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Analysing Factors that Influence Economic Growth in South Africa

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Abstract: Since achieving high economic growth in South Africa persists as one of the ultimate serious development issues, it is critical to examine factors that influence South African economic growth. Using Autoregressive Distributed Lag (ARDL), the study was conducted to analyse the variables influencing South African economic growth from 1990 to 2021. The study discovers that technological progress, labour, power supply, and capital formation are all associated significantly with South African economic growth. According to the research, in the long run, labour and technological progress coefficients are positively correlated with economic growth, whereas power supply and human capital are negatively correlated. These findings have significant policy implications. According to the study's findings, it is advised that appropriate policies be created to support the industries that help South Africa's economy flourish. Strategies to be endorsed should include those that captivate such as improving the quality of education to increase human capital and greater investment mostly in the infrastructure of the electricity supply industry are crucial for resolving the issue of electricity supply since doing so would force South Africa to experience long-term economic growth.

Keywords: economic growth; labour; capital; technological process; power supply

JEL Classification: E24; J21; J24; O33; O47; 013

1. Introduction

According to Gordhan (2012), there has been a rising discussion regarding what factors influence economic growth, particularly in emerging countries such as South Africa. Economic growth is defined as an increase in the overall volume of goods and services produced over a specific period. As a result, a country's wealth and

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prosperity increase in direct proportion to its output produced. Economic factors are also crucial in ensuring economic success. Similar to many other emerging nations, South Africa places a high priority on achieving sustainable economic growth. Achieving rapid and sustainable economic growth is essential, and to achieve and maintain such significant growth, policymakers must first understand the factors of economic growth. Capital, technological progress, and labour are considered important factors in neoclassical economic growth theories (Anyanwu, 2014:468). The productivity and economic growth hypothesis, which has evolved for centuries, has long recognised the link between technology and economic growth. Labour is a production element that is utilised to boost economic growth by producing commodities and services. Investments in labour increase the effectiveness of human capital. Apartheid policies altered the roles of labour and human capital in the South African economy, notably an exclusion of a major segment of the people from economic activity. Furthermore, skill shortages and features of labour regulation have acted to boost the cost of labour relative to capital (Arora & Ricci, 2005). Previous studies were confined to electricity consumption and economic growth only (Inglesi et al., 2003), in order words, there are no articles focusing on the power supply with economic growth in South Africa, thus this research fills that gap. The country's electrical generation has been unpredictable. The power supply has been dropping since 2006, and it was extremely close to usage in 2008, leaving the company with limited reserves. This resulted in electricity rationing in 2008 when the mismatch between electricity supply and usage nearly caused power generators to fail (Data from 1981-2011 electricity consumption and supply).

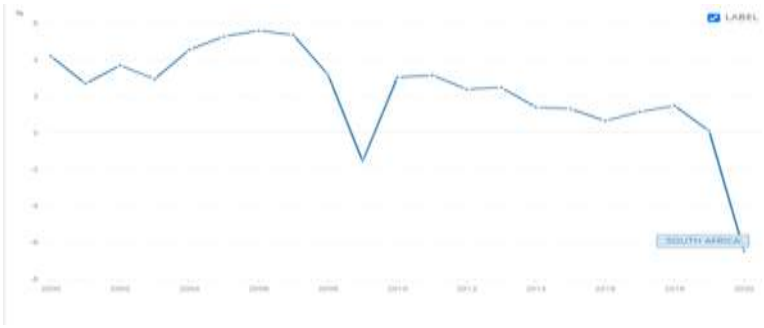

Figure 1. South African GDP Growth Annual % from (2000-2020)
Source: World Bank (2022)

Therefore, the underlying technological progression in an economy, i.e., the rise in production owing to variables other than measurable inputs, may be affected by the amount of educated labour in the economy. Reliable power supply and human labour improve the productivity of capital, such as machinery or electronic products. Several studies in developing countries concentrate primarily on specific areas such as technological innovation Richard & Sheehan (2011) and economic growth, which

promote human capital (Ouhibi et al., 2021). While there is a scarcity of empirical study that investigates issues of technological innovation, capital, labour, and power supply that impact the economic growth of South Africa specifically. As a result, the study's aims to explore factors that impact South African economic growth. As a result of the aspects to discuss, the study presents the literature review which consists of theories and empirical studies that connect economic growth and its determinants. Whilst the methodology section and results present and analyse the empirical results. Lastly, the research presents the conclusion of the study.

2. Literature Review

Most literature on economic growth has been performed to identify and evaluate potential economic growth-influencing elements and their effects. (Jannat *et al*., 2020:78). When describing growth, economists frequently use the factors of production for goods and services, where total economic output is a function of several factors of production. These factors of production include labour, capital, and economic progress. The increase in the real production of the economy could not possibly have been boosted by labour inputs. Due to the country's dropping investment rate by that time, the capital was no longer contributing as much to the South African economy's growth performance (Fedderke & Simkins, 2012, p. 182). Electricity is an important source of energy in the contemporary day. Electricity is a key source of energy that may be used to suit the demands of both residential and industrial customers (Salehen *et al*., 2012). According to Ghosh (2009), electricity also encourages global trade. The aforementioned is because the efficiency of electricity supply is improved by technological progress and developing economies are incentivised to absorb highly technological inputs into their own generating from countries that are developed. Moreover, Morimoto and Hope (2004:77) research showed that a steady and sufficient supply of energy can reduce poverty and promote economic growth.

Since 1970, the growth of total output in South Africa has been frequently growing and human capital is seen as input to economic output. When it comes to the capital stock's contribution to growth, capital has been becoming less significant, while in the industrial sector, it has been more significant (Fedderke & Simkins, 2012:183). The supply side of the power supply has not received enough research attention. Numerous studies such as (Yoo, 2006; Guttormsen, 2007; Wang et al., 2011; Shahbaz et al., 2020; Yoo & Kwak, 2010), have looked at the relationship between economic growth and electricity consumption. This implies that the studies explored whether an increase in the supply of electricity boosted economic growth or either economic growth boosted the supply of electricity.

In Africa, Lu *et al*. (2019) utilised the Solow model to look into the short-term and long-term influence of foreign investment in South Africa's economic and

technological growth, as well as the dangers and possibilities of international commerce with the South African economy. The authors demonstrated that increased investment in an investigation can drive GDP growth. However, Thierer and Broughel (2019) identify that most of the research on technological progress examined factors of production, which is fundamentally incompatible with technical innovation.

According to Solow (1956), human capital is an essential determinant of economic progress. Notwithstanding, these and other scholars utilise distinct substructures to describe the impact of human capital on economic growth. Nelson and Phelps (1996) further argue that human capital is a catalyst that increases levels of productivity through creativity and flexibility of adaption to new technological production methods, finding that greater human capital endowments lead to higher innovation levels. According to Qamruzzaman *et al*., (2021), human capital has a linearly positive influence on economic growth. Endogenous growth theory confirms that human capital has a linear positive influence on economic growth in both the short and long run. A large body of work on the theory of endogenous growth highlights the importance of humans as a major contributor to economic growth, both direct and indirect, in developing nations such as South Africa. Both the indirect effect of total productivity improvement and the direct influence of human resource productivity can affect economic growth (Prasetyo, 2020). According to the endogenous growth theory total productivity, which is dependent on technological advancement, is the primary indicator of long-term economic growth (Howitt, 2004). If electricity is employed once throughout the process of technical advancement, then long-term economic growth will result. Therefore, there are correlations between electricity supply and economic growth.

According to empirical models that have been pointed out by Stern, energy is a major factor in economic growth (Stern, 2004:35). Thus, inefficiencies in the South African energy sector caused by variables such as load-shedding might have a considerable influence on economic growth. similarly, South Africa's continuously low levels of economic development may be hurting the electrical market. As a result, there is sufficient data in the literature to suggest that the influence of power supply on economic growth in South Africa is worth exploring. According to the law of diminishing returns, the additional output generated when adding one additional item of capital or labour input will eventually decrease, holding other input components constant. As a result, a country cannot continue to grow in the long term by merely acquiring more labour or capital. Therefore, technological progress must be the main force behind long-term growth. However, in developing countries such as South Africa, the amount of educated labour in the economy may have an impact on the underlying technological progress or the increase in production due to factors other than quantifiable inputs. The productivity of capital, such as machinery or electronic goods, is increased by a dependable power supply and human labour (Van Zyl,

2011). Moreover, in the case of South Africa, it might be a problem due to factors such as load shedding and structural unemployment faced by a country. Many studies in developing nations focus largely on particular aspects like technological innovation and economic growth, which support human capital (Ouhibi *et al.*, 2021).

3. Methodology

The study's main goal was to look at the variables that affect economic growth. The relationship between the various elements affecting economic growth has been examined in the theoretical and empirical literature. These included the availability of power, labour, capital, and technological advancement. These factors had been chosen to investigate their effects on South Africa's economic growth. Given that study used a cross-sectional research style, a quantitative research strategy was thought to be appropriate. The secondary data for the variables used in this study, which was mostly an empirical analysis, were acquired from the World development indicator. The World Bank indicators 2022 were the sources of secondary data used in the research (World bank, 2022). Utilising annual time series from EViews' unit root test, the data set is created. The model's variables, their descriptions, and the anticipated sign of their prior coefficients are listed in table 1.1 below. The empirical literature relating to power supply, labour, capital, technological progress, and economic growth is reviewed below:

Table 1. Summary of Variables and Expected Outcome.

Variable	Description	Source	Expected outcome
LGDP	Log of economic growth (1990- 2021)	World development indicators	Dependent variable
LLAB	Log of labour (1990-2021)	World development indicators	
LHC	Log of human capital (1990- 2021)	World development indicators	
LPOW	Log of power supply	World development indicators	
LTECH	Log of technology progress	World development indicators	

Source: Authors (2022)

With the aid of annual data covering the period 1990 to 2021, the ARDL method had been applied to examine the linkage between the power supply, labour, human capital, and technological progress with the economic growth of South Africa. The findings can either indicate if the is a long-run relationship between the variables of interest and which of the variables accelerates economic growth.

3.1. Data Source

The World development indicators (2022) was used as the source of the annual time series data for the study. The time-variant data, which was used to build a model of South Africa as a whole, encompassed the years 1990 to 2021. In this study, the growth equation, which is based on the growth rate of the real GDP per capita, treats economic growth as a dependent variable. The growth equation for this study includes the dependent variable along with four independent variables. These factors include the availability of power, labour, capital, and the advancement of technology (World Bank, 2022).

3.1.1. Econometric Method and Model Specification

To estimate how these elements will affect South Africa's economic growth. The study used a model of multiple regression. Since the dependent variable, economic growth, typically depends on a broader array of explanatory factors, including power supply, labour, capital, and technological advancement, the study must broaden our study to include more than one repressive. The following is a description of the generic mpirical model that is utilised to examine the influence of explanatory factors on economic growth:

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \cdots + \beta_k X_{kt} + \varepsilon_t \quad (1)$$

Confining with the aforementioned, and the main intention of the study, the model was formulated as follows:

$$GROWTH_t = \beta_0 + \beta_1 HC_t + \beta_2 LAB_t + \beta_3 POW_t + \beta_4 TECH_t + \beta_5 CAP_t + \varepsilon_t \quad (2)$$

As a dependent variable, GROWTH stands for economic growth and the explanatory variables were included, HC stands for human capital development/skills required for production, LAB stands for labour as a factor of production, CAP stands for physical capital as a factor of production, POW stands for the power supply required for production, and TECH stands for the technological progress. The intercept is B0, the coefficients to be estimated are B1 B2 B3, and B4, and the error term, Ut, is used to account for omitted variable bias and measurement error. With the linkages between labour and its dependent variable, economic growth is predicted to be positive. Economic growth is projected to possess a positive relationship with capital. Economic growth is projected to be positively correlated with power supply, whereas economic growth is expected to be positively correlated with technology. Table 1 above elucidates. This paper considered ARDL which stands for Autoregressive Distributed Lag, bounds testing technique for integration which was established by Pesaran and Shin (1999) and later improved by Pesaran et al., (2001). The model considers the conventional sources of economic growth in South Africa namely human capital (CAP), Labour (LAB), power supply (POW), and technological progress (TECH). The model takes the following reduced form: Outcomes of stationary tests on Augmented Dickey-Fuller tests were run. The

estimated values were compared with the critical values at 1%, 5%, and 10%. These had a null hypothesis of a unit root. The null hypothesis that the series has a unit root is rejected if the computed value is higher than the critical value, supporting stationary series. After the initial differencing, all variables that were initially non-stationary turned stationary. To restore stationarity, non-stationary data requires differencing (Brooks, 2008).

3.2. Empirical Results and Discussion

3.2.1. Unit Root

The variables are counter to look for stationarity and the sequence of integrating at levels and first difference. According to Stock, Elliot, and Rothenberg (1996), Dickey-Fuller has generalised the least squares of the unit root test, which improves the effectiveness and impact of the enhanced Dickey-Fuller test. The DF-GLS test equation is as follows:

$$\Delta yd_t = (k - 1)yd_{t-1} + \sum_{j=1}^{p} \varphi j \ \Delta yd_{t-1} + \varepsilon_t \quad (3)$$

Thus yd_{t-1} is the discriminant function series, p is the ADF test lag length, and (k − 1) is the dickey - fuller regress using the discriminant function series yt. Table 2 shows the DF-GLS findings for variables such as economic growth (GDP), labour (Lab), human capital (HC), and technical development (TECH). The first step was to see if the time series employed in this investigation was stationary. One formal stationary test was performed in the research. The ADF test which stands for Augmented Dickey-Fuller is employed to figure out the amounts of periods in which a variable must be differenced to become stationary. This can enable tests for the misspecification that might skew the test of the root (Dickey & Fuller, 1981). Moreover, the ADF examines the unit-roots null hypothesis. Whereas if the statistic test is not statistically significant in comparison to crucial values, then the H0 which is the null hypothesis of a unit root should be accepted in the approval of the stationary substitute. The null hypotheses are specified in the ADF unit root test as the following: H0: Where the unit root the data is not stationary and H1: where the is not unit root the data is stationary. The time series must then be tested up until the null hypothesis can be rejected and the finding that the unit root does not exist. This means that the time series data is stationary. Throughout this investigation, variables were investigated at three models: a level with none, intercept, and trend with intercept. None, intercept, and trend and intercept are used in the ADF test. The tables below show the findings of each variable studied starting at the level, then at the difference.

Table 2. Unit Root Tests Results

Variable	Model	Level	First difference	Conclusion
LGDP	None	1.0000	0.0384**	I(1)
	Intercept	0.7879	0.0039***	I(1)
	Trend and intercept	0.9761	0.0139**	I(1)
LHC	None	0.8979	0.0000***	I(1)
	Intercept	0.0123	0.0008***	I(1)
	Trend and intercept	0.9731	0.0002***	I(1)
LLAB	None	0.2569	0.0001***	I(1)
	Intercept	0.2445	0.0024***	I(1)
	Trend and intercept	0.3490	0.0092***	I(1)
LPOW	None	0.3499	0.0000***	I(1)
	Intercept	0.9281	0.0011***	I(1)
	Trend and intercept	0.9550	0.0015***	I(1)
LTECH	None	0.0422**	-	I(0)
	Intercept	0.0000***	-	I(0)
	Trend and intercept	0.0320**	-	I(0)
LCAP	None	0.9505	0.0032**	I(1)
	Intercept	0.4198	0.0188**	I(1)
	Trend and intercept	0.9952	0.0370**	I(1)

Note: ***, ** and * denote significance levels: 1 percent, 5 percent, and 10 percent respectively.
Source: Authors computation (2022)

The findings of each variable are examined at level, none, intercept then trend, and intercept and are shown in the tables below. Table 2 comes first. The ADF test results are displayed in the table below along with the model's predicted values for particular variables of GDP. Table 2 shows that the P-values for LGDP are greater than the five per cent significance level. In this instance, the null hypothesis of the unit root can be accepted. As a result, the LNGDP contains the unit root, and it can be concluded that the data is non-stationary. Therefore, as result, the ADF should be continued at first Difference to make our data stationary. First difference results show that the probability values of LGDP at none, intercept, and trend and intercept, are all smaller than the five-per cent significance level. In this instance, the null hypothesis of unit root can be rejected and conclude that the data contains stationarity. The P values should all be less than five per cent for the data to contain stationarity (free of unit root problem). However, the P-value for LHC is greater than the five per cent significance level at none and trend and intercept. In this instance, the null hypothesis of the unit root cannot be rejected. As a result, the LHC contains

the unit root, in this instance, it can conclude that the data is non-stationary. Therefore, as result, the ADF should be continued at first Difference to make our data stationary. LNHC at first difference. The table also indicates that the Probability values of DLHC at none, intercept, and trend and intercept, are all smaller than the five per cent significance level. In this instance, the null hypothesis of unit root can be rejected and conclude that the data contains stationarity.

3.3. Empirical Results

Following the differentiation of all variables, the OLS regression is conducted to assess the significant influence of the explanatory factors on economic growth and which variables among all variables are best explaining economic growth in South Africa. OLS regression results are shown in the table below. It gives the coefficients of the variables, the probability (P-value), standard error, constant statistic values., and as well as the t-statistic.

Table 3. Economic Growth Determinants Estimates in South Africa

Variables	Coefficient	Standard error	t-statistic	P-value
Constant	19.75074	1.056092	18.70173	0.0000
LNHC	-0.067917	0.073393	-0.925383	0.3633
LNLAB	0.504802	0.121127	-4.167530***	0.0003
LNPOW	-0.439924	0.053483	-8.225511***	0.0000
LNTECH	0.0114104	0.005440	2.592554**	0.0154
LNCAP	0.536044	0.021033	25.48604***	0.0000

R-squared 0.995247
Adjusted R-squared 0.994333
S.E. of regression 0.018837
Sum squared resid 0.009225
Log-likelihood 85.01855
F-statistic 1088.915
Prob (F-statistic) 0.000000
Durbin-Watson stat 1.64182

Source: Authors, (2022)

According to the results of the OLS regression, the above regression model has an R2 which is the coefficient of determination of 0.995247, an adjusted R2 of 0.994333, and a standard error of 0.18837. The Durbin-Watson is 1.641862, and the F-statistic is 1088.915. The multiple correlation coefficients each describe a fraction of the variation in the dependent variable. In general, the more accurately the model matches your dataset, the higher the R-squared. The estimated coefficient of determination is higher than 0.8, based on the results of the OLS regression analysis. This result shows that 99.5247% of the variance in GDP can be attributed to the independent variables. The overall significance of the regression model is assessed using the F value and Probability (F) statistics. The null hypothesis, according to

which all of the regression coefficients are equal to zero, is what they look at. Additionally, the probability that the null hypothesis for the entire model is true is represented by the value of Prob (F). The F-test of the estimated model has the P-values of 1088.915 and 0.000 correspondingly. While the P-value of 0.0000 is an indication that the 0% probability of the model coefficients is identical to 0, implying that the null hypothesis can be rejected. It is feasible to conclude that the coefficient findings are statistically significant. On the other hand, the findings gave a value of 1088.915 for the Standard error of the regression. The lower the standard error, the more exact the regression estimation. Because the standard error of the model is more than the 0.05 level of significance, and the regression estimations are not credible. This regression's deviation values have a first-order autoregression component. As a result, the value of this test aids in determining if there is autocorrelation among variables. As a rule of thumb, the Durbin-Watson should be between one and four. A number around 1 suggests that there is positive autocorrelation. A score of around 4 suggests negative autocorrelation, whereas a value of two shows no autocorrelation. As a result, the Durbin-Watson statistics value can be rounded to two. In this instance, the estimated model does not show indicators of autocorrelation between its variables. Table 3 provides the values of the explanatory variable's coefficients concerning GDP. The findings of the regression are shown in the following equation, which also gives the constant values, sign, and magnitude of the coefficients for the GDP as explanatory variables.

$$LGDP = 19.75074 - 0.067917HC - 0.504802LAB - 0.439924POW + 0.014104TECH + 0.536044CAP \quad (4)$$

Equation 3 demonstrates that whereas human capital, labour, and power supply have negative relationships with GDP, technology and capital formation have positive correlations with GDP. Considering the statistical prerogatives of the model when interpreting the results of the OLS regression findings, heteroscedasticity, Normality, stability, and test bound testing were all performed on the model.

3.4. Diagnostic Test

The tests of Normality, Heteroscedasticity, Stability, and ultimately the bounding was used as diagnostic tests for this investigation. The diagnostic tests allow for the model's fitness to be evaluated. The findings of the diagnostic tests performed are shown in table 4 below.

Table 4. The Summary Results of the Diagnostic Tests

Test	Null hypothesis	t/F statistics	Probability
Heteroscedasticity	Homoskedasticity	0.576143	0.7177
Stability (Ramsey)	Squares of fitted values	0.655497/0.429677	0.5181
Bounding test			
Jarque-Bera	Not normally distributed	-	0.324052

Source: Authors, (2022)

a. Normality Test

Data of normality may be assessed using normality tests, which can also be used to estimate the likelihood that a random variable underpinning the data is dispersed normally. The Jacque-Bera test was used to perform normality checks for this investigation. The Jarque-Bera test determines if the data sample contains skewness and kurtosis that are consistent with a normal distribution. The results of the normalcy test are also shown in the following graphic.

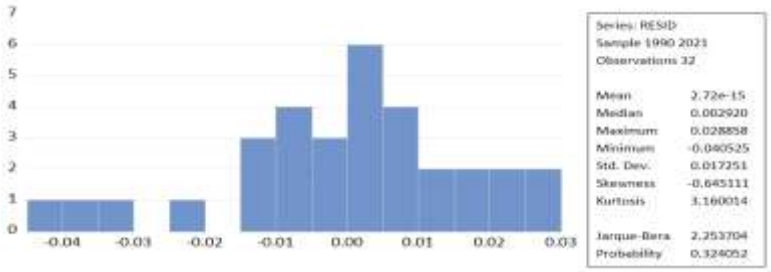

Figure 2. The Results of the Normality Test
Source: Data from world bank indicators

The regression normality test findings reveal that JB has a t-statistic value of 2.253704 and its value of probability is 0.324052. The residuals are not normally distributed whenever the probability value for the JB is less than a 5% confidence interval, suggesting that the model is skewed. Provided that the p-value is identical to zero, the null hypothesis of the normal distribution can be rejected. However, the presence of a probability value larger than 0.05 in this investigation suggests that the null hypothesis should not be rejected. As a result, it is possible to conclude that the data is compatible with the null hypothesis being true. Therefore, as result, the null hypothesis of regular distribution is accepted, and the series may be normally distributed.

b) Heteroskedasticity

The test enables testing for a variety of heteroskedasticity requirements in the equation's residuals. In the case of heteroscedasticity, the estimations using ordinary

least squares are constant. The Breusch-Pagan-Godfrey test served as the basis for this experiment. The p-value is bigger than 0.05 therefore accept the null hypothesis of homoscedasticity and conclude that the model doesn't suffer from heteroskedasticity. This means that the model is correctly specified, and its output may be trusted. Meaning the model has no misspecification. The results of the test for heteroscedasticity reveal that, with an F statistic value of 0.576143, the P-values of the heteroscedasticity test are 0.7177, 0.6704, and 0.8098 for F, Chi-square one, and Chi-square two, correspondingly. The model does not exhibit heteroskedasticity, according to the p-value, which is larger than the 5% level of significance. In this instance, the null hypothesis of homoskedasticity can be accepted. This suggests that there was no issue with heteroscedasticity among the variables and the model is accurate, therefore its output may be trusted.

Table 5. Heteroscedasticity Test Results

Heteroskedasticity Test: Breusch Pagan Godfrey Null hypothesis: Homoskedasticity			
F statistics	0.576143	Prob. F (5.26)	0.7177
Obs*R squared	3.191849	Prob. Chi-Square (5)	0.6704
Scale explained SS	2.275703	Prob. Chi-square (5)	0.8098

Source: Authors (2022)

c) Test for Stability

To test for stability, the Ramsey RESET test was used. Regression Specification Error Test is also known as RESET. The values of the stability testing results are displayed in the table below.

Table 6. The Ramsey RESET Test of Stability.

Ramsey RESET Test Omitted Variables: Squares of fitted values			
	Values	Df	P- values
t-statistics	0.655497	25	0.5181
F-statistics	0.429677	(1.25)	0.5181

Source: Authors (2022)

The findings show that the t-statistic has a P-value of 0.5181 and the F-statistic has a P-value of 0.429677. Therefore, test result demonstrates that we do not reject the null hypothesis "no misspecification", thus the model good and desirable.

d) Serial correlation/Autocorrelation

Breusch Pagan Godfrey: Serial correlation LM Test Null hypothesis: No serial correlation			
F statistics	1.004772	Prob. F (5.26)	0.3310
Obs*R squared	2.472377	Prob. Chi-Square (5)	0.2905

Source: Authors (2022)

Since the p-value is greater than the 5 per cent level of significance, the null hypothesis of no serial correlation can be accepted and conclude that indeed the model doesn't suffer from autocorrelation.

e**) Bounding test**

F-Bounds test Null hypothesis: No levels of relationship				
Test statistic	Value	Significance	I(0)	I(1)
F statistic	57.13820	10%	2.26	3.35
K	5	5%	2.62	3.79
t-Bounds test Null hypothesis: No levels of relationship				
Test statistic	Value	Significance	I (0)	I (1)
F statistic	-24.24267	10%	-2.57	3.86
K	5	5%	-2.86	-4.79

Source: Compiled by the authors

Both t statistic and F statistics are greater than the upper bound and lower bound statistic at a five percent significance level. This clearly shows that the is a long-run equilibrium relationship between dependent and independent variables. The Bound test shows that power supply and labour have a negative relationship with the dependent variable.

3.5. Empirical Results Analysis

In conclusion, this chapter used the OLS regression model to analyse the model of factors influencing economic growth. Three smaller parts made up the main section. Results of the ADF stationary test were reported in the first segment. The variables became stationary at the first difference, according to the unit root of the ADF test findings. As a result, first-order integration of all the variables was achieved. In the second portion, the Ordinary Least Squares (OLS) regression was covered. The results showed that, except for human capital, the variable correlations were statistically significant. Only the coefficients for labour, electricity, and technological advancement are positive. Because human capital's p-value was more than 5%, it was not statistically significant. This may not be entirely compatible with the empirical and theoretical research on the model of economic growth. The power supply also had a negative sign, indicating a negative relationship with economic growth. The dependent variable, which is GDP, is positively correlated with labour, technical advancement, and capital formation (GDP). The overall conclusions indicate that the regression analysis's findings were unexpected. It was accurate to predict that the coefficients of the explanatory variables would be positive. Findings suggest that other factors outside GDP parameters also have an impact on economic growth. About 99 per cent of the explanatory factors were able to account for the

changes in GDP rates. However, the findings suggest that capital formation and labour are both significant factors in explaining changes in South Africa's GDP. The OLS regression findings, therefore, showed that the two factors that best explain changes in South Africa's GDP are labour and capital formation. Diagnostic testing made it clear whether the model was appropriate. The was no presence of misspecification, errors were normally distributed, and the residuals did not exhibit any autocorrelation. As a result, the research's findings are trustworthy and persuasive when it comes to drawing generalisations about economic growth and its causes.

4. Conclusion

Please read these instructions carefully. Prepare your paper and data exactly according to the instructions. Please present your results clearly in a logical sequence which supports the hypothesis/research target. This paper's main goal has been to shed light on several significant underlying variables that have previously either helped or impeded South Africa's economic growth. To create plans for generating better, sustainable, and equitable economic growth of South Africa, it is essential to recognise these factors. This study used annual data from 1990 through 2021 to analyse the long- and short-term relationships between economic growth, labour, capital, electricity supply, and technological progress in South Africa. The ARDL model was used to assess the co- integration test of the variables. The results showed that throughout time, economic growth, power supply, labour, capital, and technical progress all move together. The study's findings confirmed that technological advancement and labour both contribute to South Africa's economic growth. In this study, the results revealed that there is a negative relationship between human capital and economic growth which suggests that a 1% decline in human capital will result in a 6% decline in economic growth in South Africa which is divergent to the a priori expectation. To eradicate severe poverty and promote more inclusive communities, the government must make investments in people's nutrition, health, quality education, employment opportunities, and skill development. In contrast, there is a negative correlation between power supply and economic growth, which means that a 1% reduction in power supply will result in a 43% decline in South Africa's economic growth. Therefore, it is essential to guarantee that the nation receives safe, dependable, effective, pure, and sustainable electricity. The electricity supply industry needs to be restructured, and the government and policymakers should support this. As more businesses will be permitted admission into this market, there will be a greater supply of electricity. Therefore, policy makers should choose power policies that will aid in South Africa's economic growth.

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