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Impact of Military Expenditure on Economic Growth of Afghanistan

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Abstract
This empirical study estimates and considers the impact of military expenditure on economic growth of Afghanistan for the period of 2004-2018 by applying the VAR model and VAR Granger causality (1980). The model is run by having the dependent (predicted) variable of economic growth and independent variable of military spending and employment. Ultimately, this analysis revealed that arm expenses do not have a significant effect on the economic growth of Afghanistan for the 15 years period from 2004-2018. And after running the VAR Granger causality it revealed that if some policy changes accrue to the GDP or economic then it will cause the military expenditure (unidirectional causality) and policy changes to the military expenditure will not cause GDP. According to the joint test, it is seen that if some policy changes accrue to the employment and military expenditure so it will cause GDP, if some policy changes accrue to the employment and GDP so it will cause military expenditure.

Keywords: Military Expenditure, Economic Growth, Employments and VAR Model.

1. Introduction

This imperial study is conducted related to the effect of the arm expenses on the economic growth of Afghanistan which is suffering war approximately more than 40 years, and a different portion of the budget is allocated for handling military expenditure. It is a country which is going war for a long term and surrounded by terrorism and extremism so its compulsory order to allocate some portion of the budget for naturalizing the threats. There are already researches exist regarding the effect of the military and arms expenditure on overall economic growth, the impact of arms expenses on less developing countries (LDC) and developed countries (DC) economic growth and individually, but never has been done any researches about the military spending impact on economic growth of Afghanistan. After having military expenditure at which level the gross domestic product (GDP) and employment level is affected will be discussed.

There are a different school of thoughts related to the effect of arm expense on economic growth of a country. Military Keynesianism is the point that claims that the government must rise military spending for having boost economic growth. In the Keynesian school of thought, the Narayan and Singh (2007) believe that making high the military burden stimulate demand, rising purchasing power parity (PPP), national output and create positive externalities. According to the Keynesian approach, by rising defense spending, aggregate demand will become high and this increase in demand will be the reason for having output and employment to grow. Hence, defense expenditure will bring positive effects on economic growth. The Classical school of thought says that increasing the arm spending is most likely depending on economic growth. This statement is established on the assumption that higher arm expenses is causes for level of private investment and internal savings to be decreased and consumption due to less aggregate demand go down.

1.1 Objective and Research Question of the Study

The essential purpose is to focus on the effect of the arms expenses on economic growth and how much the employment level will be affected is considered and illustrated to discover the following questions

a. What is the effect of militaries and arms budget expenditure on the economic growth of Afghanistan?
b. Does changes in policy of military expenses will be affecting economic growth in Afghanistan or not?

After clarifying the association between economic growth and military expenses it will be suggested to decrease or increase the military budget. If that portion of the military budget which is allocating for the military

expenditure would be served for other purposes like schooling, reconstruction, or poverty decreasing how much it will affect the economic growth in Afghanistan will be found and analyzed here.

Afghanistan is one of the military ammunition importers in which after the first world war (WW1) and second world war (WW2) from 1950-2018 imported approximately $15869 million and unfortunately there is no production and export so it must have affected the economic growth of Afghanistan at a huge level. Obviously at the absence of having any military and weapons producing companies inside the countries and continuously importing ammunition will affect economic growth. How much this budget which is allocated for the military expenditure affects the economic growth and at which level this importing and non-producing of military ammunition affect the employment and overall economic growth will be investigated and analyzed.

2. Literature Review

Literature review part is divided in to two parts as impact of military expenditure on economic growth of developed countries and impact of military expenditure of developing countries.

2.1 Impact of Military Expenditure on Economic Growth and Employment of Developed Countries (DC)

Yilgör, Karagöl, and Saygili (2014) conducted research related to the effect of arms spending on the economic growth of 11 developed countries (USA, Germany, Belgium, UK, Italy, Canada, Norway, Denmark, France, Netherlands, and Portugal) from 1980-2007. By the help of the Granger causality test, it is found that defense expenditure is a factor in economic growth or it justifies the hypothesis which claims that defense expenses by developed countries directly contributes to their economics and according to the Pedroni cointegration test long-term association exists within economic growth and military expenditure.

Khalid and Razaq (2015) launched research which investigated the association between arms expenses and economic growth of United State of America (USA) by using the Autoregressive Distributed Lag (ARDL) testing method to cointegration test for the period from 1970-2011. The founding claims that a negative association between economic growth and arms expenses. Khalid and Razaq (2015) results suggest that the United States of America (USA) economy military expenditure can play a non-productive role. It doesn't mean that it is not motivating the economy growth for the long term. The current situation is looking crucial then more increase is likely to be at the cost of economic growth in the long period.

Gerace (2002) lunched a research analysis on the growth rates of the military (arms) and nonmilitary (non-army) American government expenditures and GDP from 1951 to 1997. The results claim which nonmilitary expenditure moves counter periodic cyclically with real GDP growth rates, but military spending does not. But this research could not find support for countercyclical interaction between the growth rates of United States military spending and gross domestic product and there is no actual support for the hypothesis that military expenses are adversely related to the GDP growth rate.

Bremmer and Kesselring (2007) lunched a test to find out the effect of military and arms expenses in the economic growth of North America (Canada, Mexico, and the US), and the data set for 3 countries are involve of 43 observation between 1996-2005. After increasing the military expenditure, the nominal GDP in Canada and Mexico is increased and employment is created, but in case of US as much the military spending in increase that much the growth in nominal GDP is reduced and unemployment created but long run the impact is not same like short run.

Paul (1996) estimated three models to find out the association among military expenses and unemployment in 18 OECD countries between the period of 1962-1988, which used the VAR (vector auto regression model) and Granger Causality Test. One of the conclusions was that association among military expenses and the unemployment rate is not uniform across the countries. Military expenditure has a favorable impact in Australia and Germany while in the case of Denmark it damaged the employment rates situation. In the UK the defense expenditure acts as a motivational tool to change the unemployment rate. With Canada, USA, Italy, Japan, Netherland, Spain, Austria, New Zealand, Sweden there is no causal association among military expenses and employment rate.

2.2 Impact of Military Expenditure on Economic Growth and Employment in Developing Countries or Less Developed Countries (LDC)

Hou and Chen (2013) completed the research related to the effect of the defense spending on the economic growth of 35 developing countries from 1975 to 2009. For finding the result Solow Growth Model is applied and the system of Generalized Method of Moments (GMM) estimator is used. And after the completion of research, Hou and Chen (2013) concluded and remarked that an arms expense has an indirect and significant impact on economic growth in the sample countries.

Lobont, Glont, Badea, and Vatavu, (2019) did research related to the association among military expenses and economic growth in Romania. And this research is done by using annual data from the period of 1991-2016. The estimating methodology applied is the granger causality test. According to this research it is proved that economic growth is a reason for an increase in military and arms expenses over the long term like six years and as much the period is extending like eight-year and more the military expenses get an important reason for the economic growth. From the economic point of thought, this result shows the impact of military spending producing different direct effects on labor, capital, economic growth, and efficient use of reserve in the economic sector, at the national level.

Yildirim and Sezgin (2003) made a research related to the impact of military expenditure on employment in turkey and from 1950-1997. The employment model is specified by using the CES production function and modelled employed ARDL approach. Yildirim and Sezgin (2003) concluded the result that military expenses adversely affect employment in both a short period and a long period and military expenses lead to economic growth in turkey.

Dunne and Watson (2000) did investigation about the impact of military and arm expenses on employment in South Africa. The data is taken from 1963 – 1990 and used the ARDL approach. Such analyses provide an opportunity to test for crowding out effect. After applying the research process, it is found that some proves are supporting the thought of which military expenses have a detrimental effect on long period creating employment and indirectly impacting the industrial structure and performance ability.

Huang and Kao (2005) investigated the effect of the military expenses on employment in Taiwan. The data is taken from 1966-2002 and the Autoregressive Distributed Lag (ARDL) approach is used. Huang and Kao (2005) concluded the result that military expenditure is capable to create advantage for the employment condition in the long period, but it destroys employment in a short period. The change in real GDP has a direct effect and significance on employment in short and long period.

Qiong and Junhua (2015) launched research to investigate the association between military expenses and the unemployment rate in China by using the data form 1991-2013. It tasted the time series of four variable like military expenditure, unemployment rate, nonmilitary expenditure and economic growth, the ARDL (Autoregressive distributed lag) model is applied as the basis of the estimation. Qiong and Junhua (2015) concluded at the last part of the research command are devoid of grounds and more mentionable that in china two part of the government expenditure boasts opposite economic effect, and the result shows that after increasing the military expenses, the unemployment rate is also increased and after the increasing, the non-military expenditure reduce it with near 10 times lower than military and arms expenses. As there was one more research relevant to the Chinas military expenses impact on economic growth it is seen that it was affected positively.

3. Data and Methodology

3.1 Data

This study uses time-series data for the analysis. The data is taken from the 2004-20018 period, which unfortunately because of internal war in Afghanistan there is no data available before 2004, so taking data for 15 years is a compulsory order. The data are extracted from different sources, the military expenses are taken from Stockholm International Peace Research Institute (SIPRI), and the two other variables, the GDP and Employment are taken from World Development Indicator (WDI).

3.2 Methodology

The GDP is taken as dependent variable, military expenditure, and employment as independent variables. The methodology is based on the Vector Auto regression (VAR) model and Granger causality test according to Sims (1980).which is an ad hoc dynamic multivariate model, treating simultaneous sets of variables equally, with each endogenous variable regressed on the lags of all other variables and its own lags and in a finite order system. By using Augmented Dickey-Fuller (ADF) Unit Root Test the variables are tested for stationarity and order of integration (Dickey and Fuller 1981). Then it will be discussed regarding the VAR Granger Causality test individually and jointly as the Wald Test (1943).Autoregressive models only model one series Yi on its own past vector autoregressive (VAR) models consider several series. The model of the VAR with time series Yi and Zi and one lag selection can be shown as follow:

$$yt = \delta 0 + \alpha lyt - l + ylzt - l + ult \qquad (1)$$

$$zt = \eta 0 + \beta lyt - l + plzt - l + u2t \quad (2)$$

Although in this thesis the lag selection is 2 but here simplicity, we got the lag 2. Where $U(t)$ is the error term with zero expected value given past information on Y and Z and each variable depends only upon the previous of Yi and Zi but can be extended to depend on different combinations of the previous k value of booth variables, and all the variables are treated as endogenous.

The impulse response is the derivative with respect to the shocks. Impulse response at horizon h of the variables to an exogenous shock to variable j is as follow:

$$\frac{\partial y_{t+h}}{\partial \epsilon_{j.t}} = \frac{\partial}{\partial \epsilon_{j.t}} (\prod y_{t+h-1} + \epsilon_{t+h-1}) = \frac{\partial}{\partial \epsilon_{j.t}} (\prod^{h+1} y_t + \sum_{i=0}^{h} \prod^{i} \epsilon_{t+h-1}) \quad (3)$$

This derivative will eliminate all terms but one which is namely the term in the sum which is $\prod h \in t$ for that we get the following equation:

$$\frac{\partial y_{t+h}}{\partial \epsilon_{j.t}} = \frac{\partial}{\partial \epsilon_{j.t}} (\prod^{h+1} y_t + \sum_{i=0}^{h} \prod^{i} \epsilon_{t+h-1}) = \frac{\partial}{\partial \epsilon_{j.t}} \prod^{h} \epsilon_t = \prod^{h} ej \quad (4)$$

VAR model for Afghanistan take the following shape:

$$GDP = F(GDP_{t-1}, GDP_{t-2}, EM_{t-1}, EM_{t-2}, ME_{t-1}, ME_{t-1}) \quad (5)$$

$$EM = F(GDP_{t-1}, GDP_{t-2}, EM_{t-1}, EM_{t-2}, ME_{t-1}, ME_{t-1}) \quad (6)$$

$$ME = F(GDP_{t-1}, GDP_{t-2}, EM_{t-1}, EM_{t-2}, ME_{t-1}, ME_{t-1}) \quad (7)$$

4. Empirical Result

Before running the VAR model, the ADF unit root test is launched. The results of the ADF test indicate that the dependent variable is stationary or has not unit root at level and both independent variables are stationary at the first differencing. The following table presents the test results.

Table 1. Unit Root Test Result for Level

Variables	T-State	1%	5%	Prob
GDP	-3.304	-4.004	-3.098	0.034
EM	1.146	-4.200	-3.175	0.994
ME	-1.954	-4.004	-3.098	0.300

Table 2. Unit Root Test Result for First Difference

Variables	T-State	1%	5%	Prob
GDP				
EM	-4.150	-4.200	-3.175	0.010
ME	-3.142	-4.057	-3.119	0.04

After testing the stationarity or unit root test then for running the model there must be the lag selection. There are more criteria for lag selection like Akaike Information Criteria (AIC),Final Prediction Error (FPE), Hannan Quinn Information Criteria (HQ), Schwarz Information Criteria (SIC)and LR test, which the most acceptable is AIC. And according to the following result we can see that AIC and all other criteria point for the 2 lags, so the lag is selected 2 and run the model.

Table 3. Lag Selection Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	1.51e-07	-7.194481	-7.073255	-7.239364
1	35.211	8.96e-09	-10.9596	-9.611054	-10.27549
2	22.37*	7.0e-10*	-130.7145*	-12.22287*	13.38563*

* Indicate lag order selected by the criterion, LR is Sequential modified LR test statistic (each test at 5% level), FPE is Final perdition error, AIC is stand for Akaike information criterion, SC is stand for Schwarz information criterion and HQ is stand for Hannan- Quinn information criterion.

4.1 The VAR Model Result for GDP, Employment and Military Expenses

Although after running the VAR model this result will be taken out by having this result no conclusion can be gain, so for having a significant result the impulse response which is like a shock who gives to the residual and affect all the model will be relied on, and in the following part first, the diagnostic testing is done for the heteroskedasticity, normality, serial correlation and stability for each equation separately and then the impulse response is gain and interpreted.

After running the vector autoregression (VAR) model, there will be 3 equation and here each on is tested as diagnostic.

$$GDP = F\ (GDP_{t-1}, GDP_{t-2}, EM_{t-1}, EM_{t-2}, ME_{t-1}, ME_{t-1}) \quad (1)$$

Table 4. First Equations Diagnostic Test

Normality test	Jarque- Bera	Prob
	0.331818	0.847123
Serial correlation LM test	Obs*R- squared	Prob.Ch square
	2.147127	0.1257
Heteroskedasticity test	Obs*R- squared	Prob.Ch square
	8.804172	0.3591
Stability test	Cusum test (5% significance)	

The second equation which is derived from vector autoregression (VAR) model is tested as follow:

$$EM = F\ (GDP_{t-1}, GDP_{t-2}, EM_{t-1}, EM_{t-2}, ME_{t-1}, ME_{t-1}) \quad (2)$$

Table 5. Second Equations Diagnostic Test

Normality test	Jarque- Bera	Prob
	0.331818	0.847123
Serial correlation LM test	Obs*R- squared	Prob.Ch square
	7.827877	0.0200
Heteroskedasticity test	Obs*R- squared	Prob.Ch square
	8.762275	0.3627
Stability test	Cusum test (5% significance)	

The third equation which is derived from VAR model is as follow:

$$ME = F\ (GDP_{t-1}, GDP_{t-2}, EM_{t-1}, EM_{t-2}, ME_{t-1}, ME_{t-1}) \quad (3)$$

Table 6. Third Equations Diagnostic Test

Normality test	Jarque- Bera	Prob
	0.331818	0.847123
Serial correlation LM test	Obs*R- squared	Prob.Ch square
	6.680497	0.0354
Heteroskedasticity test	Obs*R- squared	Prob.Ch square
	9.627212	0.2922
Stability test	Cusum test (5% significance)	

Consequently, the impulse response is explained in the following part after the completion of the diagnostic test.

4.2 Impulse Response

The impulse response is important to step of econometrics analysis in vector autoregressive (VAR) models. The main purpose is to describe the evolution of a model's variables in reaction to a shock in one or more variables.

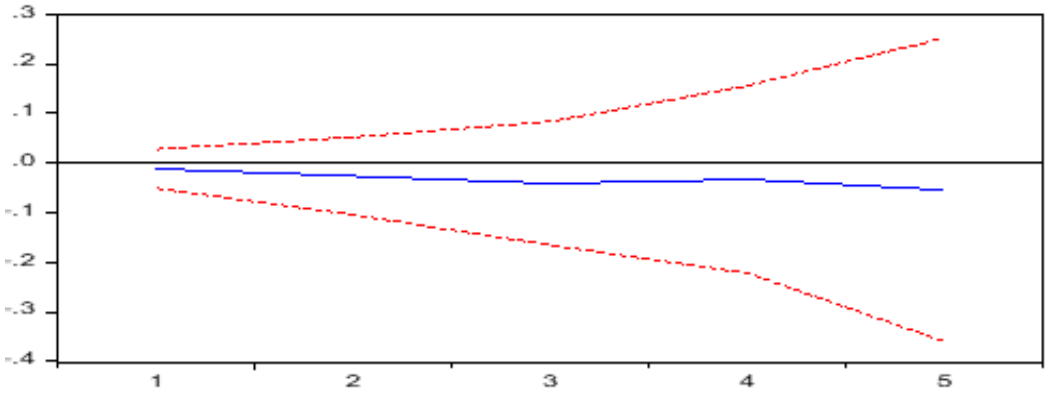

Figure 1. The Impulse Response of GDP to Military Expenses

The above graph is the impulse response of GDP when a shock is given to the military expenditure. Although it shows a negative relationship between the military expenditure and GDP, we cannot conclude any comment because of insignificance (it the confidence interval or band contain zero in horizontal axis then it is statistically insignificant). The reason might be that the military expenditure of Afghanistan is being paid by foreign donner and the expense portion which is being paid by Afghanistan's military budget is negligible so it can not affect the GDP.

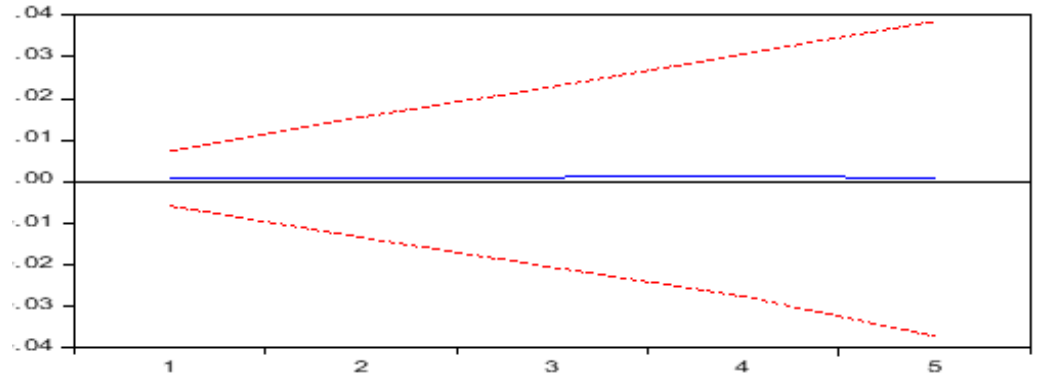

Figure 2. The Impulse Response of Employment to Military and Arm Expenses

The above graph is the impulse response of employment when a shock is given to the military expenditure. Although it shows a positive relationship between military expenditure and employment, we cannot conclude any comment because of insignificance (it the confidence interval or band contain zero in horizontal axis then it is statistically insignificant). The reason might be the non-independency of Afghanistan's military expenditure because if the military expenditure is paid by government then the portion of the budget which is allocated for military expenditure will be considered that in which part is it used, is it used for military operation or infrastructure and after that, it will be concluded.

So finally for the current result, we can conclude that if a shock is given to the military expenditure the impulse response of the GDP and employment is insignificant and we cannot have any comment related to that, but military expenditure will be having a positive relationship for one year and after that still we cannot have any comment because the remaining period is still insignificant. Now we are going to the VAR Granger causality and will see that is there any causal relationship or not.?

4.3 VAR Granger Causality

The VAR Granger causality is used to find out the directional and in directional causality among the independent variables and dependent variable, as one of the questions in this research is to find out the causality of defense expenses and economic growth that does arm expenses is causing the economic growth or does economic growth is causing military expenditures? so for completion and gaining such a result the VAR Granger causality result must be used.

Table 7. The VAR Granger Causality Individually for GDP and Military Expenses

Dependent variable: GDP			
Excluded	Chi-sq	Df	Prob.
ME	1.598020	2	0.4498
ALL	1.598020	2	0.4498
Dependent variable: ME			
Excluded	Chi-sq	Df	Prob.
GDP	29.46882	2	0.0000
ALL	29.46882	2	0.0000

According to the above form, if some policy changes accrue to the GDP or economic then it will cause the military expenditure and policy changes to the military expenditure will not cause GDP (unidirectional causality). The reason is that most of the military expenditure is being paid by the foreign donners that is why policy changes (increase or decrease) in military expenditure will not affect the GDP, but if there are some policy changes (increase or decrease) in GDP then it will affect military expenditure because after the increase or decrease to GDP there will be some add up and cut off for military budget which will be affected.

Table 8. The VAR Granger Causality Individually for Employment and Military Expenses

Dependent variable: EM			
Excluded	Chi-sq	Df	Prob.
EM	0.828704	2	0.6608
ALL	0.828704	2	0.6608
Dependent variable: ME			
Excluded	Chi-sq	Df	Prob.
EM	23.21954	2	0.0000
ALL	23.21954	2	0.0000

According to the above form, if some policy changes accrue to the employment it will cause military expenditure, and policy changes to the military expenditure will not cause employment (unidirectional causality). Because if there is some increase or decrease in employment it means that military budget is used for infrastructure so it claims that an increase or decrease in employment will have casual relation with military expenditure but military expenditure will not cause employment because most of the military expenditure is being paid by outside sources.

Now, in the following form it is Tasted as joint that does jointly the independent variable cause the dependent variable or not.

Table 9. The VAR Granger Causality Jointly for all Variables

Dependent variable: GDP			
Excluded	Chi-sq	Df	Prob,
EM	9.715232	2	0.0078
ME	7.328686	2	0.0256
All	12.07455	4	0.0109
Dependent Variable: EM			
Excluded	Chi-sq	Df	Prob.
GDP	0.546175	2	0.7610
MEL	0.319983	2	0.8522
All	1.202766	4	0.8776
Dependent variable: ME			
Excluded	Chi-sq	Df	Prob.
GDP	8.841085	2	0.0120
EM	6.469283	2	0.0394
ALL	54.75304	4	0.0000

According to the joint test, it is seen that if some policy changes accrue to the employment and military expenses so it will cause GDP (because individually the portion of military expenditure and employment which is being paid by the government is very minor and negligible so it will not be able to affect the GDP but jointly the portion will be getting significant and high so will cause GDP). If some policy changes accrue to the employment and GDP so it will cause military and arm expenses (because after the increase or decrease to GDP there will be some add up and cut off for military budget which will be affected and if there is some increase or decrease in employment it means that military budget is used for infrastructure so it claims that an increase or decrease in employment will have casual relation with military expenditure, that is why both jointly affect the military expenditure) and any kind of changes to the military expenses and GDP will not cause employment.

As a summary for gaining empirical results, first, the data is transformed to the log and then the unit root test has been done through the ADF and KPSS test in which the variables are stationary in first differences then the lag criteria is selected by the help of AIC, FPE, LR, SC and HQ which is 2 and VAR model is run in which there are 3 equation comes out so for each one the normality test, serial correlation test, heteroskedasticity test, and stability test is used which all comes correct then the impulse response and VAR Granger causality test is used to recommend about the effect of arm expenses on the economic growth of Afghanistan.

5. Conclusion and Policy Implication

5.1. Conclusion

Ultimately, the analysis revealed that military expenditure does not have significant effects on the economic growth of Afghanistan for the 15 years period from 2004-2018. And after running the Var Granger causality it revealed that if some policy changes accrue to the gross domestic product (GDP) or economic then it will cause the military expenses(unidirectional causality) and policy changes to the military expenses will not cause GDP. According to the joint test, it is seen that if some policy changes accrue to the employment and military expenditure so it will cause gross domestic product (GDP), if some policy changes accrue to the employment and GDP so it will cause military and arms expenses.

5.2. Policy Implication

Policy implication, which is provided regarding the result, but unfortunately because of internal war existence for a long time in Afghanistan the data are missed and we couldn't collect more observation to run our model for a long period of time. In our study that is only for 15 years of data from 2004-2018. So, by considering the result and as overall Afghanistan is conditionally investigated and considered, we can provide the following policy:

(It is getting a long time that Afghanistan's military, arms expenses, and ammunition are being paid and provided by the outside and foreigner donors so that is why it does not affect the gross domestic product (GDP) and the portion of Afghan military budget which is allocated to the military expenses from Afghanistan's financial budget is not as much by comparing of gross domestic product (GDP) to affect it. But at the none providing of military tools and ammunition by the outside, Afghanistan itself must allocate a big portion of its budget and provide the militaries requirement, so for sure Afghanistan is not producing any type of ammunition and must allocate the budget of education, infrastructure, industries, etc. to import the military tools and ammunition for fulfilling of the militaries requirement, which will make worse the economy. After considering the entire above situation it is suggested for Afghanistan that starts producing and exporting military tools if there is no export at least import must be stopped that it may not be felt necessary to use the budget of education, infrastructure, industries, etc. Producing military ammunition and tools will be decreasing your import and create employment (that works as a motive machine for economic growth) inside the country, which no doubt that will have a positive effect on the economic growth of Afghanistan)).

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