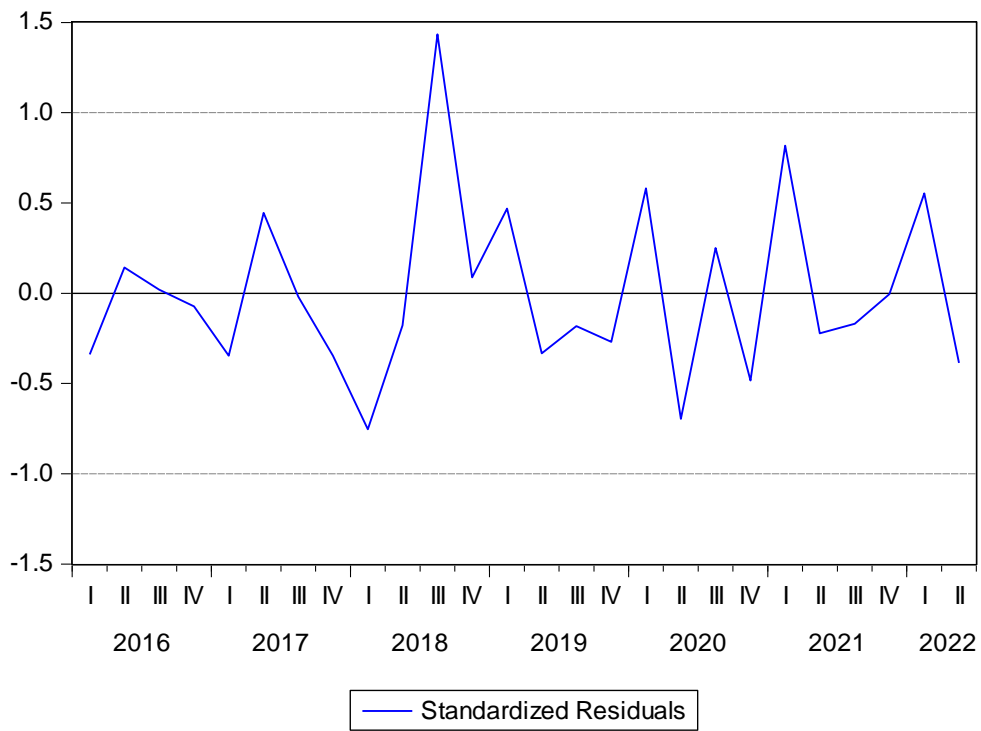
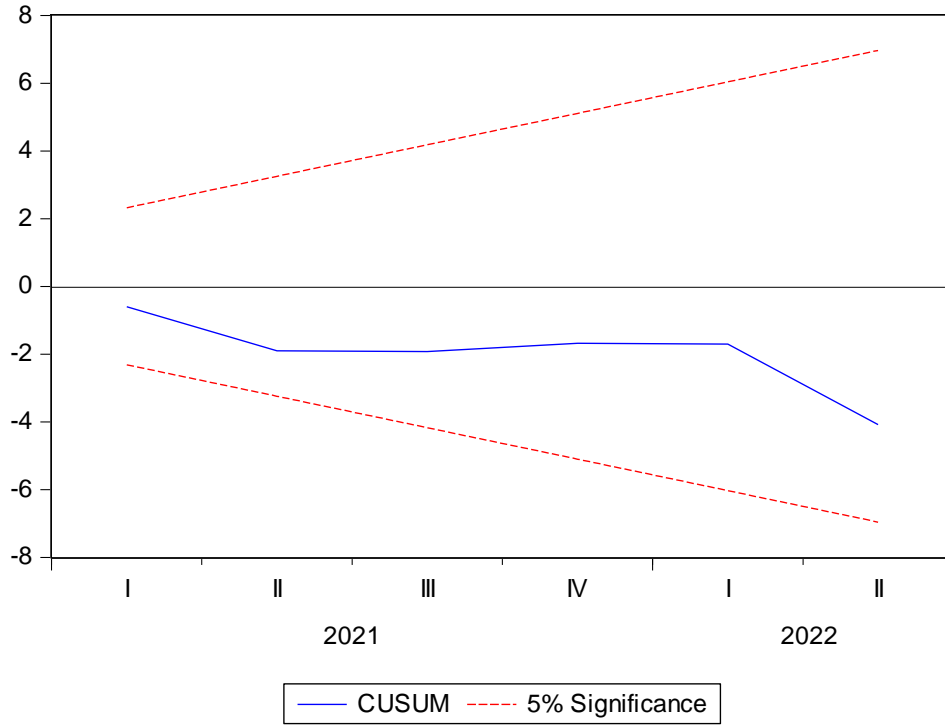
Date: 10/22/22 Time: 23:41

Sample: 2016Q1 2022Q2

Included observations: 26
Maximum dependent lags: 4 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (4 lags, automatic):
Fixed regressors: C

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.916203	0.165185	5.546523	0.0026
GDP(-2)	-0.053614	0.245575	-0.218321	0.8358
GDP(-3)	1.337078	0.341618	3.913962	0.0113
GDP(-4)	-1.755555	0.304183	-5.771377	0.0022
INV	0.001109	0.001581	0.701611	0.5142
INV(-1)	0.003676	0.002034	1.807218	0.1305
INV(-2)	0.004491	0.001909	2.352938	0.0653
INV(-3)	0.004922	0.001740	2.828021	0.0368
INV(-4)	-0.011207	0.003512	-3.190722	0.0242
L_INF	10.52284	2.694147	3.905815	0.0113
L_INF(-1)	-4.433927	2.205601	-2.010303	0.1006
L_INF(-2)	-4.674485	1.782516	-2.622408	0.0470
L_INF(-3)	3.493184	1.667586	2.094754	0.0904
L_INF(-4)	2.642215	1.153500	2.290607	0.0706
L_MANF	11.86317	2.305752	5.145032	0.0036
L_MANF(-1)	-17.13616	5.034947	-3.403443	0.0192
L_MANF(-2)	11.61078	3.994779	2.906488	0.0335
L_MANF(-3)	-17.77606	4.239161	-4.193297	0.0085
L_MANF(-4)	6.142929	2.618003	2.346418	0.0659
C	27.55835	21.87005	1.260095	0.2632
FITTED^2	-0.062426	0.032018	-1.949707	0.1087
R-squared	0.981427	Mean dependent var	2.411538	
Adjusted R-squared	0.907137	S.D. dependent var	2.904387	
S.E. of regression	0.885064	Akaike info criterion	2.560413	
Sum squared resid	3.916694	Schwarz criterion	3.576568	
Log likelihood	-12.28537	Hannan-Quinn criter.	2.853029	
F-statistic	13.21075	Durbin-Watson stat	2.346890	
Prob(F-statistic)	0.004733			

*Note: p-values and any subsequent tests do not account for model selection.



Pairwise Granger Causality Tests

Date: 10/22/22 Time: 23:29

Sample: 2015Q1 2022Q2

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
INV does not Granger Cause GDP	28	2.77374	0.0833
GDP does not Granger Cause INV		4.77397	0.0184
L_INF does not Granger Cause GDP	28	0.26055	0.7729
GDP does not Granger Cause L_INF		4.07597	0.0305
L_MANF does not Granger Cause GDP	28	0.04128	0.9596
GDP does not Granger Cause L_MANF		1.75153	0.1959
L_INF does not Granger Cause INV	28	1.59307	0.2249
INV does not Granger Cause L_INF		0.07209	0.9307
L_MANF does not Granger Cause INV	28	2.55384	0.0996
INV does not Granger Cause L_MANF		0.37149	0.6938
L_MANF does not Granger Cause L_INF	28	0.47243	0.6294
L_INF does not Granger Cause L_MANF		0.24434	0.7852