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A Study of the Role of the Manufacturing Sector in Zambia's Economic Growth – A Quantitative Approach

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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 Vision 2030 towards economic growth, with a bias towards understanding the contribution of the manufacturing sector to economic growth. The study made use of quarterly time-series quantitative secondary data from 2014Q1 to 2021Q4 that was analyzed 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 has 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.

Keywords-- Economic Growth, Manufacturing, Economic Drivers, Key Sectors, Sustainable Growth

I. INTRODUCTION

Garidzirai and Muzindutsi (2020) highlight 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 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, the mining sector, and the tourism sector.

The manufacturing sector in Zambia is said to account for nearly 8 percent 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 the 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

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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 several 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).

The 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, and 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 policymakers in Western economies argue for the need to rebalance economies from an overreliance 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).

Statement of the Problem

Several studies have shown that the Manufacturing sector has a 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 can 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 sector's competitiveness can be accelerated leading to the achievement of sustainable and inclusive development in the country. However, for this study, the paper will focus on the manufacturing sector and its contribution to attaining 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, this study aims to understand the contribution of each sector identified as a key economic sector in Vision 2030 toward 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 for further efforts to enhance productivity in these sectors.

Main Hypothesis

H_o: There is no effect of the manufacturing sector on Zambia's economic growth.

H_a: There is a positive effect of the manufacturing sector on Zambia's economic growth.

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.

II. EMPIRICAL LITERATURE REVIEW

Hatoongo (2020) 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 while money supply and exchange rate are short-run drivers of output growth. The study outlines further that while domestic physical capital accumulation is good for an economy, employment is a key player and should be given significant focus on 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

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Central Bank of Nigeria statistical bulletin for the 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 periods. This technique further also catered to 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 policymakers 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-industrialization 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 positive 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.

III. THEORETICAL LITERATURE REVIEW

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 to 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 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

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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 the existence of economies of scale in manufacturing. The second law states that labor productivity is positively related to the growth rate of the 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 the manufacturing sector is argued to increase productivity in the 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 in 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 in manufacturing enhances demand for services such as 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).

IV. RESEARCH METHODOLOGY

Research Design

This study made use of a descriptive research design to analyze 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.

Population of the Study

The populations of interest included macroeconomic data on Zambia on Economic Growth, the Manufacturing Sector output, the Inflation rate, and Investment.

Sample and Sampling Procedure

Due to the limited data available, the study considered quarterly data obtained from the ZamStats (2022) and ranged from 2014Q1 to 2021Q4. The data used was time-series quarterly quantitative data.

Data Collection

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). The following quarterly data in the period of interest was collected:

1. Manufacturing Sector
2. Economic growth
3. Inflation rate
4. Investment

Data Analysis

To analyze the data, the study made use of the model as defined by Hussin and Ching (2013) and Popkova, E.G., Haabazoka, L. (2019). which is the autoregressive distributed lag (ARDL) model. To ensure the 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 this 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 (Larina, L.B., et. al, 2021). The study made use of E-Views statistical analysis software.

Model Specification

The research methodology focuses on the contribution of the manufacturing economic sector to the economic growth of Zambia. As has been highlighted, the selection of the key sectors is following the Government's long-term economic plan, Vision 2030 (GRZ, 2006). Therefore, this study examined the relationship between the

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manufacturing sector from the implementation of Vision 2030 and its relation to economic growth in Zambia. Hence, multiple regression analysis was used to scrutinize the relationship between the dependent variable and the independent variables (Mwanaumo, E.M., et. al, 2020).

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, it is 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, it is 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,

$i = 1, 2\ldots., N$, $t = 1, 2\ldots., T$

Where:

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

V. RESEARCH RESULTS AND ANALYSIS

Descriptive Statistics

Table 1 below presents statistical summaries of variables under study over the period of interest produced by E-Views version 9 software.

	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

Table 1: Descriptive Statistics

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.

Test for Stationarity

The results from the test for stationarity are outlined in Table 2, produced by E-views version 9 software. 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. The study made use of observed probability at 5% level of significance.

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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

Table 1: Augmented Dickey-Fuller Root Test

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.

Model Estimation

Autoregressive Distributive Lag (ARDL) Model

Table 3 below shows the key statistics from the ARDL model that was used in the analysis:

R-squared	**0.967307**
Adjusted R-squared	0.863781

Table 2: Autoregressive Distributive Lag (ARDL) model

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.

Test for Long-Run Cointegration

Table 4, produced by E-views version 9 software, was the result for the test for the presence of a long run relationship in the model using the 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

Table 4: ARDL Bounds Test

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.

ARDL Long-run Relationship

Table 5, obtained from E-views version 9 software, presents the long-run coefficients and effect of the model. 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.

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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

Table 5: ARDL Long Run Coefficients

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.

To appropriately model the effect of capital structure along with each control variable on commercial bank performance, the Lagrange Multiplier Test of Random Effects and the Hauseman Tests were conducted.

ARDL Short Run Relationship

Table 6, from an E-views version 9 output, presents the cointegrating form which is used to express the short-run coefficients and effect of the model. 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.

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

Table 6: Short Run Coefficients

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 a 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 a 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.

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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

Causality Test

The Pairwise Granger Causality Test was used to check for a causal relationship between the dependent and independent variables as produced by E-views version 9 software as indicated in Table 7.

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

Table 7: Pairwise Granger Causality

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 two unidirectional causal relationships are significant at a 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 the observed probability of 0.0184 and 0.0305 respectively.

VI. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

This study aimed to examine the relationship between the manufacturing sector from the implementation of Vision 2030 and the 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 a 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)

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(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).

Conclusions

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 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.

Recommendations

The study made the following recommendations based on the findings and the discussion:

- Government should seek to ensure a growth in investment in the manufacturing sector both from domestic and international investors by ensuring a conducive environment.
- The Government should ensure an export market is made available for the output from the manufacturing sector as this will promote investment.
- The Government should continue to prioritize the growth of the manufacturing sector through continued relevant intensive investment.

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