The effect of government expenditure on economic growth: The case of Tanzania using VECM approach

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Abstract

The purpose of this paper is to observe empirically the effect of the government spending annex economic growth in Tanzania for the period covered 1990 to 2015 using VECM approach. The results revealed the existence of long-run cointegration among all our variables. Also, the results showed that government expenditure, foreign direct investment inflows, gross capital formation and inflation have positive and significant associations with Tanzania economic growth in the long-run and short-run as well. However, the government and policy-makers must become stable the variation of the inflation rate of commodities to persuade economic growth of Tanzania. Finally, the study suggests that government expenditure promotes economic growth in Tanzania and the paper recommends that more of government's resources should highly allocate to capital expenditure.

Keywords: Government Expenditure, Economic Growth, VECM, and Tanzania.

Introduction

The government expenditure is important to sign, to speed up the economic development of the country ever since this promotes the regime to apportion more funds for improvement together with social and economic standpoint. The connection between government spending and economic growth, and more generally the magnitude of the public sector, is an essential subject of analysis and debate. An essential matter is whether or not public sector spending promotes the long-run and short-run stable economic growth. For decades the relationship among public sector expenditure and economic growth has continued to engage sequence of discussion between researchers and policy makers. The universal agreement among the researchers is that government spending has recognized as the vital tool which the management uses to persuade the performance of the economy. The direct through which public powers that be satisfy the common need of the citizens can categorize beneath public sector spending. It is broadly recognized that public expenditure on infrastructures such as roads, ports, or communication systems, public research spending and the provision of basic education and medical services raises the economic productive. Their results showed that nonmilitary public capital reserve is more vital to determine output than either the flow of nonmilitary or military spending and spending on the roads and networks influences economic growth.

According to Easerly and Rebelo (1993) and Canning and Pedroni (2004) conducted on the Effect on Infrastructure on Long-run Economic Growth. Their results suggested that there is evidence that infrastructure influences long-run economic growth but the results defer from country to country. Besides, the overall results also showed that infrastructure provides the maximum level of economic growth. The aim of this article is to

provide a significant study of the current theoretical literature that links among government expenditure and long-run economic growth and the consideration of the resulting distribution regarding welfare. The subsequent section of this paper presents the review of the literature and the methodology, and empirical model is in Section 3 followed by Section 4 provides the discussion of the result and empirical evidence. Lastly, concluding comments presented in section 5.

Literature Review

Various studies had been conducted regarding the effect of government expenditures on economic growth and showed different results. Some of them revealed positive results, and some researchers showed negative results and the rest showed no relationship as well.

Ritwik and Joydeb (2016) determined the effect of public expenditure, economic growth and poverty alleviation for the period of 1990-1991 and 2009-2010 using together fixed effects model and random effects model test panel data. Their results indicated that the percentage of public spending due to the development of infrastructure for example roads, irrigation, power, transport, communication and for each capita earnings is higher and occurrence of poverty is lower, implies that improvement of infrastructure is compulsory to economic growth. Thus public expenditure on road and rail network has a positive and significant impact on per capita income and hence ruins economic growth of the country. Finally, the study recommended that the government should spend much amount of money toward infrastructure for the sake to reduce poverty alleviation and ultimately economy of the country will increase.

Shahid A. et al. (2013) argued on the composition of public expenditures and economic growth: evidence: Pakistan intended period of 1972-2009 using autoregressive distributed lag (ARDL) model. Their results indicated that in Pakistan there is contractionary fiscal extension appears and the coefficient of increase expenditure has a positive and significant to economic growth. Besides, public expenditures are complimentary to private expenditure. However, the study suggested that overall government expenditures have a negative and significant impact on economic growth. Moreover, the study suggested that government should reduce infertile expenditure and focused on its resources to mobilize its economy and to establish better policies to develop its fiscal policy. Finally, the research suggested that to have a better composition of government expenditure for the sake to generate the big impact of the residents and persuade public mindset by investing more in human resources.

Valcarcel (2013) studied the impact of government spending on private spending in a two-sector economy for the period of 2008 to 2009 using Vector Autoregression (VAR) estimates. The outcome revealed that there is negative relationship amongst spending and two measures of government expenditure that has not greatly varied over time whilst the connection amongst non-durable expenditure, and government expenditure have not changed all the way through the illustration and the huge depression of 2008 to 2009 had improved unpredictability of utilization payments by means of no comparable increases in the uncertainty of government costs.

Quang D. (2012) examined on government expenditure and growth in developing countries for the period of 2008 and 2010 employed ordinary least square (OLS). The result revealed that for each capita growth domestic product is relied ahead the development of for each capita public strength payments in the GDP, development for

every capita public expenditure on education in the GDP, growth of residents, expansion of an allocation of overall health costs in the GDP and the allocation of nasty resources construction in the GDP. Lastly, the researcher suggested that policy-makers in low developed countries should prioritize their government spending to motivate economic growth.

Taeyoung and Whasun (2015) explained on socioeconomic contexts of government expenditure across Organization for Economic Co-Operation and Development countries: A complementary perspective from trust and state-business relations for the period from 1995 to 2008 using contingent factors. Their results portrayed that high stage of reliance is negatively associated with government costs, while strong state business relations are positively associated with the declining tendency of government spending. Finally, they suggested that consideration should be paid to the communal contexts of an economy with its contingent factors while analyzing changes in political-economic activities.

Andre´ B. (2011) based on illustration at the margin parties on spending in Canada for the period from 1964 to 1993 employed federal payments data in guidelines domains. The study revealed that holding other variables stable, a partisan impact in nearly all strategy domains beneath study and the multipart system tends to affect the function of parties in public expenditure for the sake to promote the economy of the country. Moreover, the researcher recommended that the strategy domains as a substitute of bigger payments groups and guide the estimates articulate different associations in different field and conservatives are expenditure a smaller amount on labor and immigration policies but more on police and national defense.

Samira (2016) conducted on how government expenditure effects on economic growth in Nigeria for the period from 1986 to 2011 using multiple regression. The study revealed that the running leadership payments have a negative and significant impact on the growth of national income, on the other hand, the in general model performance is the best fit as shown by the R-square and F-test. Moreover, the results revealed economic growth in Nigeria is a fiscal policy phenomenon but the government should pay attention to economic services concerning the well-designed arrangement of its expenses. Furthermore, government expenditure should be adequate monitored and study be supposed to be conducted to investigate and influence the growth of national income of Nigeria which would assist financial management creation and accomplishment. Lastly, the research suggested that public authority is obliged to concentrate to spend on capital spending and to put much effort toward eradicating corruption and corrupt practices in the economy and ensuring financial allocations are channeled appropriately.

Nurudeen and Usman (2010) aimed to test on government expenditure and economic growth in Nigeria for the period covered 1070 to 2008 using disaggregated analysis. Their outcome revealed that administration overall consumption, the full amount of recurrent expenditures, and education expenditure have a negative effect on the growth of national income. On the other hand increasing of administration spending on road and rail network and health care has a helpful and important effect on the growth of national income. Additionally, the research recommended that the following: first of all, the management be supposed to enhance capital expenditure, recurrent expenditure, and education expenditure and ensuring the funds are spending consistent with the planning. Second, of all, the public authority is supposed to raise its investment in the infrastructure to create a conducive environment to enhance internally and externally investors to invest within the nation that leads economy of Nigeria to grow. Third of all, the administration ought to increase its outflow toward health sectors,

and this will enhance human capital and improve the national income of the country. Finally, the government should encourage to anti-corruption agencies so as to deal with high level of fraud appeared in the public workplace.

Ali C. et al. (2016) conducted on the impact of government expenditure on agricultural and economic growth in Pakistan intended for the phase of 1983 to 2011 employed unit root using Augmented Dickey-fuller test, Johansen Co-integration test, and Ordinary Least Square techniques. Their outcome has covered the present of long-run associations among public office payment on farming and growth of national income. Also, agriculture output, management expenses possess a positive and significant persuade on the growth of national income, and farming sector of a circle is yet compared with various dispute similar to insufficient financial support, underdeveloped road and rail network, indigent farming advertising and a deficiency of irrigation. Finally, the research recommended that public authority of Pakistan be supposed to raise its spending within the improvement of farming division ever since it would improve capacity for farming and economic development.

Nkiru and Daniel (2013) discussed the impact of government expenditure on economic growth in Nigeria for the period of 1977 to 2012 employed Error Correction Model (ECM). Their outcome revealed with the intention of in the long-run total expenditure education has positive and significant associations in compliance with the growth of national income in Nigeria. Finally, the research recommended the following: first of all, the public authority ought to make sure that capital spending and recurrent expenses are correctly administered in the sense that the production capacity of the country increased. Secondly, the government of Nigeria should focus its expenditure toward productive sectors in such a way as education division to create human resource capacity and hence Nigeria will have competent staffs for monitoring recurring and capital spending of their country. Finally, the government should finance anti-corruption agencies such as economic and financial crime commission (EFCC) and the Independent Corrupt Practices Commission (ICPC) in order act against and punish individuals of who abuse people money.

Gylych and Muhammad (2016) focused on the impact of government expenditure on economic growth in Nigeria for the period of 1981 to 2012 using Ordinarily Least Square (OLS) techniques. Their findings revealed with the intention of management payments have a positive and significant relationship between the growth of national income and administration cost is a true parameter to the growing of country economy. Besides, other variables such as interest rate, exchange rate, and inflation rate have a positive and significant association through the productive capacity of the economy. Moreover, the research recommended the management must raise its spending and the bank rate ought to be set aside low to promote the national economy of the country. Further, the responsible power that the worth of its local currency is secured; this will point the direction of the increase the value of the home currency and finally increase the national income of the country as well.

Iheanacho (2016) investigated on the contribution of government expenditure on economic growth of Nigeria disaggregated approach for the period of 1986 to 2014 employed Johansen Co-integration test and Error Correction Model (ECM). The findings revealed the regular spending is the most important to stimulate national income in Nigeria and surveillance intended for the effect of non-oil income, while regular spending has a negative relationship with growing the economy in the long-run. Moreover, capital spending has a negative association through Nigeria's national income. Finally, the research recommended intended for the state-policy implication that policymakers ought to direct on successful consumption of people money on equitable projects

to a certain extent that spends it on huge projects that will transform toward the significant development of the economy.

Research methodology

In this article, we applied time series secondary data covering the period of 1990 to 2015 using VECM approach. The variables used in this study are Gross Domestic Product (GDP), Government expenditure (GEXP), Foreign Direct Investment Inflows (FDII), Gross Capital Formation (GCF) and Inflation (INFL). The data used were obtained from various sources in the World Bank through World Bank indicators. GDP collected from World Bank state accounts data and OECD National Accounts data files, GEXP and GCF collected from World Bank national accounts data, and OECD National Account data files, FDII collected from International Monetary Fund, International Financial Statistics and Balance of Payments database, World Bank, International Debt Statistics and OECD GDP estimates, and INFL collected from International Monetary Fund, International Financial Statistics and balance of Payments database, World Bank, International Financial Statistics and to check stability of the model. Finally, in this study, we applied to establish the connection between long-run and short-run among variables. In addition, we also applied the EVIEWS 8.0 software to generate the results and analyzing the data.

3.1 Empirical Model

The empirical model can be presented as follows;

$$GDP_t = ?(GEXP_t \ FDII_t, GCF_t, INFL_t)\varepsilon$$
....(1)

The mathematical specification of the model is:

$$logGDP_{t} = \beta_{0} + \beta_{1}logGEXP_{t} + \beta_{2}logFDII_{t} + \beta_{3}logGCF_{t} + \beta_{4}logINFL_{t} + \varepsilon....(2)$$

Whereas: $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 > 0$, $\beta_3 > 0$, $\beta_4 > 0$. Where:

 GDP_t = Economic Growth measured by GDP annual growth rate at time t.

 $GEXP_t$ = Government expenditure comprises all administration spending intended for purchases of merchandise and services at time t.

 $FDII_t$ = Foreign direct investment inflows measured by the net inflows of investment to acquire a lasting management interest at 10% at time t.

GCFt = Gross capital formation consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories at time t.

INFL = inflation measured by the consumer price index at time t.

 β_0 = intercept term

t = Represents time period from 1990 to 2015

 $\epsilon = Error \ term$

The researchers decided to change data into logarithm model for the following reasons:

- i. To find out the dependent variable (logGDP) percentage change resultant in the percentage change in the independent variables. Thus, the study struggles to discover the responsiveness of economic presentation to changes in the independent's variables specified in our model. That we will call elasticity of the variables. Therefore the application of log-linear model is extremely important.
- ii. To minimize the crack amongst the value of variables, therefore, we require applying logarithm for the reason that it is extremely significant to bring all the variables at the same level.
- iii. To stay far from the possibility of existence of heteroscedasticity, and serial correlation in the model
- iv. To minimize the value of coefficients in the model in other words to keep the value of coefficients low in the model.

The researchers has investigated the stationarities of the variables in the model by employed unit root test through Augmented Dickey-Fuller test (ADF) and Phillips-Peron test. The general estimated equations of the ADF and PP test respectively are written below:

ADF:
$$\Delta Y_t = \alpha_0 + \alpha_1 \gamma_{t-1} + \sum_{t=1}^n \alpha \gamma_t + \eta_t + \varepsilon_t$$
....(3)
PP: $\Delta Y_t = \alpha_0 + \alpha_1 \gamma_{t-1} + \varepsilon_t$(4)

Where:

Y= is a time series, t= linear time series trend, Δ = first difference, α_0 = is the constant and n= optimum number of lags in the dependent variable

In addition, the authors employed Johansen Co-integration test to observe the long-run relationship between dependent and independent variables. The Johansen's test of co-integration starts with Trace test and followed by Maximum Eigen test as shown in the equation (5) and (6) respectively to check long-run association among variables.

$$J_{trace} = -T \sum_{i=r+1}^{m} \ln(1 - \lambda')....(5)$$

$$J_{\max} = -T \ln(1 - \lambda_{r+1})....(6)$$

Where Y_t is an nx1 vector of variable that they are integrated order one- commonly denoted I(1)- and \mathcal{E}_t is nx1 vector of innovations.

If the results observe that there is long-run, then we will employ restriction VAR (VECM), however, if the results show there is no long-run relationship, thus we will apply unrestricted VAR.

Finally, we applied Vector Error Correction model to investigate short-run effect between variables in our model. The general equation is shown below: $\Delta Y_{t} = A_{0} + A_{1} \Delta Y_{t-1} + a. (\beta' Y_{t-1}) + \varepsilon_{t}....(7)$

Where, Δ is the difference operator, A_0 is the constant, A_1 are the coefficients of the stationary I(1) endogenous variables, ε_t is the error correction terms and a and β' are coefficients.

Justification of the chosen the variables of the model

Economic growth can be consequential from various constituent (exchange rate, inflation, financial and infrastructure), however, for our study, we used four variables, such as Government expenditure (GEXP), Foreign Direct investment inflows (FDII), Gross Capital Formation (GCF) and Inflation (INFL).

Government expenditure (GEXP) can be defined as determination the changes of the economy of the country to the required output of the nation or is all expenditure of nation includes all public authority costs, investment, and transfer disbursement. It plays a vital function in the determination of the different level of growth of the economy, given that the correct wants to be intended for possible productivity and maintaining the welfare of the economy. Government expenditure is the universal public authority of final utilization costs. We anticipate the government expenditure to have a positive and significant association with economic growth.

Foreign Direct investment inflows (FDII) are the value inward through investment prepared by non-citizen investors in the coverage economy, precludes reinvestment income and intra-company loans. FDII is the important source of outside financing and thus offer important aim of producing stable improvement achievement of national income of the country. We expect FDII to have a positive and significant impact on economic growth.

Gross Capital Formation (GCF) comprises of disbursement on additions to the non-current assets of the wealth added with net changes in the level of stocks. We expect GCF to have positive and significant to the economic growth.

Inflation (INFL) is the overall increase of general price level of goods and services for the period in the economy. Measured by price index of the yearly proportion changes in the cost to the average consumer of acquiring a basket of commodities. Inflation plays important roles in the annual economic growth. However, too much national income growth caused by inflation is dangerous. We expect inflation to have positive and significant to the growth of the economy.

Results and Discussion

The first step, we check the stationarity of our data using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP). The results showed that all variables are stationary at the level with the exception of logGCF and logINFL. However, our all variables became stationary after converting them into the first difference with both ADF and PP. Based on the results obtained in the Table1 revealed strong proof that all variables incorporated in the similar order with the trend for both ADF and PP. Therefore, we can progress Johansen's co-integration test.

	ADF			РР				
	AT LEVEL		AT 1 ST DIFFERENCE		AT LEVEL		AT 1 ST DIFFERENCE	
Variables	t-stat	Prob*	t-stat	Prob*	t-stat	Prob*	t-stat	Prob*
logGR	3.895204	0.0073	6.994136	0.0000***	2.091270	0.2495	5.856250	0.0001***
logEXP	3.703722	0.0105	7.636206	0.0000***	3.683258	0.0110	7.636206	0.0000***
logFDII	4.308166	0.0025	4.816728	0.0008***	15.31561	0.0000	4.822505	0.0008***
logGCF	1.409798	0.5612	4.759090	0.0009***	1.401100	0.5654	4.757279	0.0009***
logINFL	1.733957	0.4028	4.677952	0.0011***	1.733877	0.4028	4.674324	0.0011***

Table1. Augmented	Dickey-Fuller	and Phillins-Perron	Unit root test
Table1: Augmented	DICKEV-Fuller	and Phillips-Perion	Unit root test

Ever since this study uses a small sample with annual long data, thus selection more lags would reduce the level of freedom. Johansen and Juselius (1990) theory recommended that for small specimen the greatest lag ought to be boundless to one or two for the successful outcome. The choice of the lag length criterion in the VAR given by the residue tests (LR, LPR, AIC, SC and HQ). Thus in Table 2 shows the outcome of the maximum number of lags. According to the result in Table 2 below revealed that the maximum number of lags is two which will be applied to establish Johansen Co-integration test and VECM as well.

Table 2. Lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	55.48075	NA	1.03e-08	-4.206729	-3.961301	-4.141617
1	122.9571	101.2146	3.14e-10	-7.746429	-6.273861	-7.355756
2	171.8966	53.01777*	5.85e-11*	-9.741385*	-7.041679*	-9.025152*

In Table 3 shows the results for Trace test which indicates 3 Co-integrating equation(s) at the 5% level while Max-Eigen value test which reveals 1 Co-integrating equation at the 5% level. Under these circumstances the researchers are free to choose either 1 or 3, therefore we have decided to take the maximum Eigen with maximum rank of 1 for the scenarios selected at the 5% significance level; the Johansen co-integration test has identified one cointegrating rank and hence one rank is used to create the Vector Error Correction Model (VECM). Thus we concluded that the variables in the model have long-run co-integrating relationship.

Table 3: Johanse	n Co-integration	test
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H0 (Null Hyp.)	H1 (Alt. Hyp.)		Trace	0.05	Max-Eigen	0.05
		Eigen value	Statistic	Critical Value	Statistic	Critical Value
r = 0	r = 1	0.877108	106.0475	69.81889*	48.21828	33.87687*
r ≤ 1	r =2	0.645335	57.82918	47.85613*	23.84141	27.58434
r ≤ 2	r = 3	0.557498	33.98778	29.79707*	18.75212	21.13162
r ≤ 3	r = 4	0.375269	15.23566	15.49471	10.81999	14.26460
r ≤ 4	r = 5	0.174681	4.415671	3.841466	4.415671	3.841466

Co-integration test of our variables recommended that all variables are moving in the similar order and there is the existence of long-run relationship amongst variables. Thus the Vector Autoregressive (VAR) model will be modified to the Vector Error Correction Model (VECM). The VECM is better to handle simultaneously problem well, and we can treat all as endogenous variables in the model. Moreover, it can link the long-run equilibrium relationship applied by co-integration. Table 4 represents the results of long-run estimate using VECM. Ever since, the optimum lag length selected is two and the Johansen's co-integrating test shows one co-integrating vector. After employing VECM test, table 4 shows that the coefficient of error correction term (C1) is -0.045262 with its probability value of 0.0083. Since the significance of P-value of 0.83% and the negative sign of coefficient of error correction term, this imply that there is long-run relationship running from GEXP, FDII, GCF and INFL toward GDP. In addition, the speed of adjustment (C1) is 0.0453 of 4.53%, this indicates that she is correcting previous period disequilibrium of the system at the speed of 4.53% annually.

Table 4: VECM Long-run causality

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.045262	0.014105	-3.208822	0.0083

Table 5 shows the result of short-run causality of all variables in our model using Wald test. The results showed that the probability of each variable is significant that is less than 5% which indicated that there is short-run causality running from GEXP, FDII, GCF and INFL toward GDP.

Table 5: VECM Short run causality using Wald Test

Variables	Chi-square	Probability
logGEXP	11.61690	0.0030
logFDII	10.01363	0.0067
logGCF	19.33912	0.0001
logINFL	19.60787	0.0001

From the table 6 of the Breusch-Godfrey Serial Correlation LM Test, using Observed R-square, the result shows that the probability value is 86.90% which is greater than 5% meaning that there is no serial correlation problem in our model. Therefore, the model is well designed and does not suffer from any economic problems.

Table 6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.055614	Prob. F(2,9)	0.9462
Obs*R-squared	0.280779	Prob. Chi-Square(2)	0.8690

The Figure I shows the test of normality of the residuals using Histogram-Normality test. We used Jarque-Bera to test normality of our residuals in the model. The results showed that the significant probability value is about 12.87% which implies that the residuals are normally distributed.





Series: Residuals Sample 4 26 Observations 23			
Mean	2.17e-17		
Median	0.013222		
Maximum	0.107885		
Minimum	-0.186310		
Std. Dev.	0.067660		
Skewness	-0.949196		
Kurtosis	3.821205		
Jarque-Bera	4.100010		
Probability	0.128734		

The stability of the model investigated the plot with the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ). Figure 2 represents the test.

Figure 2: Stability test



The plots of the blue line of CUSUM and CUSUM SQ both lie between the straight lines representing the critical bonds at 5% significance level, and this indicates that the model is stable.

Conclusion and Recommendations

The purpose of this research paper is to scrutinize through empirical observation of the effect of the government expenditure on economic growth in Tanzania covering the period of 1990-2015 used secondary data sets from World Bank through World Bank indicators. The variables used such as Government Expenditure regarded as independent variables while Economic Growth regarded as dependent variables and the rest such as Foreign Direct Investment Inflows, Gross Capital Formation, and Inflation regarded as controlled variables. The data tested for stationarity using ADF and PP; the results showed that they became stationary under both ADF and PP after converting them into the first difference. Also, we found lag order section criterion and the results showed that the lag selection criterion was 2. Moreover, Johansen Co-integration test and VECM were used to check long-run and the short-run relationship between variables and the results revealed that there are long-run associations and short-run relationship running from GEXP, FDII, GCF, and INFL toward GDP using Max-Eigen value test indicates 1 co-integrating equation(s) at the 0.05 levels and Wald test as well. Finally, we checked diagnostic test of the residuals and stability of the model. The results showed that the residuals were free from serial correlation, normally distributed and the model was stable as well. This result is consistent with Shahid A. et al. (2013), Nurudeen and Usman (2010), Ali C. et al. (2016), Nkiru and Daniel (2013), Gylych and Muhammad (2016). According to the results and discussion, for the government expenditure, foreign direct investment inflows, gross capital formation, and inflation the following policy implication are suggested;

a) The government should raise its recurrent expenditure and development expenditure and make sure that all payments are correctly managed to additional force economic growth.

- b) The government should raise its payments on rural roads and electricity if the country can have the capacity to have reliable and stable electricity; this wills rapidity the productive sectors as well to promote the standard of living of poor people in Tanzania.
- c) Bearing in mind the condition of the affiliation among the inflation rate and economic growth, the certain height of inflation is desirable against economic growth; but, zero inflation is not targeted to the financial power, boundary and maintainable point of inflation for steady growth rate. For that reason, to some level of inflation is required for economic growth in Tanzania.
- d) The financial power is supposed to ensure that the price of the Tanzania domestic currency secured by promoting exportation which leads the appreciation of the Tanzania local currency and ultimately enhancement the economy of the country as well.

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