Role of Multiple Regression in Predicting Economic Growth: A Panel Study of Kenya (2020–2025)

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Abstract- The study provides multiple regression analysis of the economic growth determinants in Kenya using panel data observations between 2020 and 2025. Through the aspect of investment, government spending, inflation, openness to trade, and human capital, it examines how such macroeconomic factors affect the growth of Gross Domestic Product (GDP). This system of analysis is done through a panel-data modus and is complemented with case studies at county level in Nairobi, Mombasa, and Kisumu to provide regional dispensations. The findings explain that investment and trade openness are positively critical when it comes to GDP growth, but the inflation has a negative impact. These data emphasize the significance of selective investment, better so-called facilitation of trade, and a consciously motivated human capital build-up as means of advancing growth on a sustainable and inclusive basis.

I. INTRODUCTION

Economic growth is the ultimate development agenda of most developing economies and Kenya has embarked in the goal of sustainable and all-encompassing growth. Consistent identification of macro economical basis of growth is not only necessary but paramount in formulating evidence-based policies. In this context, the multiple regression analysis has become a powerful instrument that is used in measuring the combined effect of several predictors on the results of the economy (Gujarati and Porter, 2009).

The study in question uses a panel data model in the exploration of the factors influencing the growth of the GDP in Kenya between 2020 and 2025. In addition to regional case studies, the analysis goes beyond the results of a national level trend in order to capture the county-specific dynamics, which improves the applicability of the conclusions to decentralized economic planning.

II. LITERATURE REVIEW

The analysis of economic growth is broadly applied by regression- based techniques. The key theory of Barro (1991) made cross country regression analysis a tool of exploring positive effects of macroeconomic variables on aggregate performance. His conclusions emphasized the attentiveness of investment, the government policy and the formation of human capital. Rustiness tests were therefore carried out later by Levine and Renelt (1992) who confirmed the significant effects of trade openness, educational attainment, and accumulation of capital on growth paths. In the Kenyan context, Were and Tiriongo (2012) have used the econometric modelling of evaluation of the macroeconomic milieu and its stabilizing monetary and fiscal policy impact. Following Chege and Nyambura (2020), the relationship between the development and investment in infrastructure at county level is considered taking note of the informational value attribute associated with disaggregated information at regional level. All these contributions show that regression methods are valuable in isolating determinants of growth and offer a strong basis on which to base this research.

III. METHODOLOGY

This paper uses a multiple linear regression model to evaluate the effects of some chosen economic factors on the economic growth of Kenya as measured by the real GDP growth. The study will use a panel on the 35 Kenyan counties between 2020 and 2025.The model used is as follows:

The empirical model, which is expressed as below, aims at estimating the relationship between the GDP growth (Yit) and the five core indicators- gross capital

formation (INVit) ,government expenditure on development (GOVEXPit), inflation (INFit), trade openness (TRADEit) and human capital (HCit).

$$Yit=\beta0+\beta1INVit+\beta2GOVEXPit+\beta3INFit+\beta4TRADEit+\beta5HCit+\epsilon it$$

Where;-

Yit = Economic growth (GDP growth rate) in county i at year t

INV = Investment (measured by gross capital formation)

GOVEXP = Government development spending

INF = Inflation rate

TRADE = Trade openness (exports + imports as a percentage of GDP)

HC = Human capital (measured by secondary school enrollment)

ϵ = Error term (captures other factors not included in the model)

The regression coefficients will be used to indicate the influence of the individual independent on GDP growth.

The analysis is based on data sets collected through four well-recognized sources: Kenya National Bureau of statistics (KNBS), the central bank of Kenya, the World Bank, and respective county government reports.

The analysis process was done using STATA version 17, which also tested the data to determine;-
1.multicollinearity and
2.heteroskedasticity, as well as
3.autocorrelation.

Case Studies

The study used in the paper is an investigation into the industrial dynamics of the Nairobi, Mombasa, and Kisumu counties with the help of sophisticated economic modelling approaches.

Nairobi County

The capital city of Kenya, Nairobi, is also the hub of commerce and recorded a very strong GDP growth over the study period. Regressions show that the government spending and openness to trade are the two major determinants of growth; investment in ICT and service sectors played a major role in the overall growth.

Mombasa County

The international trade played a major role in the performance of Mombasa and the trade openness has a high significant relationship between GDP and growth. However, there was a huge negative influence of inflation, especially in 2021-2022 when there were global shocks related to commodity prices.

Kisumu County

Kisumu in turn has recorded moderate but a steady growth rate fueled by infrastructure development, health and education improvement. Development of human capital turned out to be a significant determinant of growth which demonstrated the importance of education in productivity within the region.

IV. RESULTS AND DISCUSSION

The indicated empirical evidence recorded by regressions made it evident that the following are the relationships that do exist between the known exogenous variables and economic growth:-

Investment (beta 1): It is significantly and positively linked to the process of GDP growth ($p < 0.05$), thus validating its status as one of the major drivers of growth.

Trade Openness (beta4): Positively significant at level 0.05, which shows the positive influence of an outward directed economic policy.

Inflation (beta 3): It had a very significant negative impact on the growth in GDP ($p < 0.10$) which agrees with the macroeconomic theory of price instability.

Government Expenditure (beta 2) and Human Capital (beta 5):-
Both were only positively correlated to the GDP growth but were not significant at the national level. Their impact however was stronger in the county level analysis. The adjusted R-squared is equal to 0.76, which shows that the model is capable of explaining about 76 % of the variation in GDP growth among the counties and years, and is, therefore, showing a high degree of explanatory power.

CONCLUSION AND POLICY IMPLICATIONS

The study provided herein has served to conclusively affirm that multiple regression analysis forms a very strong framework to untangle the determinants of economic growth in Kenya. The openness in investment and trade comes out as the statistically important factors in GDP growth. Inflation on the other hand has a cooling effect hence the necessity of having good macroeconomic management. These results make the inclusion of regional heterogeneity in the growth models policy important. Policymakers are, therefore, advised to achieve investment-friendly environments, maintain price stability and also increase investment in human capital- especially in the areas of underdevelopment. Subsequent studies can also build on this trend by embracing curved or non-linear regression analysis models and incorporate such factors as the quality of institutions and technological innovation to obtain a clearer understanding of the processes supporting economic development in Kenya.

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