

# **CHAPTER–I**

## **INTRODUCTION**

### **1.1. Background of the Study**

It has been the concern of policy makers to determine the relationship between economic growth and macroeconomic factors since long ago (Abdylmenaf & Besime, 2015). So is the attention of economist on determining the impact of public expenditure made on education to economic growth. Education is tool of development. It directly produces the productive manpower needed for the nation. Education helps to enhance the innovation which results to increase in productivity and efficiency in all sectors of the economy. The level of education and the way it is giving output also shows the major differences between developed and developing country. Human capacity building can be possible within education because it helps to upsurge the national output with synergic effect in the various sectors of the economy. Education leads to explore several avenues of possibilities in the economy which leads to decrease in unemployment, inequality and severity of life.

Major classical and neoclassical economist such as Adam Smith, Romer, Lucas and Solow stressed on the contribution of education in evolving their economic growth theories and models (Mohd H. M., Fidlizan, Mohd, & Razak, 2012). Adam Smith while analysing the dynamics of wealth of nations and welfare of individuals and societies focused on the determinants of economic growth like division of labour, education, human capital, learning by doing, increasing returns to scale, technological change, externalities, institutional factors such as global free-competitive market economy, the role of government etc. (Ucak, 2015). In an endogenous growth model it is explained that human capital as one of the major factors of economic growth. Accumulation of human capital is possible through the expansion of education (Lucas, 1967). Solow (1956) defined Long- term development by introducing technology in the Solow model and defined it as Solow residual. Solow and other theorists of growth have exogenously determined the level of residuals, existence of which confirmed the link between economic growth and education, where the growth of total output and production is a result of progress in knowledge (Osmanković, Jahić, & Šehić, 2011).

Expenditure in education helps in the creation of human capital, similar to physical capital and social capital, leading significant contribution to economic growth (Dickens, Sawhill, & Tebbs, 2006). The long term growth rate of the economy is affected by fiscal policy of the government through the process of announcement of the budget. As education plays vital role in the overall socio economic development, public expenditure on education has always been the concern of the government and concerned policymakers.

From the ages of Adam Smith and David Ricardo keen interest is given for what factor does really matters the economic growth of nation. The neoclassical approach to growth theory, also known as the early theory contained several weaknesses. The major thing they assumed is that productivity growth and technological change were determined by factors that we cannot manage, which is unrealistic to the practical world. In the early 1980s, a series of more refined models were developed based on New Growth theories. These models are not identical as one side emphasises the stock of human capital as prominent factor of economic growth while the other gives more importance to incentives that firms contains to generate new innovation. (Lawal & Wahab, 2011).

Education is seen as contributing to economic growth in two ways first it directly affects economic growth by making individual workers more productive; and secondly it indirectly affects economic growth by leading to the creation of knowledge, ideas and technological innovation either by the process of acquiring education or considering education as a key effort into advancement of a research that produces new understanding and thoughts (Lawal & Wahab, 2011).

Amartya Sen thoroughly distinguished human capability from human capital. Human capital do have importance as it refers to the group of people in increasing production possibilities while human capability is more significant because it refers to the greater freedom of people to guide lives and their choices. Education helps to increase production and also human capability and therefore choice (Hearn, 2009).

In the recent era of development, through the use and initiation of education level in obtaining human capital helps to stimulate the growth rate of the economy. It is one of the vital tools for development so it helps to draw both qualitative and quantitative manpower to get engage in the development process (Mallick & Dash, 2015).

In order to create the human resource for economic development, investment in education has been supreme objective of most of the country. In the modern age of liberalization and globalization development of productive manpower helps to compete with the global market and assist the economy. In developing country like Nepal, public expenditure on education is directly linked with additional returns in the labour market and increase in the potential output of the sector of strength. From the time budget started to take the shape, its amount has increased. In the budget education has always been the priority of the government as we report the data in FY 1974 was Nrs.3694.92 million while it has become Nrs.82491.25 million in 2016. If education aids to enhance the economic growth, it is ethical to increase public spending on education.

## **1.2. Statement of Problem**

Economic growth cannot be thought of without investment in human capital. Education is the major tool for the development of human capital. So we can say that education is base for economic growth of the nation. The objective of education taken by government is not only limited to skill development and general literacy among citizens but there is huge impact of education to achieve social objective like socialization and raising group recognition, social upliftment of different strata of the society, boosting social dynamism and promoting equity. Viewing education as the means of human resource development by relating it with economic development has begun to gain priority in recent days. Education has remained as a vital means to achieve higher GDP growth as availability of skilled and productive citizens will be increased through education. Having known there is multidimensional role of education, appropriate investment in education's impact is clearly seen in the social sector (Economic Survey, 2016/17). From the economic survey we can trace out specific contribution of education in generating the GDP but we cannot find the specific studies done to understand impact of public expenditure on education towards economic growth though several studies has been conducted from this viewpoint in South Asian developing countries as well as entire world.

Government has taken education as the top most priority so there has been public expenditure on education in every fiscal year. In order to have effective influence on growth government expenditure on education should be fairly distributed. As in Nepal poor people do not have effective access to education by which they lack to enhance their productivity. At present scenario government is increasing recurrent expenditure on

education with large scale than that of capital expenditure on education. But the study is necessary whether the track taken by government is in right direction or not. So this study is carried out to address the impact of public expenditure on education and economic growth. The research question is in line with addressing the trend as well as impact of public education expenditure on economic growth. So the research questions are:

- a) what is the trend and nature of public expenditure on education and GDP?
- b) is there any existence of short term and long term relation between public expenditure on education and GDP growth?
- c) is there any causal relationship between public expenditure on education and GDP growth?

### **1.3. Objective of the Study**

For the purpose of determining the impact of public expenditure on education to economic growth the following objectives have been set .The general objective of this study is to find the relationship between public expenditure on education and economic growth and the specific objectives of the study are:

- a) to determine the trend and nature of public expenditure on education and GDP.
- b) to find the short term and long term relation between public expenditure on education and GDP growth.
- c) to examine the causal relationship between public expenditure on education and GDP growth.

### **1.4. Hypothesis of the Study**

The hypothesis set on this study is given below:

Null Hypothesis ( $H_0$ ): There is no any significant relationship between public expenditure on education and economic growth

Alternate Hypothesis ( $H_1$ ): There is significant relationship between public expenditure on education and economic growth

## **1.5. Significance of the Study**

The topic thus selected focuses on the Nepalese context. The share of budget in the social sector has always been the concern of the society and the specific share on the education cannot be undermined. The government expenditure on education is divided into recurrent expenditure on education and capital expenditure on education. The analysis of impact of the public expenditure on education and economic growth has significant implication towards economic growth. There are various studies conducted in order to assess the impact of public expenditure on education towards economic growth however it is not found that the research is done with special concern to Nepal using econometric tool. This study is useful in order to address the situation of expenditure allotment and its special impact on growth. The findings of the study is important to the policy makers to allot the expenditure under several heads and also to rethink on the pattern of expenditure allotment, government officials to assess the probable human capital that is going to be injected in economy and its management, researchers to develop new theories, academicians to do research with determining certain gaps and also to the scholars and stakeholders who have concern on it. This study addresses the capacity of the country to attain the target of graduating to middle income country level by going through the people's welfare state with social justice as envisaged by the fourteenth periodic plan.

## **1.6. Limitations of the Study**

This study is not out of sudden constraints. The time period covered by this study is from 1975 AD to 2016 AD where there exists several policy change and structural break. The data included is the earliest period possible. This study does not cover the private investment in education and its contribution to the GDP growth though it has greater significance in the Nepalese economy. The unavailability of authentic data on private investment is the major reason for not incorporating private sector expenditure on education. This study relies on the secondary data gathered from the source of Nepal government.

## **1.7. Organization of the Study**

The study is divided into five chapters. The first chapter is introduction that consists of background of the study, statement of problem, objective of the study, hypothesis of the study, significance of the study, limitations of the study and organization of the study. Second chapter is related with the review of the literature which includes theoretical concepts which contains the conceptualization of terms, theories of public expenditure and theories of economic growth and major empirical literature review both at international context and national context is included.. Third chapter deals with the research methodology which comprise research framework, research design, sources of data, explanation of variables, and specification of model and tools of data analysis. Fourth chapter deals with data presentation and analysis which includes trend and nature of variables, both dependent and explanatory, Descriptive statistics, unit root test ,OLS test, lag length test, Cointegration analysis.VECM and VEC granger causality as well as residual and stability test. At last the Fifth chapter deals with the summary conclusion and recommendations.

## **CHAPTER–II**

### **REVIEW OF LITERATURE**

This chapter deals with the theoretical and empirical concepts relating to public expenditure on education and economic growth. Theoretical concepts deals with the theories that we have taken as base on our study. Furthermore empirical studies covers the study carried out on this topic at national and international scenario. This chapter also deals with the research gap that exists on this study.

#### **2.1. Conceptualization of Public Expenditure on Education and Economic Growth**

Appropriate understanding of variable is necessary in order to conduct the thesis. So it is necessary to understand the meaning of the terms that thesis has considered.

##### **2.1.1. Public Expenditure on Education**

Public expenditure on education is the expenditure borne by government on education. It comprises of recurrent expenditure on education and capital expenditure on education. Recurrent expenditure on education is the expenses borne to fulfill day to day services like salary to teachers and staff. Similarly capital expenditure on education is the expenditure incurred to do development work and it comprises of returns after the year of investment too.

##### **2.1.2. Economic Growth**

Economic growth is defined as a long-term increase in ability to supply increasingly diverse economic goods to its people, the ability to supply depends upon the technological advancement as well as institutional and ideological adjustments that it demands (Kuznets, 1971). Economic growth is measured in terms of percent increase in real Gross Domestic Product. The two major indicators of economic growth are Rise in Real Gross National Income per capita and rise in GDP per capita.

#### **2.2. Theories of Economic Growth**

There are many factors that affect the economic growth. From the time of classical economist to the present age there are several views on economic growth. We have

discussed theories of economic growth in relation to the public expenditure on education.

### **2.2.1. Classical Growth Theory**

One of the major actor of classical growth theory is Adam Smith who discusses why some countries become poor and why some countries become rich. Other major economists of classical era were David Ricardo and JS Mill. Classical economist discussed the process of growth in terms of technological progress of an economy and population growth. Classical theory believes that economic growth ends when population increases due to the concept of limited resource. The theory believes that technological progress does not stands for long term. It can be concluded from the classical theory that output is function of capital, labour force, land and technology. Classical growth theory has greater significance in order to address the problems of the underdeveloped economies (Reinert, 1999).

### **2.2.2. Neoclassical Theory**

Solow (1956) has observed that input of physical capital and labour does not contain all the information that helps to understand the size , strength and growth potential of specific society. Solow observed that economic output significantly depends on the economy's technological progress. He added technology in the production function equation as exogenous variable. One of the significant benefit of Solow model was the theory of income convergence (Barrow, 2001). The theory of income convergence, first recognized by Malthus and Ricardo, states that cross country economic differences will contract over the span of time due to the diminishing return of the capital.

### **2.2.3. Endogenous Growth Model**

Romer (1986) and Lucas (1988) attempted to consider the sources of growth, so that the rate of growth would be determined within the model. This theory helped the economists to argue that not only technology causes increasing returns to scale but also technology offsets diminishing returns allows as well as enables theoretically limitless growth possibilities. This discovery finally helped to develop how growth occurs. Endogenous growth model introduced human capital into the model of growth as developed by Lucas (1988) considering accumulation of human capital as the engine of growth. Romer



(1986) considers human capital stock in the process of innovation and adaptation of new technology.

#### **2.2.4. Growth Driven by Human Capital Accumulation**

In Solow model human capital enters in the form of technology as a supplementary factor of labour. According to him, economy consists of representative agents who tend to maximize lifetime utility. The agents do have control over consumption level and time division between leisure and work. Consumption level determines the accumulation of physical capital and time division determines agent's future productivity. He considers technology to be constant and population as exogenous variable.

According to Lucas linearity assumption no matter how much capital is increased, the given efforts produces same percent increase. Romer has given reasonable explanation in this linearity assumption. The acquisition of skill in fact facilitate or prepare learning. lucas clarifies giving example that in primary school, children are taught basic knowledge which might not improve basic knowledge, which may not improve their ability contribute to production very much, Instead productivity enhancement is ongoing process in life (Schutt, 2003). Due to absence of diminishing returns acquisition of skills human capital can grow without bound, thereby generating endogenous growth (Schutt, 2003).

#### **2.2.5. Human Capital and Technological Change**

This endogenous growth model category maintains an underlying assumption that technology is key for economic growth. The theory acknowledge that huge portion of inventions is the result of purposeful research and development carried out to impulse economic incentives. With this the role of human capital is as the catalyst of technological progress rather that independent source of long term growth.

### **2.3. Theories of Public Expenditure**

In order to study the impact of public expenditure on education in relation to economic growth several theories in relation to public expenditure is to be studied. So the study has considered several theories starting from classical theory of public expenditure to the modern views on public expenditure.

### **2.3.1. Classical Views on Public Expenditure**

Classical economists were against the role of government in the economic activities. Classical economists were against the government intervention. According to classical Economists government intervention does not promote economic growth instead they believe that intervention creates negative impact in the economy. So classical economists were strong believer of laissez faire economy. If there is intervention it directly affects the self-regulating mechanism of an economy. Classical economists believe that there should be just regulating role of the government. Classical economists were the supporters of balanced budget. In conclusion, classical economist's suggested to restrain government interference in the private sector due to fear of corruption. The position of classical economists can be epitomized as "the less government, the better" (Weber, 1947).

### **2.3.2 Keynesian View on Public Expenditure**

According to Keynes classical notion of full employment equilibrium through wage-price flexibility is an occasional and distinct case. According to Keynes employment depends upon effective demand and there might not be sufficient demand to generate full employment. Cause of unemployment in an economy is decrease in effective demand. During the period of inflation aggregate demand goes up. During this period government should cut consumption by the reduction in its expenditure and with increase tax rate. During the depression, there is reduction in the effective demand. In this case the government should increase its expenditure and spend more on public works by which additional resources can be used. So in the in the period of depression it is suggested to have a deficit budget. So it can be concluded that increase in government consumption leads to increase in employment, profit and investment through multiplier effects on aggregate demand (Abdylmeanaf & Besmine, 2015).

### **2.3.3. Role of Public expenditure in the Neo-Classical Growth Theory**

Neo classical approach on defining the relationship between education expenditure and economic growth has stated to consider human capital factor in the model to address the economic growth. The role of human capital is to make income differences in various countries and convergence (Gumus, 2005). The most basic proposition of this theory is that in order to have sustained long term growth there should be advancement in

technology, market and process on the other hand in absence of technological progress there will be diminishing returns to scale and finally decrease in economic growth (Philippe, Peter, Maxine, & Penalosa, 1998). Neo Classical growth model developed on the middle of 20<sup>th</sup> century, being the tombstone to the economic analysis has not differentiated human and physical capital effects successfully (Dalhin, 2002).

#### **2.3.4. Role of Government Expenditure in the Endogenous Growth Model**

According to endogenous growth model public policies adopted by government can impact the technological progress as well as the capital formation. So we can say that public policies can affect the economic growth. Endogenous growth rate predicts that human resource is fundamental factor of economic growth. Blankenau , Simpson, and Tomljanovich (2005) in their empirical study to investigate the expenditure and growth relationship observed non monotonic response over the period of time. The relationship between among the variables depends upon the level of government spending, the tax structure and the parameters of production technologies (Muktdair & Dewan, 2012).

Other theories on public expenditure that are relevant on the study are discussed below

#### **2.3.5. Wagner's law of Increasing Public Expenditure**

The law states that there exists inherent tendencies for the activities of several layers of government to increase both intensively as well as extensively (Greg & Agboro, 2014). Wagner's hypothesis of increasing state activities states that as per capita income and output increases in an industrial nation, the public sector also grows to the proportion of total economic activity. Wagner has separated the public expenditure into two heads namely expenditure for internal and external security, culture and welfare which refers to the education, health, transport, banking etc. (Lekhi, 2007).

#### **2.3.6. Wiseman and Peacock Hypothesis**

Peacock Wiseman Hypothesis was developed by Peacock and Jack Wiseman in the study public expenditure of Great Britain for the period starting 1980 to 1955. In the study trends of public expenditure is studied and it has stated that public expenditure does not follow the smooth and continuous trend but it increases with the jerk. During

the period of time there occurs some social disturbances like natural disaster, war, epidemics etc. (Lekhi, 2007).

The approach of the hypothesis is made up of three different ideas like displacement, inspection and concentration effect. Most of the increase in tax and spending has taken place during the period of social disturbance, what we call effect. When social disturbance gets finished new level of tax tolerance makes society to accept higher level of public expenditure so that revenue gets stabilized at a new level. After this another effect occurs which we call as displacement effect. This is the phenomenon of expansion of government into new areas of economic activities. The third effect is called concentration effect which refers to the expansion of central government activity higher than state and local level (Lekhi, 2007).

### **2.3.7. Medium Voter Hypothesis**

According to Bowen (1943) and Black (1958), relying upon sudden constraints, the medium voter hypothesis states that government wishes to choose that level of government expenditure selected by the medium voter. The outcome of such choice is demand for public services. The demand for public services depends upon the income of medium voter as well as tax price (Greg & Agboro, 2014).

### **2.3.8. Musgrave and Rostow Theory of Public Expenditure**

Musgrave and Rostow developed the model to address the cause of increase in public expenditure. According to them economic growth is not possible without public expenditure. At the initial phase public expenditure provides economic infrastructure such as railways, roads, sanitation and water supply but when economic growth takes place the public expenditure shifts towards the development of human capital (Taiwo, 2011). The investment in human capital is done through the investment in education, health and welfare facilities (Greg & Agboro, 2014). The model states that economy works as an agent that does decision on behalf of its people. This theory also states that demand for infrastructural facilities becomes faster than the increase in per capita income (Greg & Agboro, 2014).

### **2.3.9. Ernest Engel's Theory of Public Expenditure**

German economist Engel has stated that when family income increases the volume of allocation of consumer budget also increases. We can also state that the composition of consumer budget changes as family income changes. A small volume of consumer budget is spent on specific goods like cloths used during work, but larger volume of consumer budget is spent on expensive goods like fancy clothes and conspicuous goods like jewellery. When average income of citizens increases then consumption pattern increases by small amount in an economy. At the initial stage of development of a state, country allocates large amount of expenditures on capital infrastructure development that might be investment in transportation facilities, water etc. But when economy gets the pace of development, investment in infrastructure decreases (Taiwo & Taiwo, 2011).

### **2.3.10. Pure Theory of Public Expenditure**

Pure theory of public expenditure was developed by PA Samuelson. This theory restricts the grouping of government services on several head but gives attention on the specific form of consumption of these services (Samuelson, 1954). Samuelsson rejected the role of political economy by stating that any further examination of the problem raised by public expenditure would take us into the mathematical domain of sociology or welfare politics and that may result to the pure blessing that within this domain there happened to be sub sector political economy with the simple properties of traditional economics (Greg & Agboro, 2014) .

According to Samuelson (1995), public expenditure will grow in order to achieve growth in labor (L) which involves increase in education expenses, growth in capital (K) and all these will come with through savings , borrowings and technological innovation (Tn), therefore we can state  $Q=F(K,L,Tn)$ . To have earlier stage of national development, there is need for overhead capital such as roads, harbors, power installation, pipe-born water education etc., but as the economy developed public share in capital formation to decrease over time. However, individual expenditure pattern is thus compared to national expenditure (Greg & Agboro, 2014).

## 2.4. International Context

Diebolt (1999) tried to analyse the impact of government expenditure on education in relation to economic cycles. The study was carried out to describe the macro economic meaning of education in the way that how resources are allocated and devoted. In order to study, volume of coordinated, homogenous and comparable data is taken. A Keynesian model is taken in the study which is formalized by matrix equation. The study shows the complex conjuncture of expenditure on education. The study has shown that changes and development of the educational and training system contributed to improve the quality of labour force. In the advanced economy education no longer operates as an exogenous variable but comes to act as the integral part of an economy which assisted to correct the imbalances in an economy.

Jacob and Walid (2004) worked on studying the impact of per worker education expenditure in relation to economic growth. The aggregate production is used in the analysis of the study. The variables used are GDP, capital, labour and government expenditure. The nature of the study is time series analysis starting from the year 1965 to 1999. In order to study the relationship between education expenditure and economic growth cointegration test and error correction term is used. The study shows that there is positive correlation between education expenditure and economic growth. The study suggests that advice of donor community to enhance education expenditure is economically sound. The study also suggests that there should be sound administration at lower levels of government to distribute and execute resources. The study also found the necessity of macroeconomic stability to implement socio economic policies.

Chandra (2010) tried to determine the causation between education expenditure and economic growth. The study is time series analysis which consists the time period starting from 1951 to 2009. The variables taken under consideration are GDP and education expenditure. Time series data are non-stationary at a level but found to be stationary at first difference, the study has shown that there exists bidirectional causality. The study shows that education expenditure does not have short term impact on economic growth rather expenditure on education has impact after the period of five to six years.

Nazneen and Joseph (2011) tried to evaluate the relationship between human capital stock and real GDP Bangladesh by using the technique of Vector Error Correction and Vector Auto Regression. Time series analysis is done by taking sample period starting from 1973 to 2004 of Bangladesh using econometric tools. Innovation in secondary education shows short term and medium term effect in GDP. The study states that if there is increase in human capital then there will be increase in income. The study suggests that Bangladesh economy should invest in primary and secondary education.

Muktdair and Dewan (2012) aimed to study the long-run relationship between public expenditure on education sector and economic growth in Bangladesh where econometric model is applied to investigate with time series data from 1995-2009. The study is conducted by Cointegration technique. The result shows that the 1 percent increase in public expenditure in education contributes 0.34 percent increase in GDP per capita in the long run. Study also shows that public spending in education has a positive and significant impact on economic growth in the long run. The study has suggested to increase the government spending on education and work on developing the education and quality.

Mohd, Fidlizan, Mohd and Azila (2012) have conducted the study to explore the long-run relationship and causal relationship between government expenditure on education and economic growth in Malaysian economy. In order to conduct the study for the period 1970 to 2010, time series data is used. To explore the relationship an estimation of Vector Auto Regression (VAR) method is applied from which it is observed that economic growth positively co-integrated with fixed capital formation, labor force participation and government expenditure on education that were considered as the representative variables in their study. In short run education granger cause economic growth and vice versa. The VAR result showed that GDP has positive, significant and long run relationship with fixed capital formation, government expenditure on education and labour force participation. From the study it is observed that education with better standard improves productivity and efficiency. So it is suggested from the study that government should give high priority on expenditure on education in order to have better economic output.

Urhie (2013) studied the impact of education expenditure and economic growth in Nigeria to study the effect of both recurrent and development expenditure on education

took a time series data from 1970 to 2010 with major objective of evaluating the relationship between public education expenditure and economic growth in Nigeria. In the study two stage least Squares estimation method was used so as to ensure both unbiased and consistent coefficient estimates is used in the study. The result from the study revealed that public education expenditure has both direct and indirect effects on economic growth. The study has shown that total public education expenditure can promote economic growth without improving education attainment first. There are different effects of public recurrent education expenditure and public capital education expenditure on economic growth. The results propose that capital expenditure do have larger effect on education while recurrent expenditure has greater effect on GDP growth. The study suggested that to have greater efficiency in public expenditure on education to reap benefits from public education expenditure.

Ali and Sulieman (2014) has conducted the study to examine the impact of the public expenditure on economic growth in Jordan during the time period starting 1993 to 2013, by observing the contribution of the current and capital expenditures on Education, Health facilities, Economic Affairs, Housing and community and Utilities. The study was mainly focused on how these expenditures affected on the economic growth of Jordan. Descriptive and econometric tool is used to examine the relation between public expenditure and economic growth. From the analysis it is seen that current expenses made on health, economic affairs, housing community facility and capital expenditure on health and economic affairs has significant impact but statistically non-significant relation is seen in case of current and capital expenditure on education as well as capital expenditure on housing and community facilities. The study has suggested to increase awareness programme among various community groups associated social sectors and activities to motivate their participation in the given opportunities.

Harpaljit, Baharom, and Muzafar (2014) conducted the study to examine and explore the relationship between education expenditure and economic growth in China and India by taking annual time series data from 1970 to 2005. Various econometric tools like Johansen- Juselius (1990) co-integration test, Ordinary Least Square method, Dynamic Ordinary Least Square, Vector Error Correction Model were used. Level of income and expenditure on education is analysed both in China and India. From the study it is seen that economic growth is affected by expenditure made on education. Long run



relationship is derived between income level and education expenditure in both China and India. A unidirectional causal relationship is obtained both running from income level to education expenditure in case of China, but the case of India education expenditure Granger causes income level. The study has suggested to implement important policies on education expenditure. Finally this study has shown that public expenditure on education is important factor to the economic growth of the country.

Yousra, Aziz, and Monir (2014) tried to find whether spending on all level of education cause economic growth in Algeria or not. The time considered for this study is the period starting from 1974 to 2012. In order to study the relationship endogenous growth model is taken into consideration. In this model human capital is taken into consideration, of which proxy is spending on education. Econometric tools are used to make study more accurate which consists of Ordinary Least Squares (OLS), Johansen Co-integration test and Causality Test. The correlation study has indicated that there exists strong positive correlation between public spending on education and economic growth. From the study it is seen that education spending impact is seen over the period of time.

Lalit (2014) on his study name does education expenditure impact India's economic growth, took annual data of the period ranging from 1981 to 2011 in order to study the relationship between public expenditure on education and economic growth. To check whether data is stationary or not, unit root test was done with Augmented Dickey Fuller test (ADF) following co integration and causality tests. The study has shown following results, Ordinary Least Square Method analysis suggests that there is positive relationship between education expenditure and GDP and vice versa and also there is positive relationship between GDP and gross domestic capital formation and vice versa. From unit root test it is seen that economic growth; education and gross domestic formation are non-stationary at the level data but found stationary at the first differences. Education, economic growth and gross domestic capital formation were found to be integrated of order one using the ADF and finally the Granger causality test finally proved that there is no causality between economic growth, education and GDCF. Causality is seen only in education and economic growth. It is suggested that level of human capital should be increased in order to promote productivity and finally the economic growth.

Mehmet and Sevgi (2014) studied the effect of education expenditure on economic growth, where data of 1970-2012 have been used. Bounds test approach developed by Pesaran, Shin, & Smith (2001) was used in order to search the effect of education expenses on economic growth. It is observed that education expenses in Turkey had a positive effect on economic growth. It is seen that one percent increase in education expenses has resulted increase in economic growth by 0.3 percent. The error correction term is significant indicating there is long term convergence. The study shows that there exists positive and significant relationship between education expenses and economic growth. It is also observed that more allocation of resources on education would affect Turkish economy positively.

Aqil, Aziz, Dilshad, and Qadee (2014) observed the relationship between Public Education Expenditures and Economic Growth of Pakistan. In order to study the relationship data from 1971 to 2012 has been obtained relating to public education expenditure (percent of GDP) and GDP per capita. Public education expenditure is taken as an independent variable while GDP per capita is taken as dependent variable. In order to know the relationship between the variable simple linear regression is used. The study has shown that there is significant impact of public expenditure on education towards GDP.

Greg and Agboro (2014) on their study the determinants of public expenditure on educational infrastructural facilities and economic growth in Nigeria had major objective to examine the impact of public expenditure in education on economic growth in Nigeria using time series data of economic growth and public expenditure. The model thus constructed is tested by using ordinary least square method and vector error correction method. To study the impact of regime changes a dummy variable was introduced. This was done to ascertain the depth of expenditure based on regime. The study has shown that spending on education expenditure by government has significant effect on economic growth. The study also depicted that the depth of expenditure between the regimes was different but not found to be significant. The study has recommended that a favorable working environment should be provided for both academic staff and their non academic personnel with sustainable wages. Government should improve the existing educational facilities by either boosting them up or by introducing new ones to enhance educational system.

Mallik, Das, and Pradhan (2016) in order to study the impact of educational expenditure on economic growth in major Asian countries, observed the dynamics of expenditure on education and economic growth in 14 major Asian countries with the help of balanced panel data from 1973 to 2012. The production function is used in the study. The results using Pedroni cointegration states that there exist of long-run equilibrium relationships between expenditure on education and economic growth on selected countries. The Full Modified Ordinary Least Square (FMOLS) results shows a positive and statistically significant impact of education expenditure on economic development of all the 14 Asian countries which are taken under the study namely Bangladesh, China, Hong Kong, India, Japan, Nepal, Pakistan, Malaysia, The Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand, and Turkey. The result using panel vector error correction (PVECM) showed unidirectional Granger causality that run from economic growth to expenditure on education (short and long term) whereas expenditure on education just Granger causes economic growth in long-run in selected countries. FMOLS presented positive impact of educational expenditure on economic growth. The study argued that education sector is one of the important factors of economic growth in these Asian countries. The recommendation from the study suggest that education sector should be given priority, large amount of expenditure of the governments should be made on education sector by boosting various elementary, higher and technical educations in the respective nations in order to get proficient man power for the long term development.

## **2.5. National Context**

Dahal (2010) on his study tried to investigate the causal relation between the development of human capital and development in Nepal. Author has taken time series data on enrollment in higher education and teachers working in the lower secondary and secondary schools and gross domestic product of Nepal for the period 1975-2009 and investigated the Granger's causality. The study shows that there exists granger causality from real gross domestic product to enrollment in higher education whereas causality was neutral between real gross domestic product and school teachers. The author has suggested to make higher education globally competitive by improving quality and skilled learning by which there will be positive effect in productivity enhancement.

Mainali (2012) has established the relationship of government expenditure with GDP. Causal relationship of government expenditure with GDP is done by using econometric tools. Cointegration estimation is used to trace long run relationship and error correction model (ECM) is used for short term analysis. From the study it is seen that government expenditure has positive relationship with growth. There is cointegration relation of GDP with recurrent expenditure, gross investment and labour force. ECM is also positively significant, the increase in recurrent expenditure and gross investment has positive relation to GDP even in short run. This study has emphasized the importance of government expenditure on economic growth. The study has suggested to have effective allocation of government expenditure.

Bhattarai and Shrestha (2015) conducted the study to examine the impact of public investment in an economy. The time series data is taken for the study starting 1974 to 2014 as a sample period in the study. The simple regression analysis is carried out to investigate the investment in education to economic growth in terms of agricultural output. The variables considered are Real Gross Domestic Product, Gross Fixed Capital Investment, Development Expenditure in education, higher level student number of Enrollment, Agriculture output ratio in GDP and Higher level student number of Enrollment in agriculture and forest. The study has shown that coefficients of gross fixed capital formation investment and higher level educational enrollment are positive and significant relationship positive relation with GDP similarly result carried out by econometric analyses shown that students enrollment in agriculture and forestry institute and agriculture output ratio in GDP are not in projected direction. Similarly impact of investment in education especially in agriculture and forestry technical education is not conclusive and it requires deeper analysis in order to find the relationship between these two variables. From the study it is suggested to have major share on education in the national budget. It is also suggested to have coordination on technical education both in private sector and public policies.

## **2.6 Research Gap**

The international review of the existing empirical literature on impact of education expenditure on economic growth by Jacob and Walid (2004), Muktdair and Dewan (2012), Mohd, Fidlizan, Mohd and Azila (2012) , Harpaljit, Baharom, and Muzafar (2014) , Yousra, Aziz, and Monir (2014), Lalit (2014), Mehmet and Sevgi (2014), Aqil,

Aziz, Dilshad, and Qadee (2014) Greg and Agboro (2014), Mallik, Das, and Pradhan (2016) shows positive relation whereas study done by Ali and Sulieman (2014), Nurudeen and Usman (2010) showed negative relationship. In Nepalese context Mainali (2012) showed positive relationship between expenditure made by government have positive effect on growth. Likewise Bhattarai and Shrestha (2015) do also proved positive relation between education investment on education has positive effect on economic growth. Since study is not done more on this topic, there exists dilemma of whether public recurrent and capital expenditure on education has impact on growth. So, this research study tries to explore the short run and long run relationship between education and economic growth in Nepal, taking GDP as dependent variable and expenditure on education as independent variable as independent variable, by applying econometric techniques on the annual dataset covering the time period from 1975 to 2016.

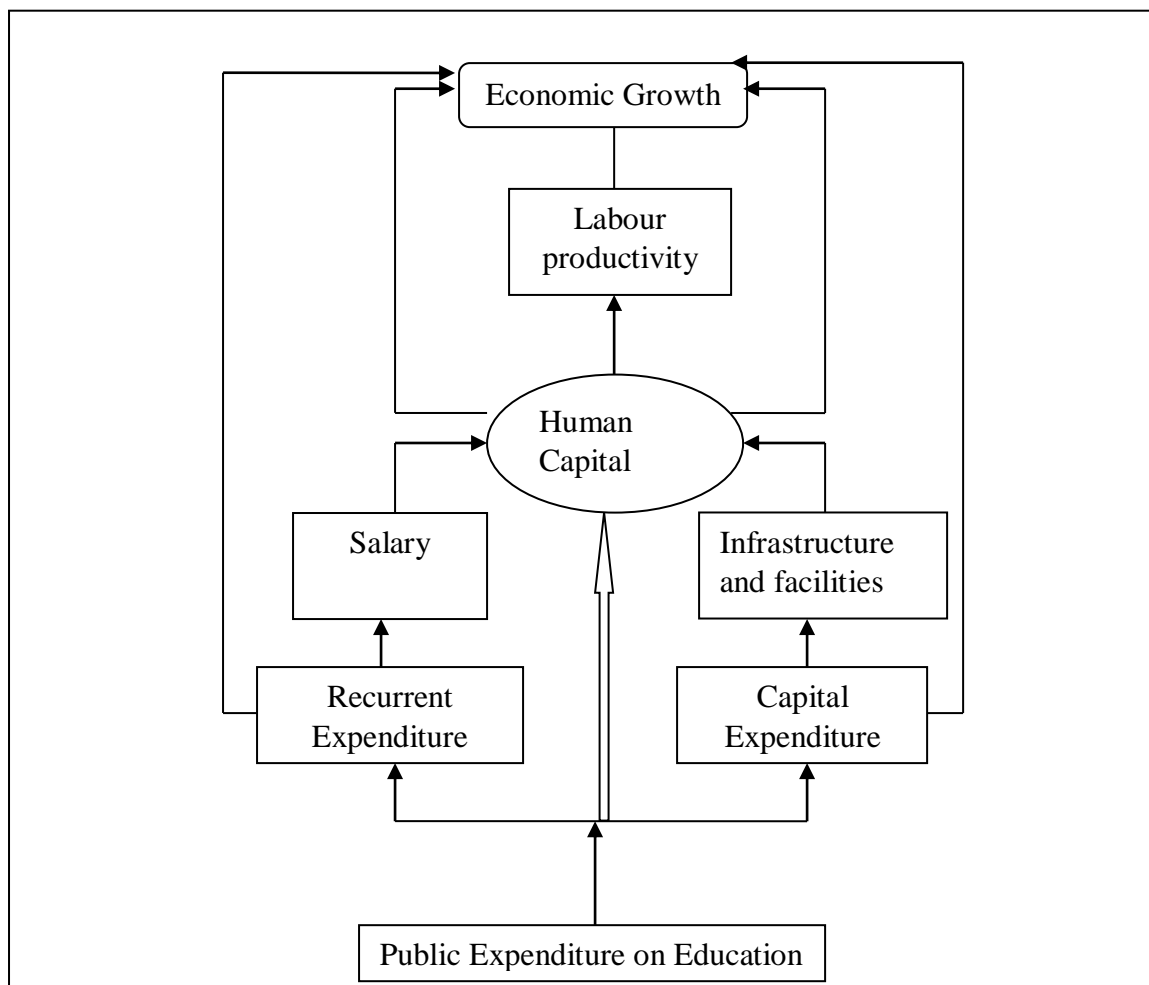
# CHAPTER-III

## RESEARCH METHODOLOGY

### 3.1. Research Framework

Public expenditure on education impact can be shown in terms of recurrent expenditure and capital expenditure. Capital expenditure deals with the development of infrastructure and equipment required for the development of education while recurrent expenditure generally deals with the salary. Thesis has taken the theoretical framework base developed by Urhie (2013).

**Figure 3.1 : A Framework for Public Expenditure on Education and Economic Growth**



Source: Public education expenditure and economic growth in Nigeria, Urhie (2013)

Infrastructure and equipment has major role on development of human capital while salary which ultimately has effects on education and to labour productivity and ultimately to economic growth. Public expenditure on education with different nature have different impact on growth. Recurrent expenditure on education includes salary given to teachers and staff, allowances, payment of utility and services etc. Recurrent expenditure is the motivation factor which in turn has effect on the better education which develops the labour productivity. Labour productivity increased by level of education affects competitiveness of countries positively and also facilitates openness (Mehmet & Sevgi, 2014). Similarly capital expenditure on education refers to the investment in infrastructure and facilities. The nature of capital expenditure is that it is not repeated and expected to give returns in the long run (Norimah, Binit, Emila, Dayang, & Awang, 2016).

Investment in education can increase the production capacity more than any other factor of production in order to transform them into new products and process. The investment in knowledge which is characterized by increase in rate of return on investment is the key for long term economic growth (Zoran, 2015). Human capital enhances the rate of growth either through the direct accumulation or through existing stock of knowledge which will result to innovation and spillover to the rest of the economy (Mukherjee, 2006).

The influence of education on economic growth was emphasized by leading economist, Denison (1967). Researcher traced that there was a remarkable importance of education on economic growth of a nation. It has a positive impact on labour productivity. Labour with more professional expertise can be engaged in skilled works which visualize the economic growth and nation building (Denison, 1967).

### **3.2. Research Design**

The main objective of the thesis is to find the relationship between public expenditure on education and economic growth. In order to achieve the given objective different technique is adopted. The methods adopted includes quantitative and qualitative techniques. Under Qualitative techniques is used to observe the nature and trend of variables through graphical and tabular presentation. For quantitative analysis,

descriptive analysis, unit root testing of variable, Johansen cointegration test and Vector Error Correction Model and VEC granger causality is used.

### **3.3. Sources of Data**

In order to fulfil the objective of the research secondary data published by regulatory and autonomous body of Nepal is used. Data published by Nepal Rastra Bank, Central Bureau of Statistics, and Ministry of Finance is taken under consideration in the study ranging the period of 1975AD to 2016 AD. The necessity to take these data is nature of study i.e. econometric time series method is adopted to study the prescribed relationship. So to fulfil the objective time series data of GDP, public expenditure (recurrent and capital) on education, gross domestic capital formation and secondary enrolment is taken. GDP is taken from Nepal Rastra Bank, public expenditure on education, gross fixed capital formation and secondary education enrolment is taken from economic survey.

### **3.4. Explanation of Variables**

For the purpose of addressing the impact of public education expenditure on economic growth variables with specific meaning is necessary. So under the model variables are considered as proxy of production function. These various variables are used to explain the relationship between the expenditure and growth through quantitative as well as qualitative tools.

**Gross Domestic Product (GDP):** GDP is the total market value of all currently produced final goods and services from every producing units within the geographical territory of a country during the period of time. It is taken out from the Current Macroeconomic Indicator produced by Nepal Rastra Bank.

**Public Expenditure on Education (PEE):** Public expenditure on Education is the total expenditure both recurrent and capital spent by government during the period of time. It is taken from the statistical year book produced by Central Bureau of Statistics.

**Gross Fixed Capital Formation (GFCF):** Gross Fixed Capital Formation measures the net increase in the Physical Assets in an economy. The data related to GDCF is taken from the Economic Survey.



**Secondary Education Enrolment (SEE):** It measures the total enrolment of the students in the secondary level during the fixed period of time. The data regarding secondary Education Enrolment is taken from the economic survey.

All the variables taken above are in natural log form so as to remove the unit differences between the variables.

### 3.5. Specification of the Model

There are a lot of authors who estimated the relationship between public expenditure on education and economic growth using different econometric models. The choice of econometric tools is based on the nature of the data that is used in the study.

The model used in this thesis is based on the aggregate production function used by Jacob & Walid (2004).

$$Y = A.k^\alpha .L^\beta .H^\gamma \dots\dots\dots(i)$$

Where,

- Y=Total output
- A=Technology (intercept)
- K= Total Stock of Capital
- L= labour Force
- H= Human Capital

In our study we replace the human capital by taking public recurrent and capital expenditure education. So the equation can be rewritten as:

$$Y = A.k^\alpha .L^\beta .E^\gamma \dots\dots\dots(ii)$$

From equation (ii) is base to develop the econometric model that helps to determine the relationship between Public Expenditure on Education and Economic growth. So we can write:  $GDP_t = A CEE_t^{\alpha1} REE_t^{\alpha2} GFCF_t^\beta SEE_t^\gamma \dots\dots\dots(iii)$

Where;

- Y= Gross Domestic Product (real)

CEE= Capital Expenditure on Education  
 REE= Recurrent Expenditure on Education  
 GFCF= Gross Fixed Capital Formation  
 SEE= Secondary Education Enrollment  
 t= Time period

Since the given model is nonlinear. In this case we cannot make the estimate the values of parameter directly. Due to unit differences between variables, data has been converted to the form of natural logarithm. This is also done in order to avoid the problem of model specification. So in this case we have to make the aggregate production function log linear as below;

$$LN\_GDP_t = A + \alpha_1 LN\_CEE_t + \alpha_2 LN\_REE_t + \beta LN\_GFCF_t + \gamma LN\_SEE_t + \varepsilon_t \dots \dots \dots (iv)$$

Where,

LN\_GDP<sub>t</sub>= logarithm of output (GDP)  
 LN\_CEE<sub>t</sub>=Log of Capital Expenditure on Education  
 LN\_REE<sub>t</sub> = Log of Recurrent Expenditure on Education  
 LN\_GFCF<sub>t</sub> = Log of Gross Fixed Capital Formation  
 LN\_SEE<sub>t</sub> = Log of Secondary Education Enrollment  
 A,  $\alpha_1$ ,  $\alpha_2$ ,  $\beta$ ,  $\gamma$  = Parameters to be estimated ; A being intercept (technology),  $\alpha_1$ ,  $\alpha_2$ ,  $\beta$ ,  $\gamma$  being the coefficients of capital expenditure on education, recurrent expenditure on education, gross fixed capital Formation and secondary education enrollment respectively.  
 t=time period to be estimated  
 $\varepsilon$ = Error Term

Equation (iv) is estimated by using the annual data starting from the period 1975 to 2016.

### 3.6. Tools of Data Analysis

To study the impact of public Expenditure on Education in relation to economic growth time series data is taken from the various sources published by Government of Nepal. This thesis relies on the time series data collected from 1975 to 2016. Before starting

time series analysis it is necessary to check whether the data is stationary or not. The data that are not stationary cannot be used for further analysis and the result thus obtained can be spurious. Among the various tests of unit root Augmented Dickey-Fuller (ADF) test is used in our study. Once variables' individual stationarity is checked then it is necessary to find the cointegration of variables. For cointegration, Engle-Granger cointegration, Johansen cointegration, Auto Regressive Distributed lag model method of cointegration are used. Since we have considered more than one independent variable and all the variables thus considered are on level so Johansen method of Cointegration and Vector Error Correction Model (VECM) is used for further analysis. VECM is adopted due to presence of cointegration among the variables. VECM will evaluate the statistical significance of the variables considered as well as short run causality among the variables. To compute the long run causality Granger Causality is used. In order to do diagnostic tests of variables like LM serial correlation, Heteroskedasticity and CUSUM test, normality test are carried out.

### 3.6.1. Unit Root Test

To check the stationarity of the variables unit root test is adopted. If series has mean and variance constant over the period of time then we can say that data is stationary. So it is necessary to study the time series property of the variables namely gross domestic product, public capital and recurrent expenditure on education, gross fixed capital formation and secondary enrollment ratio. This is done to find out the level of stationarity of the variables either level or the first difference, so that appropriate method of cointegration is used. If non stationary variables are regressed then there can be the problem of spurious regression (Granger & Newbold, 1974). ADF is most popular test among other tests (Elder & Kennedy, 2001). The ADF is better approach to check whether the data sets are stationary or not because of its robustness and the capacity to remove auto correlation from the model due to adjustment of lags. In equations (i) and (ii) below the series of interest is  $X_t$ . The symbol  $\Delta$  indicates the first difference of the series  $X_t$  in equation (ii) is a time trend, and  $n$  is the number of lag of variables that are used to ensure the error term  $e$  is error term. The lag selection is done automatic under AIC.

$$\Delta X_t = \alpha_1 + \gamma_1 X_{t-1} + \sum_{i=1}^n c_{1i} \Delta X_{t-i} + e_{1t} \dots \dots \dots (i)$$

$$\Delta X_t = \alpha_2 + \gamma_2 X_{t-1} + \beta t + \sum_{i=1}^n c_{2i} \Delta X_{t-i} + e_{2t} \dots \dots \dots (ii)$$

Where,  $n$  is the number of lags. The ADF techniques tests the null hypothesis  $Y_i = 0$ , and alternative hypothesis  $Y_i < 0$ , if the null hypothesis is rejected then we can say that series  $X_t$  is stationary. In equation (i) the alternative hypothesis indicates the series is a mean-stationary and in equation (ii) it indicates the series is a trend stationary.

The major issues in performing ADF test is inclusion of the intercept, trend and intercept and none. Thesis stationarity is checked based on intercept as well as trend and intercept.

### 3.6.2. Johansen Cointegration Test

A time series variable has distinct property that, if two variables are non-stationary but linear combination of these variable are stationary, then we can say that series is cointegrated. A vector of time series variables  $X_t$  is cointegrated if each element is integrated of order one,  $I(1)$ , but there exists a nonzero vector  $\lambda$  (called the cointegrating vector) such that  $\lambda \times X_t$  is integrated of order zero,  $I(0)$  (Dahal, 2010). Economic theory guides that certain subset of variables should be linked by a long-run equilibrium relationship. Although the variables under concern may drift away from equilibrium for a while, economic forces or government actions may be expected to restore equilibrium. Johansen and Juselius (1990) cointegration test to identify the existence of any cointegrating relationship between RGDP, public recurrent and capital expenditure on education, gross fixed capital formation and enrollment in higher education in Nepal. Johansen (1988,1991) and Johansen and Juselius (1990) derived maximum likelihood procedures for testing cointegration of finite order ( $n^{\text{th}}$  order) as:

$$Y_t = \lambda + Z_1 Y_{t-1} + \dots + Z_n Y_{t-p} + \varepsilon_t \dots \dots \dots \text{(iii)}$$

Where  $Y_t$  is the  $P \times 1$  vector of variables integrated of order one.  $\lambda$  is the drift  $Z$  is called matrix of parameter ( $i= 1,2,\dots,P$ ) and  $\varepsilon_t$  is called  $n \times 1$  vector of normal error terms with mean zero.

There are two tests under Johansen test of cointegration the maximum eigenvalue test, and the trace test. For both test statistics, the initial Johansen test is a test of the null hypothesis of no cointegration against the alternative of cointegration. The tests differ in terms of the alternative hypothesis.

### 3.6.2.1. Maximum Eigenvalue Test

The maximum eigenvalue test examines whether the largest eigenvalue is zero relative to the alternative that the next largest eigenvalue is zero (Gerald, 2015). The first test examines if the rank of the matrix  $\Pi$  is zero. The null hypothesis is that  $\text{rank}(\Pi) = 0$  being alternative hypothesis is that  $\text{rank}(\Pi) = 1$ . For further tests, the null hypothesis is that  $\text{rank}(\Pi) = 1, 2, \dots$ . Being alternative hypothesis is that  $\text{rank}(\Pi) = 2, 3$ , If the rank of the matrix is zero then the largest eigenvalue is zero which states that there is no cointegration and tests are done. If the largest eigenvalue  $C$  is nonzero, the rank of the matrix is at least one and there might be more cointegrating vectors and so on. The test of the maximum eigenvalue is a likelihood ratio test. The test statistic is:

$$LR(r_0, r_0+1) = -T \ln(1 - \lambda_{r_0+1}) \dots \dots \dots (iv)$$

Where,  $LR(r_0, r_0+1)$  is the likelihood ratio test statistic for testing whether  $\text{rank}(\Pi) = r_0$  versus the alternative hypothesis that  $\text{rank}(\Pi) = r_0 + 1$ . For example, the hypothesis that  $\text{rank}(\Pi) = 0$  versus the alternative that  $\text{rank}(\Pi) = 1$  is tested by the likelihood ratio test statistic (Gerald, 2015) as:

$$LR(0, 1) = -T \ln(1 - \lambda_1) \dots \dots \dots (v)$$

### 3.6.2.2 Trace Test

The trace test is a test whether the rank of the matrix  $\Pi$  is  $r_0$ . The null hypothesis is that  $\text{rank}(\Pi) = r_0$ . The alternative hypothesis is that  $r_0 < \Pi \leq n$ , where  $n$  shows the maximum number of cointegrating vectors that is possible. For the following test if this null hypothesis is rejected, the next null hypothesis is that  $\text{rank}(\Pi) = r_0 + 1$  and the alternative hypothesis is that  $r_0 + 1 < \Pi \leq n$ . Testing continues as for the maximum eigenvalue test. The likelihood ratio test statistic is

$$LR(r_0, n) = -T \sum_{i=r_0+1}^n \ln(1 - \lambda_i) \dots \dots \dots (vi)$$

Where  $LR(r_0, n)$  is the likelihood ratio statistic for testing whether  $\text{rank}(\Pi) = r$  versus the alternative hypothesis that  $\text{rank}(\Pi) \leq n$ . For example, the hypothesis that  $\text{rank}(\Pi) = 0$  versus the alternative that  $\text{rank}(\Pi) \leq n$  is tested by the likelihood ratio test statistic

$$LR(0, n) = -T \sum_{i=1}^n \ln(1 - \lambda_i) \dots \dots \dots (vii)$$

**3.6.3. Vector Error Correction Model**

If there exists long run relationship between the variables in same level homogeneity during Johansen cointegration test, then VECM is run to determine error correction term. Engle and Granger (1987) and Toda and Phillips (1993) introduced error correction model as a method to compute causality when variables are cointegrated. In VECM we generally used to measure Granger Causality.

There may be several linearly independent cointegrating vectors. To introduce the concept of cointegration in the VAR framework, let us consider that that all individual variables are I(1) or I(0) and the data generating process is a Z dimensional VAR(p) process

$$Y_t = A_1 Y_{t-1} + \dots + A_p Y_{t-p} + u_t \dots \dots \dots (viii)$$

Without deterministic terms. Subtracting  $y_{t-1}$  on both sides of the equation and rearranging terms yields the VECM

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \dots + \Gamma_{p-1} \Delta y_{t-p+1} + u_t, \dots \dots \dots (ix)$$

Where,

$$\begin{aligned} \Pi &= -(I_Z - A_1 - \dots - A_p) \\ \Gamma_i &= -(A_{i+1} + \dots + A_p), \quad i = 1 \dots p-1 \end{aligned}$$

**3.6.4. CUSUM Test and CUSUMSQ Test**

Under the recursive testing cumulative sum and cumulative sum of square is used. They are explained below:

**3.6.4.1. CUSUM Test**

CUSUM helps to show if coefficients of regression are changing systematically (Bhatti, Hatem, & Hossain, 2006). The CUSUM test is based on the cumulative sum of the recursive residuals. This option plots the cumulative sum together with the 5 percent

critical lines. The test finds parameter instability if the cumulative sum goes outside the area between the two critical lines.

The CUSUM test is based on the statistic

$$W_t = \sum_{s=n+1}^t \frac{w_s}{\hat{\sigma}}$$

For  $t = n+1 \dots \dots \dots T$ , where  $W_t$  is the recursive is residual which is normally distributed with mean zero and variance  $t-n$  and  $\hat{\sigma}$  is the standard error of the regression fitted to all sample points  $T$  (Garbade, 1975). If the vector of the parameter remains constant from period to period,  $E(W_t) = 0$ , but when there is change in vector  $W_t$  will get diverged from the zero-mean value line. The 5 percent significance lines are found with the connection of these two points:

$$\left[ n, \pm 0.948(T - n)^{\frac{1}{2}} \right] \text{ and } \left[ T, \pm 3 \times 0.948(T - n)^{\frac{1}{2}} \right]$$

If the line passes out from the critical line then the model remains to be instable.

### 3.6.4.2. CUSUMSQ Test

CUSUM square shows if the coefficients of regression are changing suddenly. (Bhatti, Hatem, & Hossain, 2006).

The CUSUM of squares test is based on the test statistic (Garbade, 1975):

$$W_t = \frac{\sum_{s=n+1}^t w_s^2}{\sum_{s=n+1}^T w_s^2}$$

The expected value under the hypothesis if parameter is constant is  $E(S_t) = \frac{t-s}{T-s}$ , which goes from zero to unity. The CUSUM of Square test provides a plot of against and the pair of 5 percent critical lines. As with the CUSUM test, movement outside the critical lines suggests that parameter of variance of instable.

### 3.6.5. Granger Causality Test

Granger (1969) introduced the ideology of causality speaking that B variable is said to be Granger caused by variable A if present value of B can be predicted with greater accuracy by using past value of A. The study employs Granger Causality in order to investigate the causal relationship between the GDP and variables like public recurrent and capital expenditure on education, gross fixed capital formation and secondary education enrollment rate. Consider two-time series  $Y_t$  and  $X_t$ , the series  $X_t$  fails to Granger cause  $Y_t$  if in a regression of  $Y_t$  on lagged  $Y$ 's and lagged  $X$ 's, the coefficient of later is zero (Maddala, 2009).

The Granger representation theorem (Robert & Granger, 1987) clarifies that if two variables are cointegrated and each is individually I (1), then either  $Y_{1t}$  Granger causes  $Y_{2t}$  or  $Y_{2t}$  to  $Y_{1t}$ .

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta Y_{t-1} + \dots + \alpha_n \Delta Y_{t-n} + \beta_1 \Delta X_{t-1} + \dots + \beta_n \Delta X_{t-n} + u_t \dots (x)$$

$$\Delta X_t = \gamma_0 + \gamma_1 \Delta X_{t-1} + \dots + \gamma_n \Delta X_{t-n} + \delta_1 \Delta Y_{t-1} + \dots + \delta_n \Delta Y_{t-n} + v_t \dots (xi)$$

It is assumed that disturbances  $u_t$  and  $v_t$  are uncorrelated.

There is following hypothesis tested for determining causality:

$H_0: \beta_1 = \beta_2 = \dots = \beta_n = 0$ , this shows X does not have effect on Y.

$H_1$ : At least one  $\beta_1 \neq 0$  i.e., X has effect on Y.

Similarly,  $H_0: \delta_1 = \delta_2 = \dots = \delta_n = 0$ , i.e., Y does not have effect on X.

$H_1$ : At least one  $\delta_i \neq 0$  i.e., Y does not have effect on X.

It shows,  $H_0: \beta_1 = \beta_2 = \dots = \beta_n = 0$  and  $H_0: \delta_1 = \delta_2 = \dots = \delta_n = 0$ , X and Y are independent.

There is no Granger Causality in any direction.

$H_1$ : At least one  $\beta_1 \neq 0$  and  $\delta_i \neq 0$  At least one, both X and Y causes each other that is there exists bidirectional causality.



### **3.6.6 Residual Diagnostic Test**

The residual diagnostic test like Serial correlation, Heteroskedasticity and Normality test are carried out.

#### **1. Serial Correlation LM Test**

The lag correlation of the residual series is called serial correlation. The null hypothesis of the serial correlation LM test is that there is no serial autocorrelation. The alternative hypothesis is there is serial autocorrelation in the model. The residual series of the VECM model should not contain serial autocorrelation for the model to be valid.

#### **2. Heteroskedasticity Test**

One of the important properties of OLS method is that the variance of the random term is constant. If this property is violated, then it is called heteroskedasticity. It means that heteroskedasticity exists when values of variance of the random term are different for different observations. The null hypothesis of the heteroskedasticity test is that there is no heteroskedasticity in the residual series of VECM model. The alternative hypothesis is there is heteroskedasticity in the model. If the residual series of the VECM have no heteroskedasticity, then the model is considered better.

#### **3. Normality Test**

The null hypothesis of the test is that the residual series of VECM model is normally distributed. If the residual series of the VECM are normality distributed, then the model is considered better. In this study, the Jarque-Berra (JB) test is performed to check whether the residual series are normality distributed. If Jarque-Berra is greater than probability then ,series is normally distributed.

## CHAPTER-IV

### PRESENTATION AND ANALYSIS OF DATA

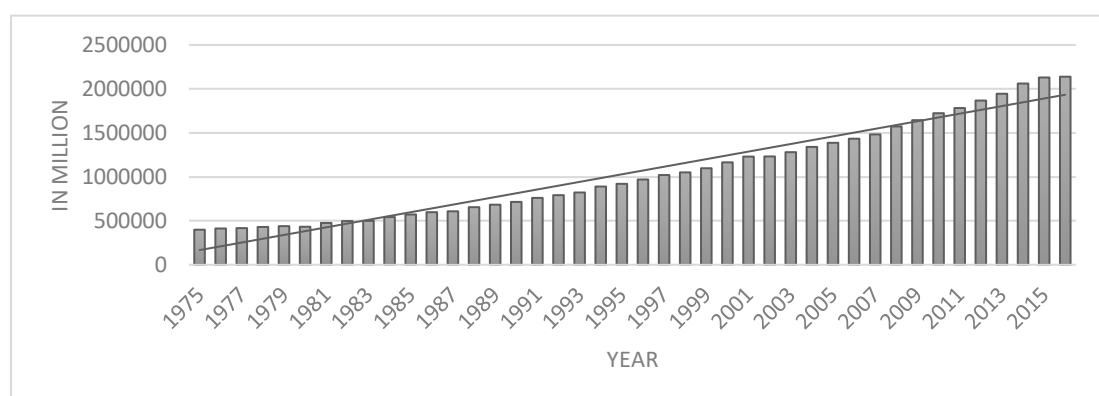
#### 4.1. Nature and trend of Public Expenditure on Education and GDP

In order to analyse the trend and structure of public expenditure on education and economic growth (GDP) descriptive analysis is carried out. In the process of analysis of the nature and trend various sources of publication are used they include economic survey published by Ministry of Finance, Statistical Year Book published by Central Bureau of Statistics, Current Macroeconomic and Financial Situation published by Nepal Rastra Bank.

##### 4.1.1 Trend of Real GDP

The pattern of GDP of the country shows that it is in increasing trend with no downturn in entire study period. While in case of real GDP it is only decreased in the year 1979. As we see there is positive improvement in social indicators of development, which is intact is the effect of increase in real GDP over the period of time. The nature and trends of public expenditure on education and economic growth can be traced in the figure:

**Figure 4.1. : Trend of Real GDP**



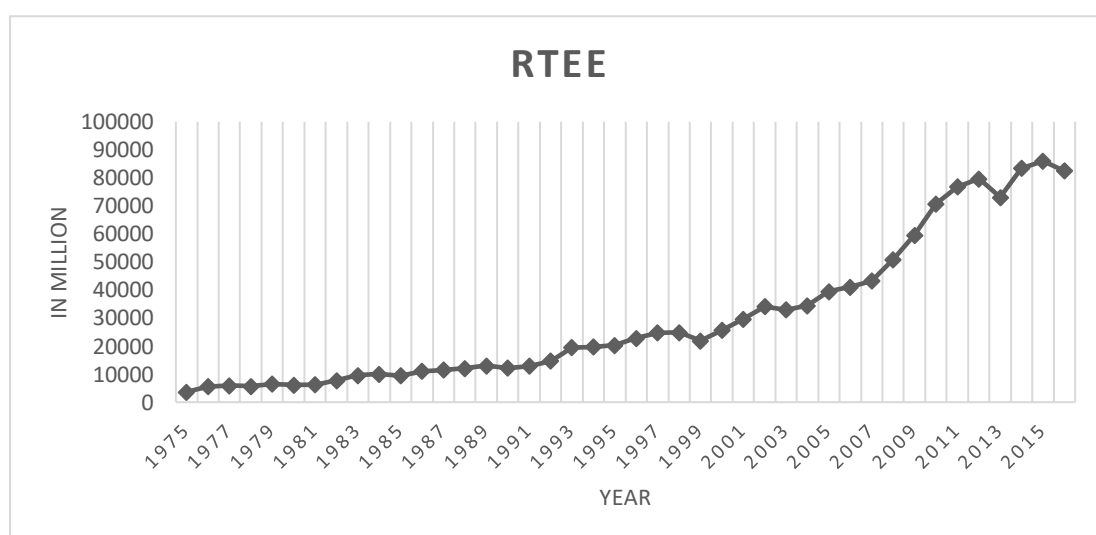
Source: author's calculation through Appendix B in excel

In the table 4.1. It is seen that real GDP has been increasing in smooth fashion. Beside year 1979 there is increase in RGDP, this is because of the spillover effect of improvement in and development of social indicators of development like health education etc.

#### 4.1.2. Trend of Public Expenditure on Education (TEE)

Public expenditure on Education has been increasing as over the period from 1975 to 2016. Public expenditure has been decreased in 2 fiscal year among 42 fiscal years. The decrease is in the year 1984 and 1998. As we know public expenditure on education has not instantaneous effect in the economy, it has effects especially in the long run. With the public expenditure on education it affects public consumption as well as public investment affecting demand for goods and services and thereby increasing output through multiplier and accelerator effect. As there is increase in the population, public expenditure on education is certain to increase.

**Figure 4.2 : Trend of Public Expenditure on Education**



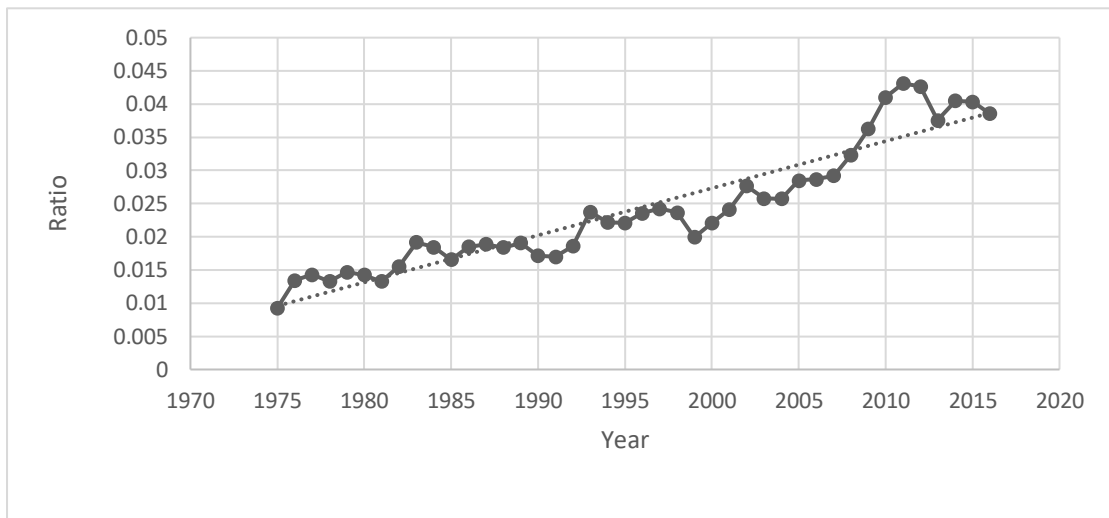
Source: author's calculation through Appendix B in excel

Similarly in the table 4.2 is seen that public expenditure on education is just moving by up to 1990 but as it is seen after that there is massive increase in the public expenditure on education. This is because there is change in regime from panchayat to democracy where there was increase in the government expenditure thereby in increase in public expenditure on education too.

#### 4.2. Trend of ratio of government expenditure on Education to GDP

The statistical trend regarding the ratio of public expenditure on education is shown in the given figure.

**Figure: 4.3 : Trend of Public Expenditure on Education to GDP ratio**



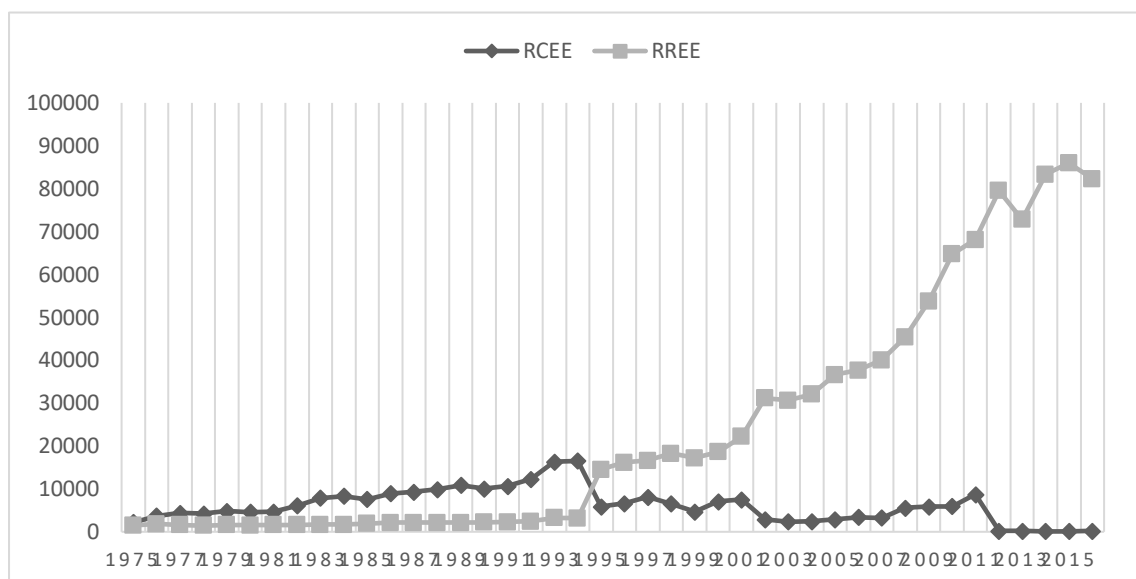
Source: author's calculation through Appendix B in excel

Figure 4.3 show that ratio of government expenditure to GDP is increasing over the period of time but it has been fluctuating between the periods of time. The ratio of government expenditure on education to GDP has increased from 1.2 percent in 1976 to 4.03 percent in 2015. The increasing trend of government expenditure of GDP is due to the need of more expenditure on education so that it could give long run effect on increasing growth potential of nation.

### **4.3. Trend of Recurrent and Capital Expenditure on Education**

The trend of recurrent and capital expenditure on education has shown dynamic phenomenon over the period of time. As it is seen that recurrent expenditure on education has been increasing at lower pace up to 1995 afterwards it has started with higher rate whereas capital expenditure on education has started decreasing after 1995.

**Figure 4.4 : Trend of Recurrent Expenditure and Capital Expenditure on Education.**



Source: author’s calculation through Appendix B

#### 4.4. Nature of Public Expenditure on Education

Trend of public expenditure on education borne by government during the period of time under various regimes is analyzed.

##### 4.4.1 Average in Panchayat, Democracy and Republican System

**Table 4.1 : Average under different Regimes**

Regime	RTEE (Rs.in Million)	TEE/GDP (in percent)
Panchayat(1975-1991)	9236.076	1.67496
Democracy(1992-2006)	27958.93	2.471059
Republic(2007-2016)	69978.93	3.813339

Source: author’s calculation through Appendix B in excel

Table 4.1 shows the trend of public expenditure on education and percent of total expenditure on education to the GDP for the period ranging 1975 to 2016 under the different system of the government that is exercised. For the panchayat system data

ranging from 1975-1991 is taken similarly for the Democracy period of 1992-2006 is taken and for the republic period data from 2007-2016 is taken under consideration. GDP is changed into real and under the base of 2016; expenditure is adjusted with NCPI published by Nepal Rastra Bank as a base of 2016. The data is summarized in such a way that it can depict the actual average under the different system of government. It is clearly seen that real expenditure on education has been increasing as time is moved from the panchayat to the democratic to the republic system of government. The reason for the increase in the government expenditure on education during the democratic period is due to the increase in the number of government workers so that high salary is to be given. During the republican age there is huge amount of increase in the salary of government employees as well as increase in the number of the schools, teachers and overall enrollment of the student. Similar is the case when one compares percentage of government expenditure on education to GDP ratio. It has increased from Panchayat to the Democracy and finally to the republic regime.

#### **4.5. Nature of Public Expenditure on Education 5 Year Average**

**Table 4.2 : Public expenditure on Education at five year average**

Time period	Average
1975-1979	5915.477
1980-1984	7946.243
1985-1989	11413.08
1990-1994	11882.66
1995-1999	18549.3
2000-2004	31390.74
2005-2009	46873.09
2010-2014	76739.09
2015-2016	81165.98

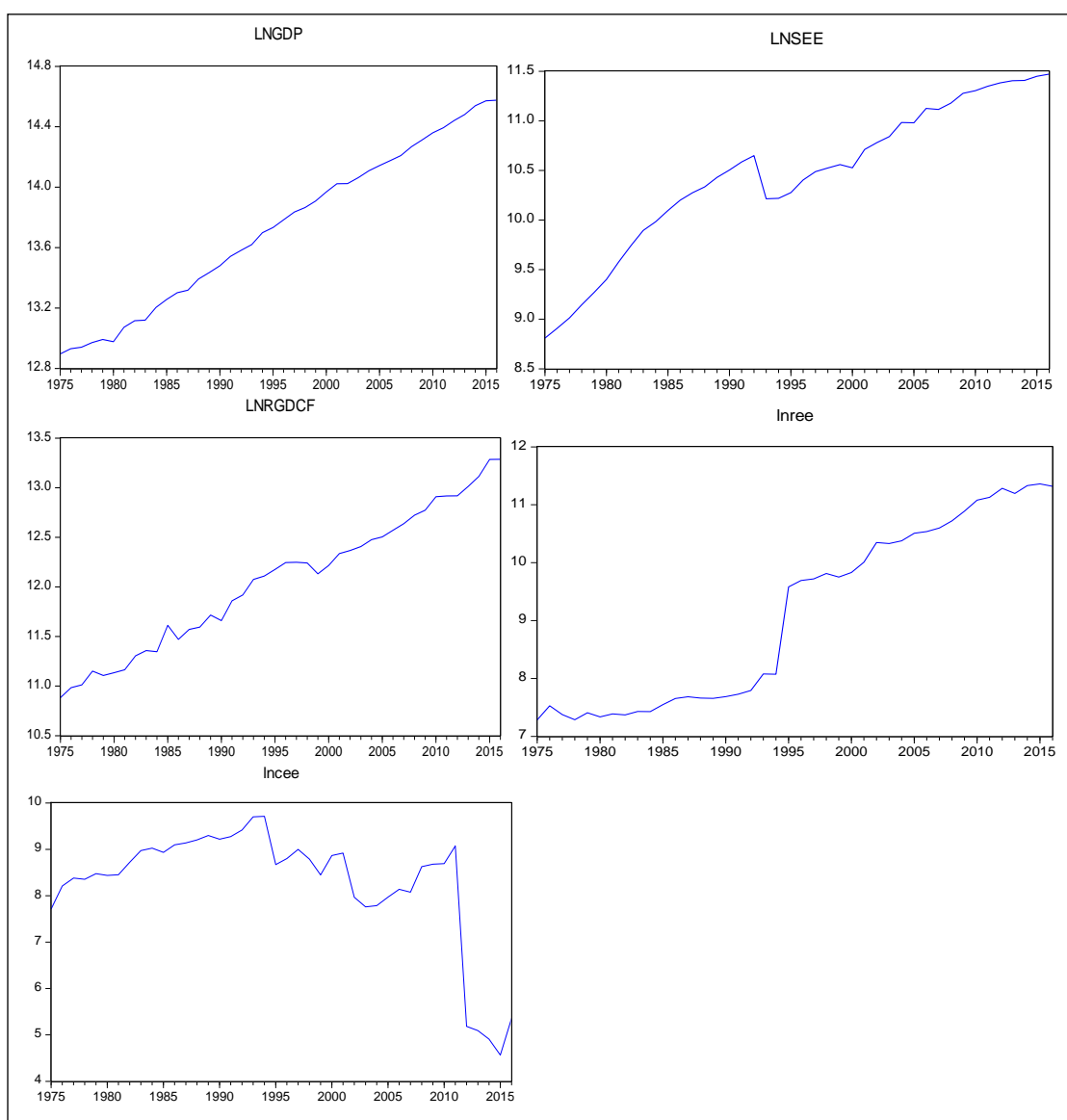
Source: author's calculation through Appendix B in excel

The average of public expenditure on education shows that it is increasing over the period of time in real term. The average has increased from Nrs. 5915.477 million starting the year 1975-1979 to 81165.98 on the period of two year average 2015-2016.

## 4.6. Relationship between Public Expenditure on Education and Economic Growth

In order to determine the short run and long run relationship among the public expenditure on education and economic growth it is necessary the order of integration of the variable.

**Figure 4.5 : Log of Public Expenditure on Education and Economic Growth**



Source: author's calculation through Excel and E-views.

In this regard it is seen the nature of the time series data that is used in this study. Here graphical presentation of data of done with the help of e-views and excel. Since the series shows that log of GDP is increasing over the period of time. It clearly shows that

data is not stationary at level. Log of Gross Fixed Capital Formation shows that the data has increasing trend over the period of time, though there is some irregularities along the period of time. Public expenditure on Education has increasing trend over the period of time. So the data shows that it is non stationary. Secondary Education Enrollment is increasing over the period of time but it has decreased and again it has increased with some irregularities. So it also shows that the data has increasing trend and non-stationary in nature. Further to know the process of nature of variable descriptive test is carried out.

#### 4.6.1. Descriptive Statistics

The given table shows the result of the descriptive statistics which is carried out before entering into the time series analysis.

**Table: 4.3 : Statistical analysis of selected variables**

	<b>LN_GDP</b>	<b>LN_CEE</b>	<b>LN_REE</b>	<b>LN_GFCF</b>	<b>LN_SEE</b>
<b>Mean</b>	13.73	8.26	9.11	12.06	12.75
<b>Median</b>	13.76	8.68	9.64	12.15	12.82
<b>Maximum</b>	14.58	9.71	11.36	13.29	13.77
<b>Minimum</b>	12.90	4.57	7.29	10.88	11.11
<b>Std. Dev.</b>	0.54	1.31	1.56	0.69	0.75
<b>Skewness</b>	-0.03	-1.76	0.10	-0.01	-0.55
<b>Kurtosis</b>	1.71	5.11	1.30	1.92	2.50
<b>Jarque-Bera</b>	2.91	29.52	5.12	2.05	2.57
<b>Probability</b>	0.23	0.00	0.08	0.36	0.28

Source: author's calculation through Appendix B in excel

The data set contains the 42 year of observation starting 1975 to 2016. The descriptive statistics shows that the average of LN\_GDP is 13.73 with standard deviation of 0.54 similarly the mean of LN\_REE and LN\_CEE is 9.93 with standard deviation of 0.91, average of LN\_GDCF shows 12.06 mean with standard deviation of 0.69 and finally that of LN\_SEE shows mean of 10.45 with standard deviation 0.75. All the variables are

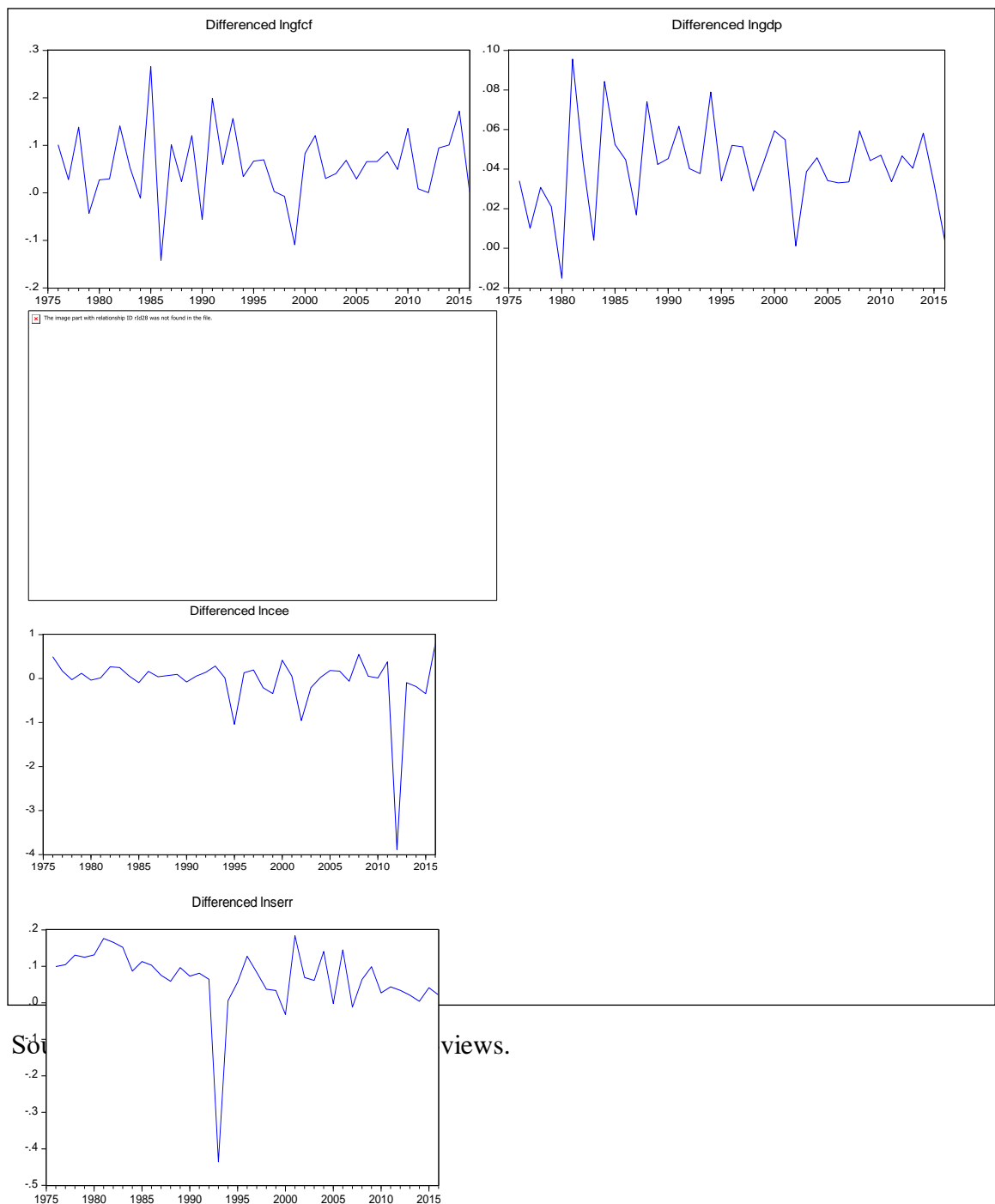


skewed leftward except LN\_TEE. The kurtosis shows all the variables are short tailed or with lower peak. Variables are not normally distributed except that of capital expenditure on education because the Kurtosis of variable is less than three.

#### 4.6.2. Graph of Differenced Data

Differenced data graph is plotted in order to know the nature of data after first difference.

**Figure 4.6 : Differenced Graph of Variables**



views.

The first difference of the variable also moves around the zero on an average. This shows that data are stationary at first difference. To get more clarity on the data's stationarity, individual unit root test of the variables is done.

The study is done through three step procedure in order to determine the relationship between public expenditure on education and economic growth. The procedure are unit root test of the variable, Johansen Cointegration technique and Error Correction Mechanism. In order to check the stationarity the Augmented Dickey Fuller (ADF) test is carried out.

The initial study shows that data is not stationary at level but thesis have to use the econometric tool to test the stationarity of data. Thesis have used ADF test to test the stationarity of data.

**Table 4.4 : Augmented Dickey Fuller (ADF) test to test Integration Order**

Variable	Level		First Difference		Order of Integration
	Intercept	Intercept & Trend	Intercept	Intercept & Trend	
LN_GDP	0.0244 [.9554]	-2.8197 [.1988]	-7.2557* [.0000]	-5.8538* [.0001]	I(1)
LN_GFCF	-0.3166 [.9764]	-3.4019 [.0651]	-9.5467* [.0000]	-9.4703* [.0000]	I(1)
LN_REE	-0.1848 [.9324]	-2.1593 [.4983]	-6.4640* [.0000]	-6.4398* [.0000]	I(1)
LN_CEE	-0.9929 [.7469]	2.0625 [0.5506]	-6.8074* [.0000]	-6.5983* [.0000]	I(1)
LN_SEE	-2.4096 [.1454]	-2.1635 [.4964]	-5.2544* [.0001]	-5.5623* [.0002]	I(1)

Source: author's calculation through e-views.

Table 4.4. Shows the results for the unit-root tests using Augmented Dickey-Fuller (ADF) tests for the order of integration of each variable. For the level of the series, the null hypothesis of the series having unit roots cannot be rejected at even 5 percent level. However, it is rejected for each differenced series. This shows that the variables are integrated of order I(1).

**Table 4.5 : The Ordinary least Square Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.091573	0.279311	21.8093	0
LN_CEE	0.000952	0.006443	0.14775	0.8833
LN_REE	0.103279	0.014632	7.05821	0
LN_GFCF	0.408533	0.053278	7.66796	0
LN_SEE	0.138155	0.031302	4.41361	0.0001
R-squared	0.994464	Mean dependent var.		13.7292
Adjusted R-squared	0.993866	S.D. dependent var.		0.53597
S.E. of regression	0.041977	Akaike info criterion		-3.39202
Sum squared residual	0.065198	Schwarz criterion		-3.18516
Log likelihood	76.23248	Hannan-Quinn criteria		-3.3162
F-statistic	1661.752	Durbin-Watson stat		1.34986
Probability(F-statistic)	0			

Source: author's calculation through e-views

The result shows the positive and statistically significant relationship between recurrent expenditure on education, gross fixed capital formation, secondary education enrollment whereas there is insignificant relationship between capital expenditure on education and GDP. The value of R-square is 99 percent which states 93 percent of the variations of GDP is explained by total variations in independent variables. But nonstationary of the

variable bias the OLS estimation as well as the low value of Durbin Watson can be the sign of spurious regression.

Since all the variables are stationary at first difference Johansen Cointegration test is conducted.

#### **4.7. Lag Length Test**

Before conduction Johansen cointegration test it should be necessary to determine the appropriate lag that is to be considered on conducting Johansen cointegration and VECM.

**Table 4.6 : Lag Length Criterion**

<b>Lag</b>	<b>FPE</b>	<b>AIC</b>	<b>SIC</b>	<b>HQ</b>
0	6.43E-06	2.234574	2.447852	2.311096
1	5.88E-10	-7.076585	-5.796923*	-6.617453
2	3.80E-10	-7.580362	-5.234313	-6.73862
3	2.29e-10*	-8.265369*	-4.852935	-7.041017*

\*Indicates lag order selected by criterion

Source: author's calculation through e-views

Based on the Vector Auto-regression, appropriate lag length selection is important in order to assure the research findings reflect real economic situation and importantly the findings are consistent with economic as well as econometric theories.

Final Prediction Error (FPE) criterion and Akaike Information Criterion (AIC) and Hannan-Quinn Information Criterion (HQ) suggested that the selected lag length must be lag 3. Meanwhile Schwarz Information Criterion (SIC) and suggested lag length 1.

Thesis has considered lag 3 as suggested in Akaike Information Criterion (AIC) as it is selected by Cheung and Lai (1993). Lag length 3 will be used for co integration test and vector error correction model (VECM).

#### **4.8. Cointegration Analysis**

Having established that the variables are stationary and have the same order of integration, the thesis is proceeded to test whether they are cointegrated or not. To achieve this, Johansen Multivariate Cointegration test is used. The results of the Johansen's Trace test is shown in Table. At the 5 percent significance level the Trace test p value shows that the null hypothesis of no cointegration was rejected in favor of alternative hypothesis. The trace statistics shows that null hypothesis of at most one, and at most two cointegrating vectors among the variable is rejected in favour of alternative hypothesis at 5 percent level of significance because their value is greater than the critical value at the stated level of significance. The trace test suggested that the variables are cointegrated with  $r = 3$ , similarly the Eigenvalue statistics shows that null hypothesis of at most one, and at most two cointegrating vectors among the variable is rejected in favour of alternative hypothesis at 5 percent level of significance because

their value is greater than the critical value at the stated level of significance. The Eigenvalue statistics suggested that the variables are cointegrated with  $r = 3$ . Cheung and Lai (1993) suggested the rank will be dependent on the Trace test results because Trace test showed more robustness to both skewness and excess kurtosis in the residual, which showed that there are at least 3 cointegration vectors ( $r \leq 2$ ) found in this model.

**Table 4.7: Number of Cointegrating Vectors**

	<b>Null Hypothesis</b>	<b>Trace</b>	<b>critical value 5 percent</b>	<b>Max-Eigen statistics</b>	<b>critical value 5 percent</b>	<b>Results</b>
Lag length 3	$r \leq 0$	104.345*	69.81889	37.7145*	33.8767	Both statistics show three cointegrating vectors
	$r \leq 1$	66.6306*	47.85613	31.1044*	27.5843	
	$r \leq 2$	35.5261*	29.79707	21.4329*	21.1316	
	$r \leq 3$	14.0931	15.49471	10.4732	14.2646	
	$r \leq 4$	3.61988	3.841466	3.6198	3.8414	

\* significant at 5 percent level of confidence.

Source: author's calculation through E-views.

Cheung and Lai (1993) suggested the rank will be dependent on the Trace test results because Trace test showed more robustness to both skewness and excess kurtosis in the residual, which showed that there are at least 3 cointegration vectors ( $r \leq 2$ ) found in this model.

#### **4.9. Estimated Normalized Cointegration Vector**

Normalized equation shows the long term relationship between the variables. In our case normalized equation shows the relationship of GDP with public recurrent and capital expenditure on education, gross fixed capital and secondary education enrollment.

**Table 4.8 : Normalised Equation between the Variables**

Variable	Vector	Standard Error	t-value
LN_GDP	1	--	--
LN_CEE	-0.06084	0.02078	-2.9268
LN_REE	0.058356	0.05272	1.1068
LN_GFCF	-0.97155	0.22594	-4.2999
LN_SEE	-0.06885	0.09125	-0.7545
Intercept	-1.14435	--	--

Source: author's calculation through E-views.

The normalized cointegrating equation with standard error in parenthesis is shown below:

$$LN\_GDP = 1.1445 + 0.06084 LN\_CEE - 0.05835 LN\_REE + 0.97155 LN\_GFCF + 0.06855 LN\_SEE$$

	(0.0207)	(0.0527)	(0.2259)	(0.0912)
SE				
t	(2.9268)	(1.1068)	(4.2999)	(0.7545)

The long run cointegrating equation shows that the estimated coefficient LN\_CEE, LN\_GFCF and LN\_SEE are positively signed whereas that of LN\_REE is negatively signed. It can be said that capital expenditure on education has positive relation with economic growth as the value of t is more than 2 it can be said that 1 percent increase in capital expenditure increases GDP by 6.08 percent, which supports the result of Lawal and Wahab (2011), Ernest (2011), Gabriel and Johnson (2013), Ojala (2016). Similarly Recurrent expenditure on Education has insignificant relation with economic growth, this is because the expenses made on teachers has not created any motivation for human capital development, what ever the salary and benefits given, there lacks specific effort of teachers to enhance productivity of the students enrolled on education. There might be the reason that training and investment made on teachers are not being used by them to enhance the productivity of students. The current scenario is stated by Abdylmenaf & Besime (2015) as the problem of the countries going through transition. Gross fixed capital formation also have positive and long run relation with GDP growth which is similar to the result of Mohd, Fidlizan, Mohd and Azila (2012) and Jacob & Walid (2004). The Enrollment of students of Secondary education also have positive but insignificant relation with economic growth.

#### **4.10. Vector Error Correction Model**

The long run causal relationship is obtained in ECT(-1) value for each of the variable. The error correction Term lagged one of GDP indicates that it has long run convergence showing GDP variable significant with negative value of coefficient. This clearly shows that public recurrent and capital expenditure on education, gross fixed capital formation and secondary education enrollment are long run Granger causality for the GDP. We can say that GDP can correct any deviation in the relationship between GDP and other explanatory variables. The speed of adjustment of the error correction term is 19.11 percent indicating that the previous level of disequilibrium is corrected by 19.11 percent in one period (one year in our case).

Similarly ECT(-1) of recurrent expenditure on education, Capital expenditure gross fixed capital formation on is insignificant. However secondary education enrollment rate shows the significant relationship but the relationship shows divergence from the equilibrium.

We can also explain the ECT(-1) as, short-run dynamics between the variables in the cointegrating equation by estimating the error correction model. This estimation is presented in Table 4.9. It is observed from the result that the coefficient of the error correction term (ECM) has the expected negative sign and it lies between zero and one and statistically significant at 5 percent level. The significance of the error correction mechanism supports cointegration and suggests that there exists long run steady-state equilibrium between the level of real output (GDP) and the explanatory variables. The ECM indicates a feedback of approximately 19.11 percent of the previous year's disequilibrium from long run elasticity of the explanatory variables. That is, the coefficient of the error correction term measures the speed at which the level of real output adjusts to changes in the explanatory variables in an effort to achieve long run static equilibrium. It can be said therefore that the speed of adjustment is low.



**Table 4.9: Result of vector error correction model**

<b>Variables</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
ECT(-1)	-0.191133	0.069831	-2.73707	0.0123
D(LN_GDP(-1))	-0.339335	0.194666	-1.74317	0.0959
D(LN_GDP(-2))	-0.469295	0.221574	-2.118	0.0463
D(LN_GDP(-3))	0.183661	0.200218	0.91731	0.3694
D(LN_REE(-1))	0.00539	0.028288	0.19053	0.8507
D(LN_REE(-2))	-0.016982	0.015456	-1.09878	0.2843
D(LN_REE(-3))	-0.016379	0.014448	-1.13364	0.2697
D(LN_CEE(-1))	-0.003478	0.005638	-0.61687	0.5439
D(LN_CEE(-2))	-0.00691	0.005372	-1.28638	0.2123
D(LN_CEE(-3))	-0.004826	0.005095	-0.94715	0.3543
D(LN_GFCF(-1))	-0.12654	0.060426	-2.09413	0.0486
D(LN_GFCF(-2))	-0.210883	0.05697	-3.70165	0.0013
D(LN_GFCF(-3))	-0.0466	0.06092	-0.76494	0.4528
D(LN_SEE(-1))	0.000907	0.039832	0.02276	0.9821
D(LN_SEE(-2))	0.044707	0.038885	1.14973	0.2632
D(LN_SEE(-3))	-0.004853	0.074334	-0.06528	0.9486
Constant	0.089872	0.024125	3.7252	0.0013
R-squared	0.623541	Mean dependent var.		0.04223
Adjusted R-squared	0.336716	S.D. dependent var.		0.02228
S.E. of regression	0.018146	Akaike info criterion		-4.87904
Sum squared residual	0.006915	Schwarz criterion		-4.14643
Log likelihood	109.7017	Hannan-Quinn criterion.		-4.61838
F-statistic	2.17394	Durbin-Watson statistics		1.85638
Probability(F-statistic)	0.048258			

Source: author's calculation through e-views

Having known there exists long run static equilibrium to determine the causality VEC Granger causality is operated.

## 4.11 Target Equation

The target equation that shows the relationship between GDP and the variables concerned is shown in the target equation with lag length of 3 under VEC model as there exists Cointegration relation of variables.

$$D(LN\_GDP) = C(1)*(LN\_GDP(-1) + 0.0583557266845*LN\_REE(-1) - 0.0608345574837*LN\_CEE(-1) - 0.971554044906*LN\_GFCF(-1) - 0.0688514254151*LN\_SEE(-1) - 1.14435239737) + C(2) * D(LN\_GDP(-1)) + C(3) * D(LN\_GDP(-2)) + C(4) * D(LN\_GDP(-3)) + C(5) * D(LN\_REE(-1)) + C(6) * D(LN\_REE(-2)) + C(7) * D(LN\_REE(-3)) + C(8) * D(LN\_CEE(-1)) + C(9) * D(LN\_CEE(-2)) + C(10) * D(LN\_CEE(-3)) + C(11) * D(LN\_GFCF(-1)) + C(12) * D(LN\_GFCF(-2)) + C(13) * D(LN\_GFCF(-3)) + C(14) * D(LN\_SEE(-1)) + C(15) * D(LN\_SEE(-2)) + C(16) * D(LN\_SEE(-3)) + C(17)$$

## 4.12. VEC Granger Causality test Output

The thesis concerned to determine the causality of GDP, recurrent expenditure on education, capital expenditure on education, gross fixed capital formation and secondary education enrollment rate. For this objective vector auto regression granger causality is used. For this purpose an endogenous variable is considered as exogenous variable.

**Table 4.10. VECM Granger Causality output**

Dependent Variable	Excluded	Chi-sq	DF	P value
D(LN_GDP)	D(LN_CEE)	2.111108	3	0.5497
	D(LN_REE)	2.354816	3	0.5021
	D(LN_GFCF)	15.18591	3	0.0017
	D(LNSER)	1.38762	3	0.7084
	All values	19.36343	12	0.0801
D(LN_GDP)	D(LN_GDP)	1.209391	3	0.7508
	D(LN_REE)	0.515965	3	0.9154
	D(LN_GFCF)	2.558933	3	0.4647
	D(LN_SEE)	2.152198	3	0.5414
	All	5.689503	12	0.9309
D(LN_REE)	D(LN_GDP)	0.603854	3	0.8955
	D(LN_CEE)	4.296255	3	0.2312
	D(LN_GFCF)	2.214972	3	0.529

	D(LN_SEE)	61.21812	3	0.000
	All	80.92049	12	0.000
D(LN_GFCF)	D(LN_GDP)	18.00202	3	0.0004
	D(LN_CEE)	3.698928	3	0.2959
	D(LN_REE)	8.970013	3	0.0297
	D(LN_SEE)	6.621146	3	0.085
	All value	27.31207	12	0.007
D(LN_SEE)	D(LN_GDP)	1.430342	3	0.6984
	D(LN_CEE)	5.854577	3	0.1189
	D(LN_REE)	2.713591	3	0.4379
	D(LN_GFCF)	5.805293	3	0.1215
	All value	13.35278	12	0.3439

Source: author's calculation through e-views.

The study shows that recurrent and capital expenditure does not Granger cause GDP. Similarly it is seen that GDP is not Granger cause of capital expenditure on education as well as recurrent expenditure on education. In GFCF it is seen that there exists bidirectional causality in short run. Similarly GDP does not Granger cause SEE and vice versa.

### 4.13. Serial Correlation

Being few drawbacks on checking autocorrelation by Durbin-Watson we use the Breusch-Godfrey Serial Correlation LM Test.

**Table 4.11. Breusch-Godfrey Serial Correlation LM Test**

F-statistic	0.215348	Prob. F(3,18)	0.8845
Obs*R-squared	1.316618	Prob. Chi-Square(3)	0.7252

Source: author's calculation through e-views

The result shows that there is not the presence of serial correlation because of presence of probability value more than 5 percent (72.52 percent).

#### 4.14. Heteroskedasticity

The Breush-Pagan Godfrey test of heteroskedasticity shows that there is not the presence of heteroskedasticity as value of probability square is (31.64 percent). Meaning more than 5 percent.

**Table 4.12 : Breush-Pagan Godfrey test**

F-statistic	1.227679	Prob. F(20,17)	0.3374
Obs*R-squared	22.4538	Prob. Chi-Square(20)	0.3164
Scaled explained SS	7.935317	Prob. Chi-Square(20)	0.9923

Source: author's calculation through e-views

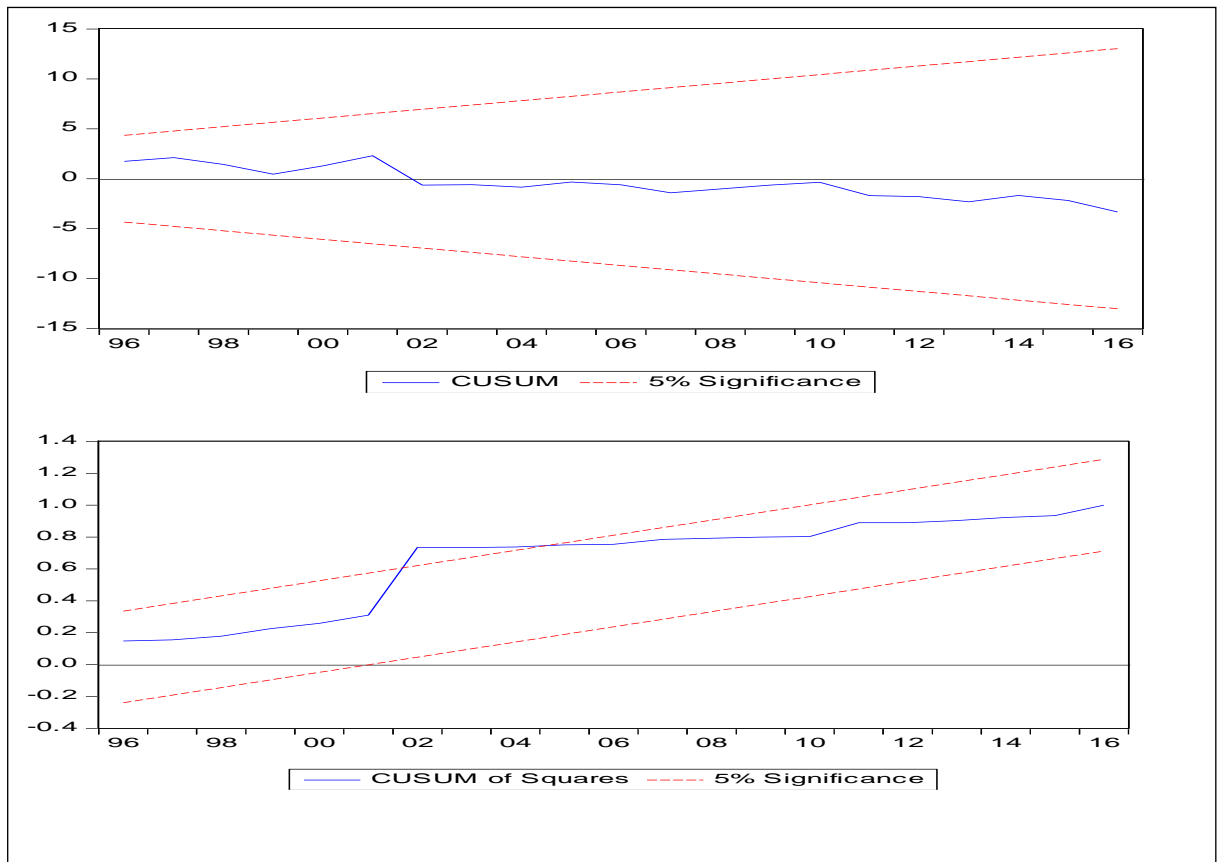
#### 4.15. Normality Test

The value of Jarque-bera probability is 0.7526 that rejects the null hypothesis of normality test that the data are not normally distributed. Hence data is normally distributed.

#### 4.16. Stability Test

In order to check the stability of the model cumulative sum test and cumulative sum of square test is carried out. The base for the studying the stability of the model is that if the blue line shown below crosses the red lines then we can say that model is not stable. Here red line represent the 5 percent critical bound. In the given figure representing the CUSUM test the blue line has crossed the red line in year 1997 ,showing model is not stable but in case of CUSUMSQ test the result shows that parameters are stable, as blue line is within the red line. So we can conclude that CUSUM statistic for GDP is within the critical line (except in 2002 and 2003) showing that long run coefficient of GDP function is stable, or to say model is stable.

**Figure 4.7 : Cusum and Cusum Square Recursive Residual**



Source: author's calculation through e-views.

So it can be concluded that CUSUM statistic for GDP is within the critical line (except in 2002 and 2003) showing that long run coefficient of GDP function is stable, or to say model is stable. The critical line of CUSUMSQ has crossed critical line in 2002 and 2003. This is due to the peak period of maoist insurgency as well as well as revision of capital and recurrent expenditure on education.

# **CHAPTER–V**

## **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **5.1. Summary**

There has always been the debate on the contribution of public expenditure on education towards economic growth. So this study has attempted to find the impact of public expenditure on education both recurrent and capital towards economic growth.

This thesis has used descriptive analysis to determine the nature and trend of public recurrent and capital expenditure on education to economic growth. In the study variables taken are in real term going from GDP to public and recurrent expenditure on education to access the growth relationship between them. Our study has considered GDP as the proxy of the economic growth which is dependent variable and recurrent and capital expenditure on education as proxy of human capital and as explanatory variable whereas gross fixed capital formation, secondary enrollment on education is taken as the control variable. The study is based in time series analysis. So in this process ADF test is conducted to check the stationarity of the variable. Since all the variables are found to be non-stationary at level, first difference of variable is done and it is seen that first difference is found to be stationary. Since all the variables are found to be stationary at first difference, Johanson test of cointegration is conducted. Johanson study shown that there exists long run relationship between the variables, so we have vector error correction for further analysis. VEC Granger causality test of output is done to determine the causal relationship among the variable. CUSUM and CUSUMSQ test is conducted to check the stability of coefficient of the model. Furthermore with the essentiality of check of the autocorrelation to check whether there exists autocorrelation or not, Breusch-Godfrey Serial Correlation LM Test is carried out and to check the heteroskedasticity Breusch-Pagan Godfrey test is done.

As the thesis investigated the time series data of the variables, gross domestic product is increasing over the period of time public expenditure on education is also increasing over the period of time but once we break the public expenditure in to two part there is significant decrease of capital expenditure on education in recent years. Simple OLS regression showed that REE has significant and positive effect on growth similarly

GFCF and SEE also has significant and positive relationship but capital expenditure on education has insignificant relation with GDP growth. But being small value of Durbin Watson there might be the problem of spurious regression so study as taken further initiatives to get more insight into the topic. As Johansen method of cointegration has shown that there exists cointegration among the variable VEC model is conducted. The long run VEC has shown that there is positive and long run relationship between capital expenditure on education and gross fixed capital formation whereas recurrent expenditure on education and secondary education enrollment rate has insignificant relationship with growth.

## **5.2. Conclusions**

On the process of accessing the relationship between public expenditure on education and economic growth, the qualitative and quantitative methodology used have drawn following conclusions:

- a. Public expenditure on education has increased throughout the sample period, recurrent expenditure and capital expenditure has reverse trend from the starting period to the current, the recurrent expenditure on education is increasing in massive rate while capital expenditure on education is around the axis line. The reason behind the increase in recurrent expenditure is that salary has been increasing after the democracy.

There is increasing trend of GDP within the study period. We know that during the period of panchayat there has been comparatively more development work carried out which consists of the development of Infrastructure on education and health. After the restoration of democracy the inclusiveness of citizens from several arenas of society and their proportionate representation on various sectors has helped to increase the GDP. This is due to their more access on health, education, transportation and communication facilities. With this there has been increase in the GDP of the country.

- b. Positive relation is achieved with capital expenditure on education as government capital expenditure on education helped to build more infrastructure, which has reduced difficulties of students to study with ease ,which has synergic effect on development of human capital leading to the productivity and hence the growth. However there exists insignificant effect of public recurrent expenditure

on education with growth because the expenses made on teachers has not created any motivation for human capital development, what ever the salary and benefits given to teachers and staff , there lacks specific effort of teachers and staff to enhance productivity of the students enrolled on education. There might be the reason that training and investment made on teachers are not being used by them to enhance the peroductivity of students. This is also created due to the weak transmission mechanism and channel of recurrent expenditure on education. There also lacks trasperacy and accountability of teachers associated with teaching ppractices of the teachers.

- c. There doesnot exists VEC Granger causality between Public recurrent and capital expenditure on education with GDP and vice versa.

### **5.3. Recommendations**

The recommendations is based on the result shown by qualitative as well as quantitative analysis .This thesis has made following recommendation.

- a. Economic growth should be increased from the existing situation, which is done through efficient capital expenditure on human capital i.e. expenditure on education, which help to develop human capital, which will assist in increase in labour productivity and hence economic growth.
- b. Excessive recurrent expenditure on education should be minimized as fa as possible, because this will help to curb inflation.
- c. Investment has positive impact on the economy as it increases output, so it is recommended to increase gross fixed capital formation.
- d. Government should have strong supervision and monitoring mechanism to get sure that funds allocated are not misappropriated.
- e. Specific funds should be devoted to the productive sector rather than haphazard allocation. Investment should be devoted to vocational studies as well as on information and technology.



## APPENDIX A

**Concerned Variables in Nominal Form ( all variables are in million except SEE in thousand)**

Date	GDP	NCPI	GFCF	REE	CEE	SEE
1975	16,601	4.173292	2223	60.9	93.3	67000
1976	17,394	4.144413	2443	77.1	152.3	74000
1977	17,280	4.256455	2580	67.9	185.6	82158
1978	19,727	4.731795	3294	69.1	201.2	93651
1979	22,215	4.894379	3263	80.8	234.5	106109
1980	23,351	5.373145	3681	82.5	248.1	121007
1981	27,307	6.092351	4299	98.6	285.6	144331
1982	30,988	6.727097	5465	106.8	412.3	170404
1983	33,821	7.680195	6576	129.4	604.6	198446
1984	39,290	8.159204	6907	137.2	678.6	216473
1985	46,587	8.497223	9386	161.4	644.2	242467
1986	55,734	9.843598	9431	207.6	879.4	268805
1987	63,864	11.15004	11825	242.3	1036.5	289923
1988	76,906	12.35318	13414	262.5	1226.8	307534
1989	89,270	13.38026	16392	282.9	1458.8	338779
1990	103,416	14.67845	17002	319.7	1479.8	364525
1991	120,370	16.11874	22780	366.3	1716	395330
1992	149,487	19.51234	29277	472.7	2395.2	421709
1993	171,492	21.24175	37278	685.2	3465	272747
1994	199,272	23.14286	42032	741.9	3822.1	274327
1995	219,175	24.91509	48370	3612.1	1453.6	290315
1996	248,913	26.94181	56081	4359.2	1791	329833
1997	280,513	29.12167	60794	4847	2356.2	358634
1998	300,845	31.54623	65375	5766.8	2073.1	372213
1999	342,036	35.13593	65269	6040.2	1641.3	385079
2000	379,488	36.32801	73324	6754.8	2573.7	372914

2001	441,519	37.21252	84750	8260.8	2783.9	448296
2002	459,443	38.28786	89889	11947	1103	480596
2003	492,231	40.10628	98072.8	12300.9	940.7	511092
2004	536,749	41.69571	109181.3	13379.5	1003.4	588366
2005	589,412	43.58822	117538.9	15960.2	1260.4	587183
2006	654,084	47.05893	135532	17729.8	1609.6	679000
2007	727,827	49.83541	153336.9	19976	1604.9	671183
2008	815,658	53.17659	178445.5	24097.4	2963.6	715378
2009	988,272	59.8672	211039	32141.8	3520.2	790000
2010	1,192,774	65.60015	264888	42490	3903.9	812000
2011	1,366,954	71.87115	292730	48945.3	6258.4	848569
2012	1,527,344	77.84724	317185	61914.2	138.8	878047
2013	1,695,011	85.50608	382971.8	62290.7	139.1	896919
2014	1,964,540	93.2708	462013.4	77699.3	126.4	900585
2015	2,130,150	100	588344.9	85860.1	96.1	938635
2016	2,247,427	109.9383	647294	90456.2	233.3	959000

Source: Economic Survey, MoF; Current Macroeconomic Indicator, NRB.

## APPENDIX B

**Concerned Variables in Real Form (RGDP ,REE RGFCF,RCEE,RREE is in RS.**

**Million and SEE in thousand)**

Date	RGDP	RGDCF	RTEE	SEE	RCEE	RREE
1975	398752.8	53267.3	3694.925	67000	2235.645	1459.28
1976	412582.6	58946.82	5535.162	74000	3674.826	1860.336
1977	416750.9	60613.83	5955.661	82158	4360.436	1595.224
1978	429785.6	69614.17	5712.419	93651	4252.086	1460.334
1979	438941.3	66668.32	6442.084	106109	4791.211	1650.873
1980	432339.6	68507.37	6152.822	121007	4617.408	1535.414
1981	475708.4	70563.89	6306.268	144331	4687.845	1618.423
1982	496694.2	81238.61	7716.553	170404	6128.944	1587.609
1983	498718	85622.83	9557.049	198446	7872.196	1684.853
1984	542592.9	84652.87	9998.525	216473	8316.988	1681.537
1985	571794.6	110459.6	9480.745	242467	7581.301	1899.444
1986	597901.3	95808.47	11042.71	268805	8933.725	2108.985
1987	608064.2	106053.5	11469.02	289923	9295.933	2173.087
1988	654864.8	108587.5	12056.01	307534	9931.05	2124.96
1989	683205.3	122508.8	13016.94	338779	10902.63	2114.309
1990	714872.1	115829.7	12259.47	364525	10081.45	2178.024
1991	760384	141326.2	12918.51	395330	10646	2272.511
1992	791621.2	150043.5	14697.88	421709	12275.31	2422.57
1993	822072.9	175494	19537.94	272747	16312.22	3225.723
1994	889641	181619.7	19720.98	274327	16515.24	3205.74
1995	920497.8	194139.4	20331.86	290315	5834.215	14497.64
1996	969630.4	208156	22827.72	329833	6647.66	16180.06
1997	1020642	208758.6	24734.84	358634	8090.882	16643.96
1998	1050670	207235.5	24852.1	372213	6571.625	18280.47
1999	1097780	185761.4	21862.24	385079	4671.287	17190.95
2000	1164914	201838.8	25678.54	372914	7084.617	18593.92
2001	1230481	227745.9	29680.06	448296	7481.084	22198.98
2002	1231959	234771.6	34083.91	480596	2880.809	31203.1

2003	1280561	244532.3	33016.28	511092	2345.518	30670.76
2004	1340525	261852.6	34494.91	588366	2406.482	32088.43
2005	1387163	269657.5	39507.46	587183	2891.607	36615.86
2006	1433835	288004.8	41096.13	679000	3420.392	37675.74
2007	1482752	307686.6	43304.35	671183	3220.401	40083.95
2008	1573268	335571.5	50888.93	715378	5573.129	45315.8
2009	1644587	352511.9	59568.51	790000	5880.015	53688.5
2010	1723797	403791.7	70722.24	812000	5951.053	64771.19
2011	1782782	407298.4	76809.27	848569	8707.806	68101.46
2012	1868021	407445.4	79711.24	878047	178.2979	79532.94
2013	1945149	447888.4	73012.12	896919	162.6785	72849.44
2014	2061643	495346.2	83440.58	900585	135.5194	83305.06
2015	2130149	588344.9	85956.2	938635	96.1	85956.2
2016	2138944	588779.2	82491.25	959000	212.2099	82279.04

Source: author's calculation through excel.

## APPENDIX C

### Concerned Variables in Logarithmic Form

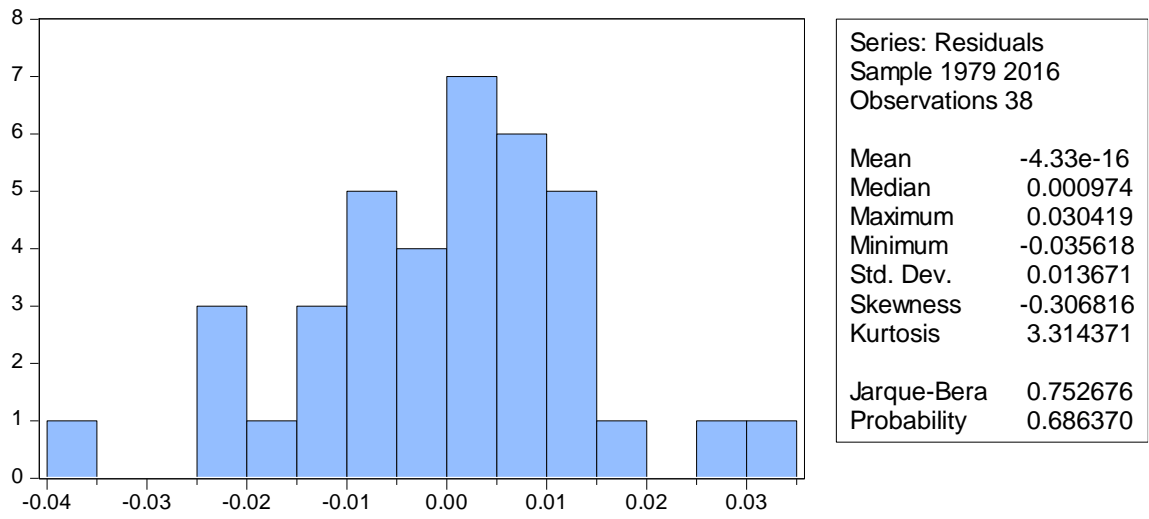
Date	LN_SEE	LN_CEE	LN_REE	LN_GFCF	LN_GDP
1975	11.11245	7.712285	7.285698	10.88308	12.8961
1976	11.21182	8.209261	7.528512	10.98439	12.93019
1977	11.3164	8.380327	7.37477	11.01228	12.94024
1978	11.44733	8.355165	7.28642	11.15072	12.97104
1979	11.57222	8.474538	7.40906	11.10749	12.99212
1980	11.7036	8.437589	7.336555	11.1347	12.97697
1981	11.87986	8.452728	7.389207	11.16427	13.07256
1982	12.04593	8.720778	7.369984	11.30515	13.11573
1983	12.19827	8.971092	7.429434	11.35771	13.1198
1984	12.28522	9.026055	7.427463	11.34631	13.20411
1985	12.39862	8.93344	7.549317	11.61241	13.25654
1986	12.50174	9.097589	7.653962	11.47011	13.30118
1987	12.57737	9.137332	7.683904	11.5717	13.31804
1988	12.63634	9.203422	7.661508	11.59531	13.39218
1989	12.7331	9.296759	7.656483	11.71594	13.43455
1990	12.80635	9.218452	7.686173	11.65988	13.47986
1991	12.88748	9.272939	7.728641	11.85883	13.54158
1992	12.95207	9.415345	7.792584	11.91868	13.58184
1993	12.5163	9.69967	8.078912	12.07536	13.61958
1994	12.52208	9.712039	8.072698	12.10967	13.69857
1995	12.57872	8.671495	9.581741	12.17633	13.73267
1996	12.70634	8.80202	9.691535	12.24604	13.78467
1997	12.79006	8.998493	9.719803	12.24893	13.83594
1998	12.82722	8.790516	9.813589	12.24161	13.86494
1999	12.8612	8.44919	9.752138	12.13222	13.9088
2000	12.8291	8.865681	9.83059	12.21522	13.96816
2001	13.01321	8.920133	10.0078	12.33599	14.02292
2002	13.08278	7.965826	10.34827	12.36637	14.02412
2003	13.1443	7.760262	10.33106	12.4071	14.06281

2004	13.2851	7.785921	10.37625	12.47554	14.10857
2005	13.28309	7.969568	10.50824	12.50491	14.14277
2006	13.42838	8.13751	10.53677	12.57073	14.17586
2007	13.4168	8.077261	10.59873	12.63684	14.20941
2008	13.48057	8.625712	10.72141	12.72359	14.26867
2009	13.57979	8.679315	10.89095	12.77284	14.313
2010	13.60726	8.691324	11.07862	12.90865	14.36004
2011	13.65131	9.071975	11.12875	12.9173	14.39369
2012	13.68546	5.183456	11.28393	12.91766	14.44039
2013	13.70672	5.091776	11.19615	13.0123	14.48085
2014	13.7108	4.909115	11.33026	13.11301	14.53901
2015	13.75218	4.565389	11.36047	13.28507	14.5717
2016	13.77365	5.357576	11.31787	13.28581	14.57582

Source: author's calculation through excel.

## APPENDIX D

### Normality Check of the VECM Model



Source: author's calculation through e-views.

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