JDE (Journal of Developing Economies)
https://e-journal.unair.ac.id/JDE/index

THE IMPACT OF INDUSTRIALISATION ON ZAMBIA'S ECONOMIC GROWTH

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ABSTRACT

This research study examines the impact of industrialisation on economic growth in Zambia. The study utilised secondary data from Zambian Central Bank and Word-Bank data statistics. The research did specify the model, where GDP was dependent (outcome) variable whereas, FDI, industrial-output, interest rate, inflation and currency exchange rate were the independent (predictor) variables. Regression-analysis was used to analyse data using Jamovi-software. The study presents that industrialisation has a positive significant impact on Zambia's economic growth.

Keywords: *Industrialisation, Economic Growth, Zambia*
JEL : O14; F43; O47

ARTICLE INFO

Received: February 17th, 2023
Revised: March 21th, 2023
Accepted: April 3rd, 2023
Online: June 15th, 2023

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To cite this document: Yangailo, T. & Chambani, T. (2023). The Impact of Industrialisation on Zambia's Economic Growth. *JDE (Journal of Developing Economies)*, 8(1), 153-161. https://doi.org/10.20473/jde.v8i1.43514

Introduction

In Zambia, there have been efforts by successive governments to explore how the country might maximise benefits from diversification and industrialisation (Mulimbika & Karim, 2018). This is the reason why industrial development has had been placed at the core of Zambia's development agenda. The formulation of the National Industrial Policy in 2018 was motivated by aspirations of the Zambia's Vision, the aim of which is to transform Zambia into a prosperous middle-income economy by 2030.

Many economists have been prompted to formulate different theories to encourage industrialisation because of the industrial sector's tendency of stimulating more economic growth. Among the early famous theories are: theory of low equilibrium trap by Nelson; Leibenstein's theory of critical minimum effort thesis of Leibensein, (1957); balance growth doctrine; unbalance growth doctrine of Hirschman (1958); the theory of big push of Rosenstein-Rodan (1943) etc. The influence of these theories on policy decisions, however, has really varied over time.

Purpose of Study

Zambia is undoubtedly considered to be one of the countries in the world that is rich in resources, as it is blessed with much mineral endowments of great economic importance (Mulimbika & Karim, 2018), paradoxically however, since 1964, with all its natural endowments, the country still ranks lowly in terms of industrialisation and development. There has been political will and strategies by successive governments to have the country industrialised to

JDE (Journal of Developing Economies) p-ISSN: 2541-1012; e-ISSN: 2528-2018
DOI: 10.20473/jde.v8i1.43514

foster economic growth, though the economy has been fluctuating in the last decade because of the instability of Real Gross Domestic Product (RGDP) (see statistics on Bank of Zambia, 2022). There are also other economic indicators that have been signalling ailing Zambian economy namely, interest rate, industrial output, FDI (foreign direct investment), inflation and foreign (currency) exchange rate. It is against this background that this study was conducted to determine whether the current Zambian fiscal and monetary policy is effective for stability and economic growth. Moreover, there is scant literature in Zambia regarding industrialisation, FDI and relationship to job creation and productivity (Aongola, 2022).

Even when industrialisation plays a positive role in economic development of European and East Asian countries, recent statistics have indicated a decreasing role of industrialisation in economic development in Africa (Lugina et al., 2022). On the other hand, there have been conflicting results regarding the nature of the association that exist between economic growth and industrialisation. Some studies have presented that industrialisation has a positive effect on economic growth (Ibitoye et al.,2022; Lugina et al.,2022; Su & Yao,2017; Wang & Su,2019). Whereas other research studies have not found any positive relations between industrialisation and economic growth (Ibbih & Gaiya,2013; Iheoma & Jelilov,2017; Jelilov et al., 2016). Based upon the contradictory presentations of findings by various researchers, it necessitated the need to determine whether industrialisation in Zambia has an impact on economic growth based on the current existing policy measures. This study was the first to be conducted in the Zambian context.

Literature Review

The endogenous growth model, which is an aggregate production function that was developed by Jones and Manuelli (1990), was the theoretical framework of this research study. This model avoids the diminishing return to capital and it is presented as follows:

$$Y=f(k,l) \tag{1}$$

Y : per capita output;

l : labour industrial output ratio and;

k : capital industrial output ratio.

Over the last twenty years, African economic growth on average as a continent has been a pleasant anecdote, and this growth trajectory has made the African region comparable to regions in the world (Opoku & Yan, 2019). Industrialisation in broader sense is considered to be an increase in value added of the non-service and the non-agricultural sectors to GDP. To be specific, it is an increase in the value added of secondary sector and it is more used synonymously referring to the industrial sector. In Zambia, the manufacturing sector continues to play a critical role in the realisation of the country's development and growth as well as the industrialisation agenda.

Economic growth is considered to be an increase (rise) in per capita income over a period of time (Bakari & Tiba, 2022; Clunies-Ross et al., 2010). On the other hand, O'sullivan & Sheffrin, (2003) define industrialisation as a process of economic and societal change that usually transforms a human being to industrial from being an agrarian. O'sullivan & Sheffrin (2003) consider industries to be bringing change in three ways that are closely associated with economic growth namely: large scale energy development, modernisation and also metallurgy production. They also contend that industrialisation usually comes with sociological process of rationalisation.

The good legal framework, good governance, natural resource availability, technology and low-cost skilled labour are considered to be the key positive factors that stimulate industrialisation.

Empirical Review

There have been conflicting research results regarding the nature of the association between economic growth and industrialisation. Lugina et al. (2022) investigated the effect of industrialisation on Tanzanian economic growth by focusing on the drivers of structural changes in Tanzanian manufacturing sector using vector error correction model which is based upon a parsimonious model for the period between 1970 and 2017. The study found a positive significant association between industrialisation and economic growth.

Ibitoye et al. (2022) carried out a research study to determine the impact of industrialisation on Nigerian economic growth using Johansen cointegration and Granger causality tests. The results presented a positive significant relationship between industrialisation and economic growth.

In China, Wang and Su (2019) conducted a study to investigate the impact that industrialisation has on decoupling of economic growth from the China's carbon emission for the period between 1990 and 2015. The study adopted causality techniques of Johansen cointegration and Granger. The results revealed that there is a decoupling (very strong) of carbon (CO2) emission and economic growth, which signified a greater impact of industrialisation on the economic growth.

Su and Yao (2017) carried out a study to investigate the role that manufacturing sector plays during middle-income stage of development. The study covered large datasets from various sectors. The results revealed that during middle-income stage, manufacturing does pull along all other different sectors. On the other hand, a decline in the manufacturing growth has a negatively growth impact on all sectors, in the long-run and the short-run. In a nutshell, the study shows that the industrial sector is the main engine of growth for the middle-income growth.

Iheoma and Jelilov (2017) conducted a study to determine the impact that industrialisation has on the economic growth of the ten countries that are members of Economic Community of West Africa (ECOWAS). These countries included: Nigeria, Ghana, Benin, Cabo Verde, Gambia, Senegal, Cote D'Ivoire, Guinea-Bissau, Niger and Mali. This study applied ordinary least squares (OLS) technique and F-test to analyse data (secondary) that was obtained from the Nigerian Central Bank and National Bureau of Statistics. The results revealed that industrialisation negatively impact economic growth in the long run.

A study conducted by Ibbih and Gaiya (2013) on a cross-sectional analysis of fifty-four countries in Africa on the relationship between industrialisation and economic growth, presented a weak link between industrialisation and growth (economic). The study adopted a least squares regression approach.

Research Methodology

Data Collection Method

This research study used data from the Central Bank of Zambia and the World Bank Statistical data (please refer to the appendices).

Data Analysis

The regression analysis was utilised to analyse the model. The approximation of the parameters of the model required only data on GDP, manufacturing output, FDI, interest rate and foreign exchange rate.

Specification of the Model

$$GDP=f(X_1, X_2, X_3, ...,X_n)+U_t \quad (2)$$

In this case: GDP (Y) is Gross Domestic Product; X_1 is Industrial output (MO); X_2 is FDI; X_3 is Foreign (currency) Exchange rate (FER); X_4 is (BIR) Bank Interest; X_5 is Inflation (IR); whereas U_t is the error.

Regression model was used for data analysis for this study using Jamovi software. The software has become widely used by different researchers in different studies (see Abbasnasab Sardareh et al., 2021; Ahmed & Muhammad, 2021; Hassen & Ramakrishna, 2020; Şahin & Aybek, 2019; Tryson, 2022; Yangailo, 2022; Yangailo, 2023; Yangailo & Mkandawire, 2023; Yangailo et al., 2023). This model and other inter related models has been used in some previous studies that analysed data in the similar settings (see Ibbih & Gaiya, 2013; Iheoma & Jelilov, 2017; Su & Yao, 2017).

Data Analysis and Interpretation

Table 1: Model Fit Measures

Model	R	R^2	Ajusted R^2	AIC	BIC	RMSE	Overall Model Test			
							f	df1	df2	p
1	0.980	0.940	0.947	402	410	1645	76.7	5	16	<0.001

Table 2: Model Coefficients - Gross Domestic (Million USD$)

Predictor	Estimated	SE	T	P
Intercept	2276.21	6164.28	0.369	0.717
Manufacturing Output (Million USD$)	10.00	2.40	4.158	<0 .001
Foreign Direct Investment: FDI (Million USD$)	2.70	1.29	2.084	0.054
Exchange rate	291.48	222.28	1.311	0.208
Interest Rate (BIR)	-42.58	120.87	-0.352	0.729
Inflation Rate (IR)	-130.27	158.98	-0.819	0.425

The tables above present the outcomes of the regression analysis. The results show that manufacturing output (industrial output) increase GDP by 10 magnitudes, foreign direct investment (FDI) increase GDP by 2.70 magnitudes, exchange rate increase GDP by 291.48 magnitude whereas the increase in interest rate decrease GDP by -42.58 signifying a non-positive association with GDP, and the increase in inflation decreases GDP by -130.27 magnitude.

The results from Table 1 also present that R^2 is 0.94. This indicates that 94% of variation in growth of GDP is elaborated by all the five independent (predictor) variables taken all together. The industrial (manufacturing) output coefficient is positive (rightly signed), and significant at 5%, indicating that growth of manufacturing output has a positive significant impact on Zambia's economic growth.

Finding and Discussion

According to the model, coefficient of determination (R^2) indicates that the model was significant (R^2=94%) indicating that 94% of the variation in GDP which is the dependent variable was elaborated by all five different independent (predictor) variables, 6% was not well elaborated due to the extraneous factors that were not captured in above model. At 0.05 of significance, the model presented that there was statistically significant association between GDP and industrial output.

The study main objective was to examine the impact of industrialisation on economic growth in Zambia. The results have presented that of all the independent variables used in

this study (interest rate, industrial (manufacturing)-output, foreign direct investment, inflation and foreign exchange rate), manufacturing output is the only independent variable that was statistically significant ($p<0.001$; $\gamma = 10$). This implies that manufacturing output which is the industrial output has a significant positive impact on Zambia's economic growth. The study result is consistent with previous studies that have presented that industrialisation has a positive significant relationship with economic growth (Ibitoye et al.,2022; Lugina et al., 2022; Su & Yao, 2017; Wang & Su, 2019). This result is also inconsistent with other studies that have presented a negative association between industrialisation and economic growth (Ibbih & Gaiya, 2013; Iheoma & Jelilov, 2017).

Based upon the results of this study, we are now certain that in the Zambian context, industrialisation has a significant impact on the economic growth based on the current existing policy measures.

Conclusion

This study examined the impact of industrialisation on Zambia's economic growth for the period between 2000 and 2021. The study included the following macroeconomic indicators: GDP as a dependent variable, whereas, manufacturing (industrial) output, inflation, FDI, interest rate and exchange rate as independent variables. The study results present that industrialisation has a positive significant impact on Zambia's economic growth. This means that the existing policy measures on industrialisation should be upheld and implemented accordingly. The Zambian government should continue creating a good and an attractive environment for industrial growth in the country.

Declaration

We wish to declare that this article was not preliminary sponsored by any organisation and there is no conflict of interest for us to disclose; we can provide data and material research upon request; we would also like to extend our sincere thanks to the editor and reviewers for their valuable time in reviewing our paper.

Conflict of Interest

We wish to declare that there is no conflict of interest to declare as there is no significant competing financial, professional, or personal interests that might have affected the performance.

Availability of Data and Materials

Data and material research can be provided upon request, though all materials used were obtained from the published materials and there is no primary data used.

Authors' Contribution

Taonga Chambani conceptualized the study; Tryson Yangailo created the methodology; Tryson Yangailo and Taonga Chambani wrote, reviewed, and edited the manuscript; Tryson Yangailo and Taonga Chambani wrote the original draft.

Funding Source

We wish to declare that this paper was not preliminary sponsored by any organisation.

Acknowledgment

We would like to extend our sincere thanks to the editor and reviewers for their valuable time in reviewing our paper.

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Appendix

Table 3: Data

Year	Real Gross Domestic: RGDP (Million USD$)	Industrial Output (Million USD$)	Foreign Direct Investment: FDI (Million USD$)	Exchange rate	Interest rate	Inflation rate
2000	3,600.68	340.38	121.70	3.11	38.80	26.03
2001	4,094.48	371.86	145.00	3.61	46.23	21.39
2002	4,193.85	402.02	298.39	4.40	45.20	22.23
2003	4,901.84	497.45	347.00	4.73	40.57	21.40
2004	6,221.08	626.17	364.04	4.78	30.73	17.97
2005	8,331.87	819.89	356.94	4.47	28.21	18.32
2006	12,756.86	1,200.15	615.79	3.60	23.15	9.02
2007	14,056.96	1,220.12	1,323.90	4.00	18.89	10.66
2008	17,910.86	1,514.18	938.62	3.75	19.06	12.45
2009	15,328.34	1,331.26	694.80	5.05	22.06	13.40
2010	20,265.56	1,535.78	1,729.30	4.80	20.92	8.50
2011	23,459.52	1,763.25	1,108.50	4.86	18.84	6.43
2012	25,503.06	1,804.55	1,731.50	5.15	12.15	6.58
2013	28,037.24	1,688.89	2,099.80	5.40	9.52	6.98
2014	27,141.02	1,851.01	1,507.80	6.15	11.57	7.81
2015	21,251.22	1,598.58	1,582.67	8.63	13.25	10.11
2016	20,958.41	1,610.89	662.81	10.31	15.50	17.87
2017	25,873.60	2,102.81	1,107.52	9.52	12.38	6.58
2018	26,311.59	1,801.76	408.44	10.46	9.79	7.49
2019	23,308.67	1,582.41	547.97	12.89	10.29	9.15
2020	18,110.63	1,397.30	- 172.75	18.34	9.48	15.73
2021	21,203.06	1,876.46	- 466.47	20.02	9.00	22.02

Source: World Bank Data and Bank of Zambia

Table 4: The Assumption Checks

Autocorrelation Test of Durbin–Watson		
Autocorrelation	Statistic (DW)	P
0.247	1.43	0.022
Collinearity Statistics		
	VIF	Tolerance
Manufacturing (Industrial Output (Million USD$)	10.04	0.0996
FDI (Million USD$)	4.31	0.2320
BER	6.18	0.1619
BIR	12.05	0.0830
IR	5.70	0.1753
Normality Test (Shapiro-Wilk)		
Statistic		P
0.971		0.737

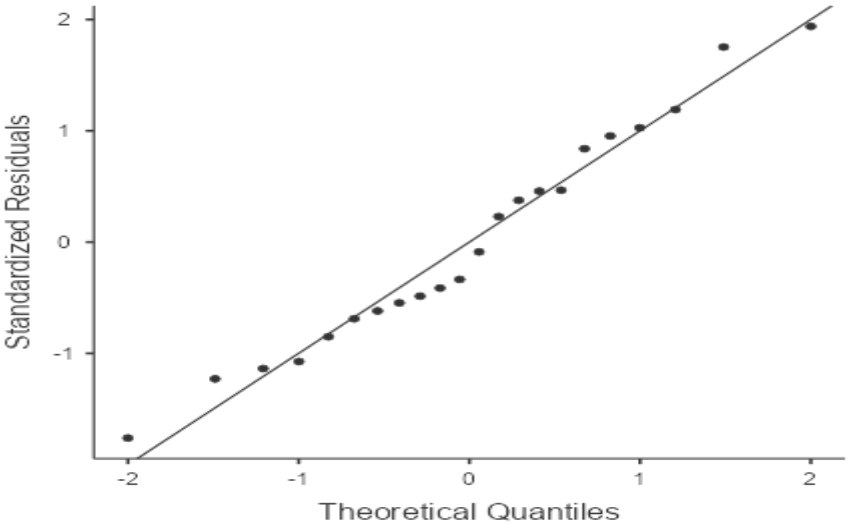

Figure 1: Q-Q Plot