CHAPTER I

INTRODUCTION

This chapter consists of a background of the study, the context of the research, statement of the problem, objectives of the study, the hypothesis of the study, the significance of the study, limitations of the study, and organization of the study.

1.1 Background of the Study

After the decades of conflict and political situation in Nepal, Nepal is going to embark on an accelerated economic growth for which transport development has been recognized as one of the core strategies. This work is an intensive work of government. Hence, public investment has a great degree of implication.

Public investment is an investment in the public sector in specific assets, whether through central or local governments or through publicly owned industries or corporations. The general definition of the public sector includes government ownership or control rather than mere function and thereby includes, for example, the exercise of public authority or the enactment of public policy.

Associated with the problems of public administration in developing countries have been the widespread activities of state-owned enterprises (SOEs)[1]. In addition to their traditionally dominant presence in utilities (gas, water, and electricity), transportation (railroads, airlines, and buses), and communications (telephone, telegraph, and postal services), SOEs have been active in such key sectors as large-scale manufacturing, construction, finance, services, natural resources, and agriculture. Sometime, they may dominate these sectors, particularly in the areas of natural resources and manufacturing **(**Todaro & Smith, 2012**).**

Furthermore, public investment has arisen historically from the need to provide certain goods, infrastructure, or services that are deemed to be of vital national interest. Hence, Shikha (2016) claimed private sector is reluctant to these project due to their high startup cost, both financial and national, to infrastructure capital development. Public

[1] SOEs- State Owned Enterprises, Public corporations owned and operated by the government. Currently 37 Enterprises are operating with five different laws viz. Communication act (2), Own specific act (7), Bank and Financial Institution act (3), Corporation act (2), and Company act (23).

investment has tended to increase as a consequence of industrialization and corresponding demands for new infrastructure to facilitate the growth of urban communities.

The strategic vision for the development of the country is determined by the 3 “I”s for growth: Investment, Infrastructure, and Inclusion. Investment is the foundation of a sustainable growth model but in Nepal, the state, firms, and households are lowering the investment (World Bank, 2014). Unless investment is done, there is no economic growth.

Hence there is a positive relationship between the public investment and growth. Stiglitz (2000) also pointed this two factor as a critical subject for development analysis and possessed inter-relation between them. Barro & Sala (1992) suggested direct effects of public expenditure on infrastructure with the growth of the economy.

In Nepal, inadequate and unbalanced transport infrastructure is often blamed for underdevelopment and increasing regional disparity. Political instability, non-inclusiveness, and ethnic conflict are the growing issues in Nepal where an uneven distribution of income across the regions has been taking place. Because of geographical complexity, current settlement pattern and slower development process, people from some parts of a country are struggling to achieve the minimum access to the services and economic activities. Whereas, in some places of the country urbanization is so rapid which has given rise to the increasing income, resulting in the requirement of more speedy and reliable transport system. Recently, the government of Nepal has set a target to uplift the economic status of the country from the least developed to the developing country by the year 2022. The estimated annual economic growth rate is 9.2 percent until 2022 for the graduation from least developed to the developing nation. However, the average annual economic growth rate over 1960 to 2013 was less than 2 percent. To achieve the ambitious rate of economic growth, National Planning Commission (NPC) has pointed some new policy options such as a change in resource allocation pattern, increase in absorption capacity of the economy, ensuring development friendly policy and so forth. NPC has also estimated the need for investment to achieve this goal. The estimated growth rate of investment is 19 percent per annum (GoN, 2014). The transport sector is identified as a major sector for the investment (NPC, 2014). Since transport is the “infrastructure” of the infrastructures it

needs due attention for the rapid economic growth. Transport has been taken as a major sector since 1956 when periodic planning process has been introduced. With the analysis of current scenario of transport development, this paper identifies issues, challenges and the strategies for the transport development for the rapid economic development.

With an objective of providing some valuable insights to the policymakers, this paper adopts a broad-brush approach to review the past efforts, identify current trend and pattern, explore linkages with theoretical concepts, and finally list out important strategies that would guide Nepal's transport development towards a sustainable development. It is expected that the contents of this study would provide useful guidelines for the transport policy makers in Nepal.

1.2 Context of the Research

The federal republic nation, Nepal, is facing a deficit in infrastructure. Although the line of minsters is co-operating through the consensus between them due to the Political instability, the infrastructure sector is suffering through a huge infrastructural gap. So to drive the state towards the prosperity, there are some of the ongoing pride projects in the ground or air and road transportation. Successful completion of these projects depends upon the political scenario of the country.

Detailed project report (DPR)[2] of Butwal-Gaddachauki section of East-West Electric Railway Project has been performed targeting for completion within 15 months. The government has initiated the study of a 420-kilometer section of the mega project and the study of the eastern part of the project has already been completed. The process of preparing DPR of the first section of the project is in the final stage. Preparing DPR of Kakadvitta-Bardibash section of the project will be completed within this September. According to DoRW, 70 percent of track opening of the 30-kilometer Bardibash-Lalbandi sector of Bardibash-Simara section of the project was completed in the last fiscal year 2016-17. DoRW plans to complete the track opening of the entire section within this fiscal. The mega project also includes the 22-kilometer Itahari-Biratnagar section. The government had mentioned in the budget of last fiscal year that the construction works of the mega project would be started after preparation of DPR

[2] A report used to guide project execution and control.

within that year. However, it now appears that the DPR of the project would be completed only around mid-way through fiscal 2018-19 (Shrestha & Shahi, 2014).

Nijgadh/Dhumberwana International Airport is a proposed airport development project in southeastern Nepal designed to relieve expected capacity restraints at Tribhuwan International Airport in Kathmandu. The proposed airport site lies 150kms from Kathmandu by road. However, the project has been stalled over the last two years with Nepal's Tourism Ministry announcing its intention to assume control of the project at Nijgadh due to inactivity by Investment Board Nepal and Ministry of Physical Infrastructure and Transport. It is expected that the airport will feature two parallel runways and will be capable of handling 15 million passengers annually (Sahayogee, n.d.).

In association with the pride projects, Pokhara Regional International Airport is also one of the main projects. China CAMC Engineering Co Ltd is the contractor of this project and the deadline for the completion of this project is July 10, 2021. The international airport is under construction in Chine danda. The airport is going to be established in the area of 3627 ropanis of land in Pokhara Lekhnath Metropolitan City with a soft loan of $215.96 million from China Exim Bank. The project designed to be built under the Engineering, Procurement, and Construction (EPC) and airport will have 2500 meters of the runway as per the International Civil Aviation Organisation (ICAO) norms set for 4D airports. Boeing 757 and Airbus 320 would connect Pokhara with other international destinations after the completion of the project (Koirala, 2017).

Another airport as the pride project is the Gautam Buddha Airport also known as Bhairahawa Airport, an airport serving Siddharthanagar, a municipality in Rupandehi District in Province Number 5 in Nepal. Plans are made to upgrade this airport to international standards, through which it becomes Nepal's second international airport. It has one runway designated surface measuring 1,510 by 34 meters and currently connecting only domestic routes. The construction work is expected to be finished at the beginning of 2018. It is planned to have a 3,000-m runway and have six international parking bays. The project will be financed by a loan and grant aid of $42.96 million and $12.75 million, respectively, from the Asian Development Bank. The project is currently on a second package of the Gautam Buddha Airport Project in Bhairahawa

next February, considering the expected progress of the ongoing civil works by then (Pathak, 2018).

In case of Nepal, an easy access between the Capital City and Terai, the store-house of the country and is very necessary. To facilitate this promotion of an improved core road network, Government of Nepal has launched the Kathmandu-Terai Fast Track Project. Many concerned personalities and sectors had considered this project to be number one in the list of seventeen projects of national pride declared by the government. Length of 72.6 km fast track from Kathmandu – Lalitpur – Makawanpur and up to Nijgadh in Bara district to link with the East-West Highway will be of four lanes with 50 m on each side. The project was proposed to have 96 bridges big or small; 1.6 km long tunnel will be built in Thingan of Makawanpur on public-private partnership. It had projected costs of more than NRs 250 million. Upon the completion of the fast track, the distance and time to reach the capital city from Terai will come down to only 1.5 hours and will transform the capital, eastern Terai and the country as a whole. It is estimated that NRs 4.5 billion will be saved annually of the transport cost (Dahal, Dahal, Khanal, Poudel, & Khatiwada, 2014).

Another pride project is Puspalal (Mid-Hill) Highway Project. The Mid-hill Highway is now bending its way from Chiyabhanjyang of Panchathar in the East to Jhulaghat of Baitadi in the Far-west – a distance of 1776 km. – through a total of 24 districts and 225 VDCs, directly affecting 7 million people. As per the design of the project worth nearly 750 million rupees, the upgraded road will be 5.5 meters wide. The 34.43km road had started at the start of fiscal year 2014/15 with the financial assistance of Asian Development Bank. Stipulated to be completed by March this year, the project had started by dividing the road into three sections to expedite work so as to meet the deadline. The Lumbini Kankai Surya Construction had been in-charge of the construction on the 12km Halesi-Bijule section, Lama Nagarjun Trishuli had been entrusted with blacktopping the 12km Bijule-Hurlung and 11.4km Hurlung-Diktel road sections. The contractors have cited border blockade and earthquake as reasons for the delay in construction and are said to be preparing to seek an extension of the contract period (GoN, 2011).

Postal Highway also called Hulaki Rajmarg runs across the Terai region of Nepal, from Bhadrapur in the east to Dodhara in the west, cutting across the entire width of the

country. It is the oldest highway in Nepal constructed by Juddha Shumser Jung Bahadur Rana & Padma Shumser Jung Bahadur Rana to aid transportation and facilitate postal services throughout the nation. The total length of the road project is 1,792.42 km (1,113.76 mi). According to Minister for Urban Development Arjun Narsingh KC, the government plans to build 10 new cities within about three kilometers on both sides of the highway realizing the need to making the settlements alongside the highway systematic and well-planned. The selected sites are Gaurigunj of Jhapa and Rangeli of Morang, Mahagadhimai of Bara, Ishwarpur of Sarlahi, Shambhunath of Saptari and Balwa and Sarpallo of Mahottari in Province 2. Likewise, Rajapur of Bardiya and Bardaghat of Nawalparasi in Province 5, and Belauri of Kanchanpur and Bhajani Trishakti of Kailali in Province 7 are the sites for the development of new cities (Baral, 2017).

1.3 Statement of the Problem

Nepal being developing country with low GDP, higher public investment is planned every year but inadequate implementation capacity (lack of skill manpower, political instability) and bottlenecks (Lack of adequate investment, limited availability of capital, lack of good governance[3], improper policy in place and its weak implementation, unfriendly administrative environment, dirty politics over the use of water, and lack of infrastructure) (Dhungel, 2015) continued to impede spending. Furthermore, it suffers from huge structural problems (geography, a landlocked country). Since investment in capital formation influences the economic growth of all sectors but due to lower investment in any sector by both the government as well as a household nation is not developing its infrastructure for the conduction of developmental work smoothly. The hesitation of private investment in any sector's capital formation is mainly due to limited availability of public goods, particularly physical infrastructure. Therefore, a thorough identification of policy measures is necessary for public investment in various sectors such as agriculture, education, health and other sectors in the country.

The majority of research, as noted above, supports a significant and positive relationship between public infrastructure and economic growth. Nevertheless, there is

[3] Good Governance is an approach to government that is committed to creating a system founded in justice and peace that protects individual's human rights and civil liberties.

an element of risk involved for government policymakers who depend on such research to predicate economic outcomes from various strategies. The majority of related studies refer to the positive and significant relationship found by (Aschaur, 1989); however, the impact of public infrastructure on economic growth in Nepal is not clear.

The study was based on the following research questions:

i. How is the trend and structure of transportation expenditure of public investment in Nepal?
ii. What is the relationship between transportation expenditure of public investment and economic growth in the context of Nepal?

1.4 Objectives of the Study

The general objective is to study the public investment's current trend and relation with the growth in the context of Nepal. However, the specific objectives are:

i. To identify the trend and structure of transportation expenditure of public investment.
ii. To analyze the impact of transportation expenditure of public investment in economic growth.

1.5 Hypothesis of the Study

The hypothesis of the study is as below:

Null Hypothesis (H_0): There is no significant impact of transportation expenditure of public investment in economic growth.

Alternative Hypothesis (H_1): There is a significant impact of transportation expenditure of public investment in economic growth.

1.6 Significance of the Study

The significance of this research is embedded in the notion that adequate investment in national infrastructure is critical to the socio-economic growth of Nepal. Public investment can boost growth and provide the right infrastructure to promote private investment. Why is public investment done? The first may be so-called public utilities have been granted governmental franchise monopolies because they are thought to be

"natural monopolies"[4]. Put simply, a natural monopoly is said to occur when production technology, such as relatively high fixed costs, causes long-run average total costs to decline as output expands. In such industries, the theory goes, a single producer will eventually be able to produce at a lower cost than any two other producers, thereby creating a natural monopoly. Higher prices will result if more than one producer supplies the market (DiLorenzo, 1996).

The second reason might be to control the monopoly[5] power in developing countries i.e. direct government control has been wished-for ensuring that prices are not set above the marginal costs of products. Another factor for acquiring public investment is capital formation, which is chiefly important at the early stages of development when private savings are very small. In addition, The lack of private incentives to involve in promising economic activities because of factors such as uncertainty about the size of local markets, unreliable sources of supply, and the absence of technology and skilled labor is a third major rationale for creating public enterprises. Other reasons for the creation of SOEs include the desire of some governments to gain national control over strategic sectors of the economy such as defense, over foreign-owned enterprises or over key sectors for development purposes.

1.7 Limitations of the Study

The study is primarily based on secondary data obtained from various ministries and governmental organizations. There are limitations on this research inherent in all quantitative studies. It is noted throughout that quantitative researchers use a variety of models. Only annual time-series data set has been used for analysis. As a quantitative study, this research is focused on conventional public financing: budget, expenditure. However, there are newer sources of investment funding, such as public-private partnerships, securitization, and multi-government bonds which have not been included in the study. Another limitation of this study is that it covers only the data from 1975-2016 of Nepal, which may not provide the conclusion for all.

[4] A natural monopoly is a type of monopoly that exists as a result of the high fixed or start-up costs of operating a business in a specific industry. Additionally, natural monopolies can arise in industries that require unique raw materials, technology or other similar factors to operate.

[5] Monopoly- According to Koutsoyanis, "Monopoly is a market structure in which there is a single seller, there are no close substitutes for the commodity it produces and there barriers to entry."

1.8 Organization of the Study

The study is divided into mainly six chapters. The first chapter introduces the subject matter of the study. Under which there are subsections as a general introduction, context of the research, statement of the problem, hypothesis of the study, the significance of the study, objective of the study, and limitation of the study.

The second chapter reviews the literature including both theoretical concept and empirical concepts. The empirical study comprises of national as well as international articles. This chapter views the previously written materials on this topic.

The third chapter deals the research methodology with the framework of research, research design and various econometric models and tests. This chapter basically deals with the description and introduction to the models.

The fourth chapter comprises trend and structure of infrastructural investment. This presents the present scenario of government investment on the transportation sector.

The fifth chapter deals the data presentation and analysis where the descriptive and inferential statistics to analyze the data have been discussed.

Finally, the sixth chapter allocates the summary, conclusion, and recommendations made in accordance with the study.

CHAPTER II

REVIEW OF LITERATURE

There are many studies on the topic of the relationship between the public investment and GDP or economic growth. This section discusses the various theoretical and empirical review of the literature written in the past regarding the relationship of GDP and the investment of the government. This also reviews the casual relationship between the government expenditure on various sectors and the GDP.

2.1 Theoretical Review

2.1.1 Theories of Economic Growth

Growth theories can be traced back to the Adam Smith's "Wealth of Nations" that explained the growth of a nation is only possible to be through 'division of labor'. This theory succeeded later by growth theory of Ricardo, Malthus, and Mill. These theories are known to be the 'Classical Theory of Economic Growth'. After the unsuccessful significant of the Marxian theory of historical growth and Schumpeter's growth theory of 'technological innovations', Harrod-Domar developed a path-breaking theory of economic growth (Dwivedi, 2010). This theory recognizes capital accumulation as a key factor for economic growth. It generates income, on another hand, increases production capacity. The newly generated income creates demand for goods and services which will absorb the output generated by the increase in capital stock. And if this condition is fulfilled every year then it maintains full employment and achieves steady growth in the long run.

Due to two weak assumptions, firstly, the fixed ICOR implies that there is a fixed relationship between the amount of capital stock and the output. Secondly, since labor input is not introduced in the model, the assumption is made that the labor supply is elastic (Siggel 2005, p.38) Tobin, Solow, Swan, Meade, Philips and Johnson, collaborated between Solow and Swan (1956) and relaxed the assumptions of fixed ICOR and the labor used in the HD model and developed Neo-classical growth model.

The key aspects of the Solow-Swan model are the addition of labor as a factor of production and a time-varying technology variable distinct from the capital and labor

factors. Moreover, the Solow- Swan model assumes constant returns to scale (CRTS), diminishing returns with respect to each input, and positive elasticity of substitution between the inputs.

Shortly after, Solow's (1957) showed that technological change accounted for almost 90 percent of the US economic growth in the late 19th and early 20th centuries. The increases in the factors of production (capital and labor) contributed relatively little to output growth, due to the law of diminishing returns. Therefore, the researcher argued, technological progress or total factor productivity (TFP) is the major determinant of growth and determined exogenously. Solow's findings suggest that technological progress allows greater options for input combinations to improve efficiency, leading to a higher level of economic growth. However, Solow's model failed to explain how or why technological progress occurs.

A slight improvement of the neo-classical growth theory in the notion of marginal productivity of labor and capital and looking for technological progress developed Endogenous Growth Theory. Growth economists like Paul M Romer and Robert Lucas Jr. attempted to explain the technological progress his carved an emergence of the new theory of growth known as endogenous growth theory[6].

The modified form of Harrod-Domar model of growth in the notion of the relation between technical progress function and capital investment defines Kaldor Model of Growth. Economic growth is the interdependence of fundamental variables of the economy such as savings, investment, productivity etc. Since this model is more realistic and comes close to the real situation prevailing in underdeveloped economies, it can be applicable to both developed and developing economies. The model gives two alternatives either raising the values of technological progress coefficients or control of population are of great significance.

2.1.2 Theories on Public Investment and Growth

Smith (1776) suggested that economic growth is the result of the profit motive and therefore, classical economists proclaimed the idea of free markets. They were argued

[6]According to endogenous growth theory, "income growth depends upon the rate of savings the higher the rate of savings, the higher the capital and income growth rate, given the marginal productivity of capital."

that the government should limit their activities to; Defense against foreign aggression, maintenance of internal peace and order and public development work. All other functions besides these were considered as unjust and wasteful.

Therefore, classical economists limit the government expenditure. The general opinion that the level and structure of public expenditure are determined politically and thus it is beyond the economist's proper orbit of the study (Weber & Henderson, 1947).

However, Keynes (1936) criticized the classical economists believes of a long run by saying that "we are all dead in the long run". And put forward the idea of 'government intervention' to short-term cure. Therefore, Keynesian economists assert that free markets have no self-balancing mechanisms that lead to full employment.

Keynesian economists argued that the employment depends upon effective demand and decrease in effective demand causes unemployment in the economy. They simply suggest the incremental governmental expenditure at the time of depression and limit the government expenditure at the period of inflation. Hence, Keynesian economist advocates the government intervention and public sector expenditure is exogenously determined and is an instrument for economic growth.

On the other hand, Neo-classical economists argued that the government expenditure shrink the role of the private sector by the crowding-out effect[7]. The neo-classical economist, Solow (1956), concluded that the fiscal policy does not have any effect on the growth of output and the economic growth in the long run mainly depends upon the increase in the population growth and the technological progress. However, in extended Solow model, the human capital has an important input to growth (Mankiw, Romer & Weil, 1992).

Peacock and Wiseman (1961) in Peacock and Wiseman Approach concluded that the governments like to spend more money, that citizens do not like to pay more taxes, and that governments need to pay some attention to the wishes of their citizens. The main argument was that the public expenditure does not increase in a smooth and continuous manner, but in jerks or Step-like fashion.

[7] Refers to government spending driving down private sector spending or when government borrowing absorbs all the available lending capacity in the economy.

Also, Baumol (1986) developed the productivity lag hypothesis, means productivity differentials of private and public sector. It is also called “Baumol’s Disease”. The expansion in public expenditure is made, when the economy is not automatically stabilized. This approach is taken as Baumol’s Approach.

Stanley Please Hypothesis dealt the cause and sources of increasing government expenditure in least developed countries with its effectiveness and overall impact on economy. Increasing in tax rate implies to more expenditure increases in government consumption. So, please effect is relevant in developing countries (Dhungel & Bista, 2015).

Rahn Curve asserts that there are certain sectors like national defense, infrastructure and court that can be better handled only by the government sector. But, higher government expenditure might have the negative impact on the economy through the negative externality in the private expenditure and through crowding out effect. Thus, Per the Rahn Curve 20 percent of the Public expenditure of the GDP is taken as the optimum level of the public expenditure (Dhungel & Bista, 2015).

2.2 Empirical Review

2.2.1 International Context

Costa, et al. (1987) studied public investment using cross-sectional data to estimate the production function and found it to be a significant input in the production process in economic activities. The study further concluded that the public investments have a positive impact on economic activity and is complementary, rather than substitutes.

Aschaur (1989) reported that both crowding out and crowding in effects appeared in public spending, crowding in effects is more vigorous and dominates crowding out, so the net effect of a rise in public investment spending is likely to raise private investment spending. This study concluded that private investment is positively influenced by public spending and public investment spending on infrastructure crowds in rather than crowds out private investment.

Barro (1991) examined the effect of public investment and public consumption expenditures on cross-country growth rates. The study found out that the public investment has an insignificant effect on growth rates, while the rate of economic

growth is negatively related to the share of actual government consumption expenditure.

Devarajan, Swaroop, and Zou (1996) conducted a study on public expenditure in 43 developing countries. The study found that the share of total government expenditure (consumption plus investment) has no significant effect on per-capita economic growth. However, the authors found an important composition effect for government expenditure: that is, increases in the share of consumption expenditure have a significant positive effect on economic growth, whereas increases in the share of public investment expenditure have a significant negative effect. The negative effect also holds for each of the major components of public investment, including transportation and communication.

Clark, Elsby, and Love (2002) exhibited a trend of public investment in Britain. The study concluded that the share GDP and share of government spending since 1970's have sharply declined and the reason behind the decline was due to the privatization of public investment. This affected range of central government programmes, and it has not been significantly offset by investment under the Private Finance Initiative. The study presented the illustration of different investment trend of the infrastructure of the British government for a different pace of time. It presented the history of investment in trend line showing the public sector gross capital formation and Net public investment as a percentage of GDP for certain time periods. And also presented the private finance initiative for the trend line showing the Gross Public Investment including Capital Spending by the Private Sector under the PFI as a Percentage of GDP. Furthermore investment by different branches of the state has been shown through line graph.

Milbourne, Otto, and Voss (2003) examined to find the role of public investment on economic growth considering both the predictions of the model in steady state and in transition to steady state. The study found that there is no significant effect of public investment on the level of output per worker. Standard ordinary least squares (OLS) methods have been used for the transition model and observed a significant contribution to economic growth from public investment when instrumental variables methods are used, however, the associated standard errors are much larger and the contribution of public investment is statistically insignificant.

Ghani and Din (2006) analyzed the impact of public investment and growth of the economy in Pakistan and explored the role of public investment in the process of economic growth. The results showed that growth is largely driven by private investment and that no strong inference can be drawn from the effects of public investment and public consumption on economic growth. The VAR model is used to explore the role of public investment in economic growth. The VAR model consisted of four variables i.e. public investment (IG), private investment (IP), public consumption (CG), and GDP (Y). Data on these variables real terms for the period from 1973 to 2004 are obtained from various issues Economic Survey.

Murty and Soumya (2006) studied effects of public investment in growth and poverty. According to the study, Counterfactual policy simulations of a sustained increase in public investment in infrastructure in India, financed through borrowing from commercial banks, show a substantial increase in private investment and thereby output in this sector. Similarly, due to increases in absorption, real private investment and output in all other sectors also seem to increase, resulting in several other macroeconomic changes. The study attempts to address (a) the need for achieving 10 percent GDP growth and its feasibility, (b) the role and potential of the infrastructure sector in achieving the desired GDP growth, and (c) the ways and means of raising resources for public investment in the infrastructure sector and particularly, the use of accumulated foreign capital inflows for this purpose.

Reungsri (2010) studied the impact of public investment of infrastructure on economic growth of Thailand[8]. During the Asian economic crisis in 1997, many infrastructure projects in Thailand were suspended or terminated". And this resulted in the Thailand's government to guarantee sufficient levels of revenue and investment expenditure within a balanced budget. The study concluded that the public infrastructure investment has a mixed effect on domestic growth. The infrastructure capital has a positive significant effect on economic growth in the first quarter while second contradicts the first quarter result. Furthermore, the crowding-out effect is seen within the relationship between private and government investment and can result in negative impact on growth. The analysis was preceded using a supply-side model based on the Neoclassical model framework and

[8] According to the article, "In economic downturns, the weighting of infrastructure investment in national budgets makes it a frequent contender for substantial cuts.

analyzed through production function. Time series data were used to analyze the relationship. Error Correction model was used for estimation of the coefficient. Autoregressive Distributed Lag model was used in the estimation. Finally, a simulation process was conducted, based on the estimated model, termed Infrastructure Finance Model for Emerging Economies. The simulation was carried out with ex-ante and ex-post scenarios: to generate a time-path within the data time period to prove model consistency; and for time-path values beyond the time period to provide a prediction for policy decisions.

Okoro (2013) investigated the impact of government spending on Nigeria from 1980 to 2011. The Co-integration test employed revealed that there is a long run relationship between the variables studied in Nigeria. The study recommend that Government increase both capital expenditure (investment in roads, power supply, transport, and communication) and recurrent expenditure mostly on issues that should attract economic growth. Adopting secondary data, Granger Causality test, Johansen Co-integration Test and Error Correction Mechanism models were used in the study. The model was integrated to I (1). The VECM model negates the OLS model which indicates a change from the short run dynamics to their long run dispositions.

Patricia and Izuchukwu (2013) investigated the impact of government expenditure on education leading to the growth of the country. According to the study, Government expenditures are very crucial instruments for economic growth at the disposal of policymakers in developing countries like Nigeria. The study recapitulated Total Expenditure Education is highly and statistically significant and have a positive relationship on economic growth in Nigeria in the long run. The result has an important implication in terms of policy and budget implementation in Nigeria. The objectives of the study were to determine the effect of public expenditure on economic growth in Nigeria. The methodology of the study was purely quantitative employing time series data of Nigeria from 1977 to 2012. Error Correction Model (ECM) has been used as the trigonometric tools and also used Ex-post facto research design and applied time series econometrics technique to examine the long and short-run effects of public expenditure on economic growth in Nigeria.

Hyasi, Mano, Kociu, and Celo (2016) evaluated the public investment efficiency in macroeconomic indicator terms and was able to increase the attention of the researchers. The study goes through the private and public investment and concluded that public investment at local and national level have an important role in the economic growth. And also it showed the contribution of public investment towards the increasing of private investment for developing countries. In the data analysis section, the correlation analysis of independent variables and the construction and analysis of linear regression equation was performed which expresses the connection of independent variables with the dependent variable. Furthermore, the ratio of public investment in infrastructure to public investment total, represented an independent variable in the study, whitelist, interest rates and the index of economic freedom represented independent explanatory variables, and a number of business entities represented the dependent variable.

Younis (2016) examined the impact on the growth of Pakistan through infrastructural investment. The study concluded that there is the inefficiency of infrastructure investment in Pakistan. And investment should be diverted from economic infrastructure (transportation and communication, health, education) to social infrastructure in the motive to gain increasing growth rate. The model is purely quantitative long run and short run analysis. The study used the Principal Component Analysis and VECM (Vector Error Correction Model) for the statistical analysis and decision-making process. From the perspective of long-run social & economic infrastructure investment rates and private investment rate effect, gross value added per capita which represents economic growth rate. The short-run and long-run relationship can differ in both direction and magnitude. The reason is that in the long-run a number of business cycles are included. Similarly, other stochastic shocks play a role in determining long-run and short-run dynamics of the model. The insignificant impact of economic and social infrastructure rate on economic growth rate is according to what theory suggests as there is sufficient gestation period required for the infrastructure investment to affect economic growth.

Simiyu (2016) explained the relationship of public investment for the growth of the economy in Kenya. The objective of this study was to explain the relationship between economic growth and public expenditure on Health, Education, Military and Infrastructure. The results displayed no causal relationship between public

expenditure and economic growth, however, there exists a unidirectional causation between Military and Health expenditures - Military expenditures "Granger Cause" Health expenditures. Hence, it is analyzed a change in Military expenditures cause a change in Health Expenditures. The methodology of the study was purely quantitative and used a time series data collected from 1963 - 2012. Johansen Co-integration Test and Vector Error Correction Model (VECM) was applied to the time series data to estimate the short-run and long-run relationships between public expenditures and economic growth. The study suggested that public expenditure components and economic growth co-move towards a long-run equilibrium with a speed of adjustments of approximately 3.6 percent after short-run fluctuations in the equilibrium.

2.2.2 National Context

Kanel (1988) examined the growth, pattern and impact of Public expenditure on the economic growth of Nepal by using the data from 1965 to 1981 to use simple Ordinary Least Square (OLS) technique to find out the relationship between the variables such as GDP and economic services[9], social services and used R^2 to check the significance of the model. The major findings of the research are major expansion of the public expenditure had taken place only after 1970, Over the study period development expenditure grows faster than the recurrent expenditure and elasticity coefficient for total development expenditure, economic services and social services with respect to per capita income being more than unity. At the same time, it found that the elasticity coefficient for the public investment being less than unity.

Shrestha (2009) analyzed the relationship between the various Composition of Public Expenditure and Economic Growth in Nepal with the objectives to determine the effect of the various composition of public expenditure in economic services and defence indicators on economic growth by using time series model with the application of the endogenous growth model. It has applied Augmented Dickey Fuller (ADF) technique to test the unit root of the variables and run the OLS technique. The major findings of the research are so long as productivity of the expenditure is higher than the interest rate, increase in expenditure will increase the growth rate in an economy and physical

[9] Economic services are the sector of government expenditure that includes health, education, transportation, and communication expenditures.

infrastructure plays the very important role to enhance economic growth by promoting private market production.

Aryal (2011) studied the trend, structure and effect of the public expenditure on various sectors (education, health, transportation) in economic growth of Nepal with the major objectives to examine the trend and structure of public expenditure, to show the relationship between economic growth and GDP growth rate and to find out the various factors that influence the economic growth. It has used the data set for 23 years and used the simple OLS with two variables that are public expenditures and economic growth and used R^2 technique to check the significance of the model and used t- test for the significance of the individual coefficients. The major findings are the share of public expenditure on the GDP is increasing over time, the share of current expenditure in the total expenditure is higher than the capital expenditure on the total expenditure and there is not any significant relationship between the public expenditure and economic growth.

2.3 Research Gap

By studying above literatures, it is concluded that there has not been any empirical study on the public investment in Nepal: A case of transportation expenditure. Though, there are been some literatures in the international arena. In national context, most of the studies on this field are like ‘nature and trend of public expenditure’, ‘relationship between public expenditure on economic growth’ and so on for education, health sectors and as well as overall expenditures with the growth. But no any empirical study on the public investment in Nepal: A case of transportation expenditure.

Though there are some studies on the relationship between the government expenditure and economic growth, till now no study is conduced to check the investments on transportation that leads to growth. Hence, this study checks the government expenditure in transportation sector with respect to economic growth in Nepal by employing regression model.

CHAPTER III

RESEARCH METHODOLOGY

This chapter contains the extensive discussion on the methodology used in this study. Research design, sample period, sources of data, model specification and methods of analysis are the major headings in this chapter.

3.1 Research Design

This study has the main objective to show the relation between the government and economic growth. To achieve the objectives different techniques been employed. Mostly the quantitative techniques has been used.

Firstly, under qualitative techniques to show the trend and nature of the study, summation of the expenditures in different regimes are conducted separately, graphical and tabular presentation are performed. Also the trend of plans of government that is Five Year Plan is shown under different regimes.

Secondly, for quantitative analysis descriptive analysis, unit root testing of variable, Johansen Co-integration test and Vector Auto-regressive Model using time series analysis has been done to show the relationship between the public investment on transportation and economic growth. The Gross Domestic Product (GDP) is taken as independent variable. The explanatory variables are Transportation Capital (TC) Expenditure and Transportation Recurrent (TR) Expenditure.

3.2 Sample Period

To analyze the relationship between public investment on transportation sector and economic growth, the study has used the annual data from July 1975- July 2016 (end of the fiscal year) of Nepal. Data of all the variables (LN_RGDP, LN_RTC, LN_RTR) have the same sample period of 1975-2016.

3.3 Sources of Data

The data used in this study are secondary. The data are used from quarterly economic bulletin published by Nepal Rastra Bank (Quarterly Economic Bulletin, 2017), current

macroeconomic and financial situation published by NRB (Current Macroeconomic and Financial Situation, 2017) and various economic surveys published by Ministry of Finance of Nepal (Economic Survey). However, we have used the data in natural logarithm form rather than in original form for some analysis.

3.4 Model Specification

Nepal is one of the Asian countries with higher availability of natural resources that can satisfy sustainable economic growth and development but due to lack of long-term vision for its growth, the country's productivity yielding capacity is not in the optimum state. Nepal is a landlocked country of 147,181 km^2 and a population of 26.4 million. The main source of revenue for the country is tourism and tax. The secondary data on Gross Domestic Product (GDP), Government Transportation Capital Expenditure, and Transportation Recurrent Expenditure were extracted from NRB for the year 1974 to 2016.

The underlying analytical framework for the nexus of economic growth is HD model which links output growth to aggregate investment in a linear function. The rate of output growth in the HD model can be captured in production function with capital as the sole input. Therefore, production function of developing countries can take the following form $Y(t) = f(K(t))$ (Xayavong, n.d.).

Hence, the methodology for the study is of the linear regression model in which GDP acts as the function of Government Expenditures and the source of revenue. So, the model is in the form of

$$Y = f(X_1, X_2) + u \qquad (3.4a)$$

Where, Y=Gross Domestic Product

X_1= Real Capital Expenditure of transportation

X_2= Real Recurrent Expenditure transportation

u = Stochastic error term

Hence, the linear econometric model takes the form of:

$$\text{LN\_RGDP}_t = \beta_0 + \beta_1 \text{LN\_RTC}_t + \beta_2 \text{LN\_RTR}_t + u_t \qquad (3.4b)$$

The nominal value of all variables are converted into real term by applying following formula. And the basic price is adjusted taking base year 2000/01.

$$\text{Real value} = \frac{(\text{Nominal Value})}{(\text{Consumer Price Index})_i} * 100,\ i=1....n \qquad (3.4c)$$

In order to carry out modeling, the test of stationarity is the main work which can proceed through Unit Root Test. Hence, to test the unit root Augmented Dickey-Fuller Test proposed by Dicky and Fuller (1979) is used. Further co-integration is done. The error correction mechanism first used by Sargan (1964) and later popularized by Engle and Granger and Weiss (1987) was also used to correct for disequilibrium in order to describe both the short-run and the long-run equilibrium relationship of the model. Various assumptions underlying the validity of the model are also examined.

3.5 Method of Time Series Analysis

The study used time series econometric models in establishing the relationship between GDP and Public expenditure components (transportation). The linearity relationship is assumed between variables for the model specified.

To address the objective of the study, the data was analyzed step by step using the processes and methods as described in the proceeding sections.

3.5.1 Test of Stationarity

Since empirical analysis is based on time series data, the underlying time series should be stationary. It is essential to test the stationary. There are several methods to test of stationary, such as, graphical analysis, the Correlogram test, and unit root test. However, the study uses unit root test and Correlogram test. Again there are various methods of testing unit root. But this study uses Augmented Dickey Fuller (ADF) test for the purpose.

Thus, if X and Y series are non-stationary processes, then modeling X and Y relationship as a simple linear regression as in equation (6) shown below will lead to spurious regression (Asari et al, 2011).

The equation for no intercept and no trend is,

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{i=1}^{P} \beta_i \Delta Y_{t-1} + u_t \qquad (3.5.1)$$

The equation for only intercept and no trend is,

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \sum_{i=1}^{P} \beta_i \Delta Y_{t-1} + u_t \qquad (3.5.1a)$$

The equation for both intercept and trend is,

$$\Delta Y_t = \alpha_0 + \gamma Y_{t-1} + \alpha_2 t + \sum_{i=1}^{P} \beta_i \Delta Y_{t-1} + u_t \qquad (3.5.1b)$$

However, the paper have used last two equation to analyze the unit root in the data. The unit root is often denoted by order of integration I (n) (Asteriou & Hall, 2007). The order of integration refers the number of unit roots.

$$\text{LN\_}RGDP_t = \beta_0 + \beta_1 LN\_RTC_t + \beta_2 LN\_RTR_t + u_t \qquad (3.5.1c)$$

Time series data is said to be stationary if it's mean, variance and covariances do not vary over time. Non-stationary data leads to spurious regression due to non-constant mean and variance (Dimitrova, 2005). Differencing a series using differencing operators produces another set of observations. For instance, the first-differenced values are given as $\Delta Xt = Xt - Xt{-}1$. If a series is stationary without any differencing, it is said to be I (0) or integrated of order 0. However, if a series is stationary after first-difference is said to be I (1) or integrated of order 1. In order to check for stationarity in the series (whether in levels or first-differences), the Dickey and Fuller (1979) test was used.

3.5.2 Methods of Lag Length Selection

The Johansen cointegration test requires the selection of appropriate lag length. There are so many ways of selecting the lag length of the model. Some scholars prefer the ad-hoc methods (Gyanwaly, 2012) and some are employing different techniques developed by the econometricians. The one of the most popular methods of selecting the lag length is Akaike Information Criterion (AIC) (Luo, 2013). In this criterion, the lower the value, the better the model (Gujarati & Sangeetha, 2007). This study have fixed the lag length of the model based on the SIC.

The AIC is given as (Gujarati & Sangeetha, 2007);

$$AIC = n^{k/n} \frac{\sum \hat{u}^2}{n} = n^{k/n} \frac{RSS}{n} \qquad (3.5.2)$$

or, in log form

$$\ln AIC = \frac{k}{n}\ln n + \ln\left(\frac{RSS}{n}\right) \qquad (3.5.2a)$$

3.5.3 Cointegration test

After establishing whether the series is stationary in levels or first-difference (and if the series are integrated of the same order), then Johansen's procedure is used to determine whether there exists a cointegrating vector among the variables (Johansen, 1988).

Before the Johansen cointegration test is performed, the optimal lag length for analysis should be identified. The lag length is selected using the information selection criteria which include: Sequential Modified Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Bayesian Information Criterion (SBIC) and Hannan-Quinn Information Criterion (HQIC) and ensuring that the residuals are white noise as suggested by Ivanov et al (2005).

For Johansen cointegration test, Trace statistics and Maximal Eigenvalue statistics are used which can be expressed as follows (Luo, 2013), (Asteriou & Hall, 2007);

$$\lambda_{Trace}(r) = T\sum_{i=r+1}^{g}\ln\left(1-\hat{\lambda}_i\right) \qquad (3.5.3)$$

$$\lambda_{Max}(r, r+1) = -T\ln\left(1-\hat{\lambda}_{r+1}\right) \qquad (3.5.3a)$$

The bivariate Johnsen cointegration test has been performed in this study. When the data are found to be co-integrated, the study has performed the Vector Error Correction Method for long-run and short-run relation between variables. When the data are not co-integrated, the unrestricted Vector Autoregressive Model has been used for short-run relationship.

3.5.4 Unrestricted Vector Autoregressive (VAR) Model

The models which are not co-integrated has been tested short run causality under unrestricted VAR. As the data are integrated of first order, the first-difference data have been used for the VAR models. The equation of bivariate VAR models are as follows (Asteriou & Hall, 2007);

$$\Delta \text{LN\_RGDP}_t = \beta_0 - \beta_1 \Delta \text{LN\_RTC}_t + \gamma_1 \Delta \text{LN\_RGDP}_{t-1} + \gamma_2 \Delta \text{LN\_RTC}_{t-1} + u_{vt} \quad (3.5.4a)$$

$$\Delta \text{LN\_RTC}_t = \beta_0 - \beta_1 \Delta \text{LN\_RGDP}_t + \gamma_1 \Delta \text{LN\_RGDP}_{t-1} + \gamma_2 \Delta \text{LN\_RTC}_{t-1} + u_{xt} \quad (3.5.4b)$$

And

$$\Delta \text{LN\_RGDP}_t = \beta_0 - \beta_1 \Delta \text{LN\_RTR}_t + \gamma_1 \Delta \text{LN\_RGDP}_{t-1} + \gamma_2 \Delta \text{LN\_RTR}_{t-1} + u_{vt} \quad (3.5.4c)$$

$$\Delta \text{LN\_RTR}_t = \beta_0 - \beta_1 \Delta \text{LN\_RGDP}_t + \gamma_1 \Delta \text{LN\_RGDP}_{t-1} + \gamma_2 \Delta \text{LN\_RTR}_{t-1} + u_{xt} \quad (3.5.4d)$$

3.5.5 Granger Causality Test

The Granger causality/ block exogeneity wald test has been performed under VAR for the short-run causality between the variables. For instance, the Granger causality test between RGDP, RTC and RTR is given by (Gujarati & Sangeetha, 2007).

$$\Delta LN\_RGDPt = \sum_{i=1}^{n} bi\ \Delta LN\_RTC(t-i) + \sum_{j=1}^{n} ci\ \Delta LN\_RGDP(t-j) + e2t \quad (3.5.5a)$$

$$\Delta LN_{RTCt} = \sum_{i=1}^{n} gi\ \Delta LN\_RTC(t-i) + \sum_{j=1}^{n} hi\ \Delta LN\_RGDP(t-j) + e3t \quad (3.5.5b)$$

And

$$\Delta LN\_RGDPt = \sum_{i=1}^{n} bi\ \Delta LN\_RTC(t-i) + \sum_{j=1}^{n} ci\ \Delta LN\_RGDP(t-j) + e2t \quad (3.5.5)$$

$$\Delta LN\_RTCt = \sum_{i=1}^{n} gi\ \Delta LN\_RTC(t-i) + \sum_{j=1}^{n} hi\ \Delta LN\_RGDP(t-j) + e3t \quad (3.5.5)$$

3.5.5 Residual Test

The serial correlation is tested by using Breush- Godfrey Serial Correlation LM tests in this study. The heteroscedasticity is checked by using Breush-Pagan Godfrey test. Accordingly Jarque-Bera test is used to test the normality of residuals.

3.6 Conceptual Framework

Public investment is pertinent for economic growth of a country. The conceptual framework for the study is as illustrated below:

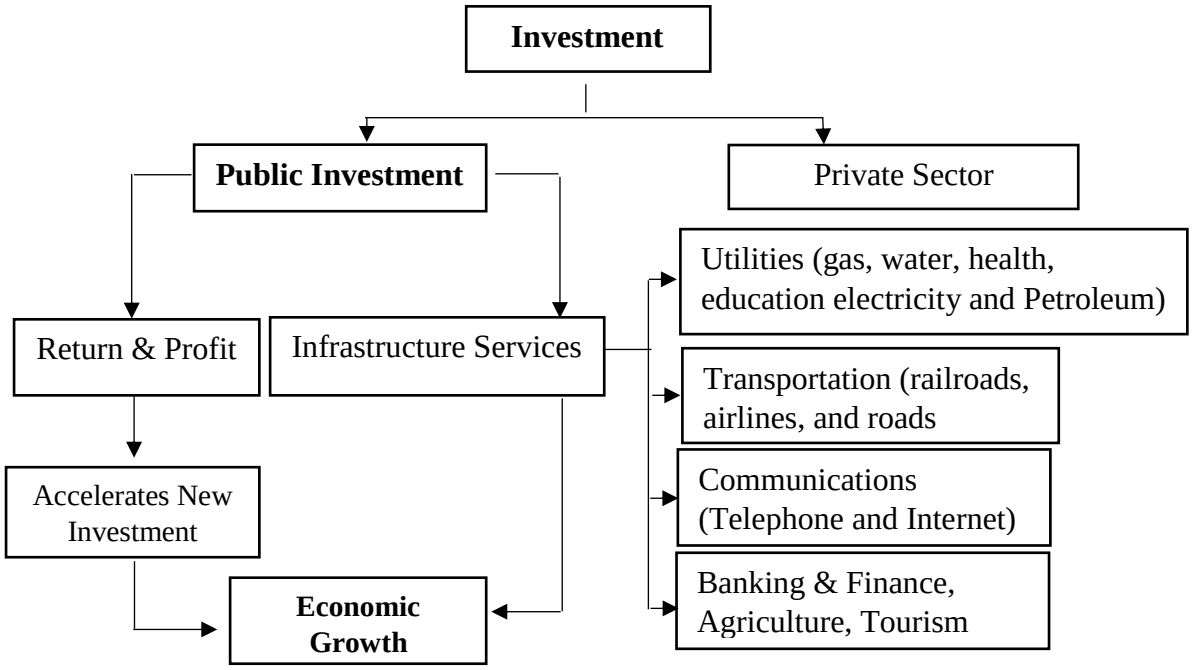


Figure: Self Composition of Conceptual Framework.

CHAPTER IV

TREND AND STRUCTURE OF TRANSPORTATION EXPENDITURE OF PUBLIC INVESTMENT

The Government of Nepal has been continuously engaged though the early stages till now for the development of transportation. Various plans are put forward for the connection between the boarders of neighbouring countries. Amendment of five years plan is the achievement of the goals that are targeted by the government. However, unsuccessful implementation and loop holes in the policy hindered the government's plan.

4.1 Panchayat Regime

There were enormous changes in the structure of governments of Nepal for the developmental inclusion for all parts of the country. Since 1960 till 1990, King Mahendra, Formulate a council of five members and divested the party system. This system is commonly referred to Panchayat system. Under this regime government implemented various projects through the direct interference of Government. Construction of the Mahendra (East-West) Highway was the main achievement on transportation sector.

Table 4.1: Detail of Transportation Sector under Panchayat Regime From 1975

Fifth-five year plan (1975-80)	• Regional headquarter established and road construction proceeded by those regional office. • District and local roads were constructed through panchayat by providing grant and technical support. • Promoted special activities along completed roads to foster economic growth. • Trolley Bus system was completed.
Sixth-five year plan (1980-85)	• Roads connected to main tourist destination and national level project location based on regional balanced approach. • Policy adopted to attract private sector in transport investment in urban area and conduction of feasibility study to develop transportation based on electricity.

Seventh-five year plan (1985-90)	• Long term policy adopted to construct roads East-West, and North-South. • Focus more on maintenance and control road accidents. • Straight alignment will be prioritized to construct East-West and North-South road. • Urban Road Master plan will be prepared and followed. • Slogan is "decade of transport and communication" of Asia and Pacific region.

Source: (Pokharel & Acharya, 2015).

4.2 Democratic System

After 1991, King Birendra promulgated the new constitution and abolished the constitution of 1962. The 1990 constitution ended almost thirty years of absolute monarchy in which the palace had dominated every aspect of political life and political parties were banned.

The constitution, broadly based on British practice, is the fundamental law of Nepal. It vests sovereignty in the people and declares Nepal a multiethnic, multilingual, democratic, independent, indivisible, sovereign, and constitutional monarchical kingdom. The national and official language of Nepal is Nepali in the Devanagari script. All other languages spoken as the mother tongue in the various parts of Nepal are recognized as languages of the nation. Although Nepal still is officially regarded as a Hindu kingdom, the constitution also gives religious and cultural freedom to other religious groups, such as Buddhists, Muslims, and Christians. The preamble of the constitution recognizes the desire of the Nepalese people to bring about constitutional changes with the objective of obtaining social, political, and economic justice. It envisages the guarantee of basic human rights to every citizen, a parliamentary system of government, and a multiparty democracy. It also aims to establish an independent and competent system of justice with a view to transforming the concept of the rule of law into reality.In this regime the transportation development moved formulating Eight Five-Year Plan which is illustrated as below:

Table 4.2: Detail of Transportation Sector under Multi-Party Democratic System From 1975

Eight-five year plan (1992-97)	• Develop the foundation for toll collection in Bridge for maintenance of bridge. • Emphasize on road connecting "Farm to Market". • Encourage private sector for construction and introduction of operation of rood and BOOT system through incentive.
Ninth-five year plan (1997/98-2001/02)	• Development of agriculture road for the promotion of agriculture productivity. • Develop transport system less expensive and favorable to environmental conservation. • Develop traffic management system to control traffic accidents and pollution.
Tenth-five year plan (2002-07)	• Road project will be selected based on minimum adverse impact on environmental and regional imbalance formulating integrated transport master plan. • Adopt low cost technology, to minimize environmental degradation and develop cycle lane in heavy traffic road area. • All district HQ are connected and link northern mountain to Tibetan market through adoption of planned system to repair and maintenance. • East-West highway will be developed as an Asian Highway and regional commercial route. • Handing local transport system to local bodies and institutional development for decentralization. • Vehicular pollution will be reduced in Kathmandu valley and other cities. • Nepal emission standard 2000 will effectively implemented.

Source: (Pokharel & Acharya, 2015).

4.3 Republic Regime

The third blow to the monarchy came in February 2005 when Gyanendra, propelled by his autocratic ambition, staged a coup by dismissing a multi-party government, suspending freedom of expression, and imposing a draconian state of emergency.

Meanwhile, the Maoists and the alliance of the opposition pro-democracy parties struck a 12-point deal that brought them closer and against the royal rule. The Maoists and the government signed a peace agreement; the Maoists joined the government under a new interim constitution, which was amended for the third time in December 2007 to declare Nepal a republic with the provision that the first meeting of the Constituent Assembly would implement that declaration (Wagle, 2008).

Table 4.3: Detail of Transportation Sector under Republic System From 2007

Eleventh-five year plan(2007/08-2009/10)	• Road will be constructed based on sector wide road program (2007-17): roads should be available within 4 hours walking distance in Hill and 2 hours walking distance in Terai. • 8 trade transit which connect northern China and Southern India will be developed. • Parallel East-West highway including current East-West, Mid Hill and Postal at Terai will be developed. • Alternative highway will be developed to connect Kathmandu and Terai.
Twelve-five year plan (2010/11-2012/13)	• District and regional headquarter connection and district connecting road and national strategic road will be made all weather. • Identify railway and construction ropeway, waterways which are important for tourism sector will be attracted through BOOT/BOT system. • Promote public private partnership in transport sector and PPP Cell will be established to promote PPP. • Disabled friendly road will be developed. • Construction of Mid hill highway and Kathmandu-Terai fast track road will proceeds. • Road network expansion in Kathmandu Valley considering urbanization safety and environmentally friendly. • Organizational structure will be developed for the Kathmandu-Pokhara and East-West electric railway.

	• Footpath and bicycle lane will be provided where possible.
Thirteenth-five year plan	• Work will be started to prepare DPR of East-West Railway. • Private investment will attract through PPP to construct Metro rail in Kathmandu valley. • In the planning period, DPR of East-West railway will be prepared and construction of Simara –Bardibas section will be started.

Source: NPC, Five year Plans.

4.4 Trend of Government Transportation Expenditure in Different Political Regime

Trend of government transportation capital expenditure, in different political period of time is analyzed in the figure as illustrated below. The real government transportation expenditure has been increasing from the Panchayat to democracy and from democracy to republic regime. Which can be shown in Table 4.4.

Table 4.4: Trend of Public Expenditure (Total in Panchayat, Democracy and Republican System) (Rs. In Million)

Regime	RTC	RTR	RGDP	RTC/RGDP	RTR/RGDP
Panchayat (1975-1991)	68553.3	4184.765	3277426	0.366	0.022
Democracy (1992-2006)	78718.5	4001.332	5967857	0.209	0.010
Republic (2007-2016)	122123.6	20170.62	6584701	0.179	0.029

Source: Author's Calculation through Excel.

Table 4.1 shows the trend of public transportation capital expenditure, recurrent expenditure and GDP and ratio of RTC and RTR to the RGDP for the period ranging 1975 to 2016 under the different system of the government that is exercised. For the Panchayat system data ranging from1975-1991 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 2001; expenditure is adjusted with base prices published by Nepal Rastra Bank. All the values presented

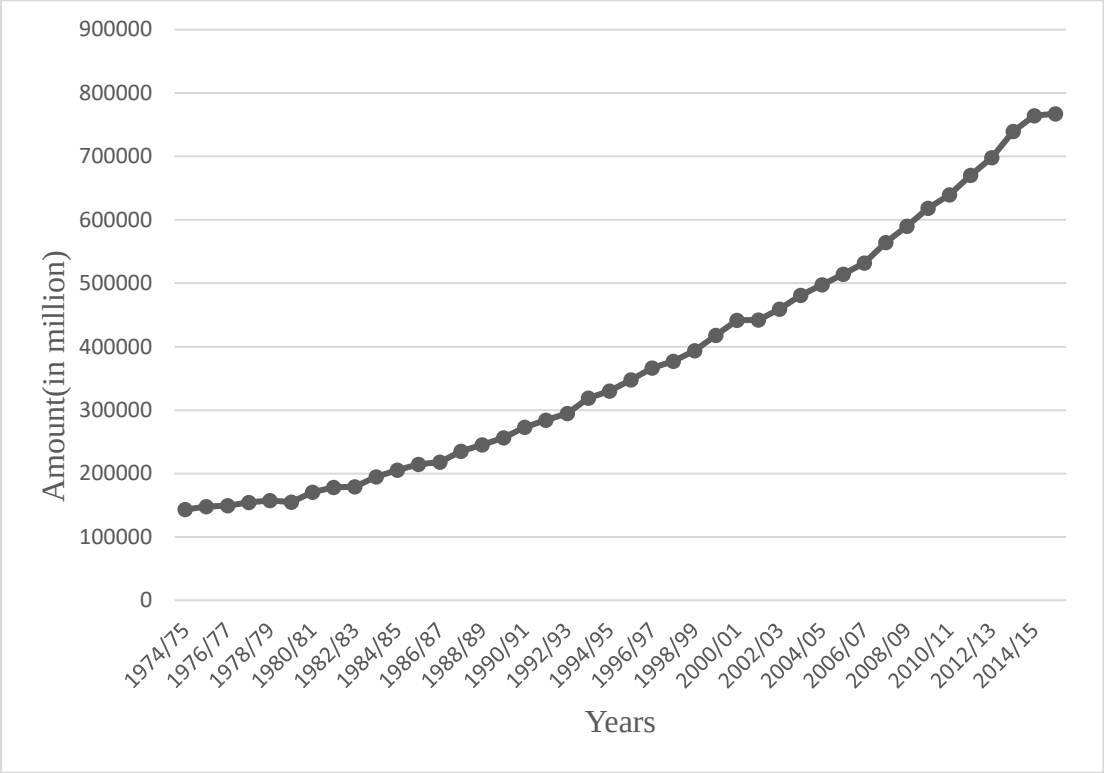
in the table reflect the average values over the period of each system of the government. The real values are given in the appendix. From the table, it is clear that total real government transportation capital expenditure in democratic system is higher than that of Panchayat system and the real government transportation capital expenditure in republican system is higher than that of democratic system. This is because in the democratic time, democratic government increases the number of the works such as; social services, providing the facilities of education, health, drinking water and local and infrastructure development in that period. Republican system was completed in 2017 and the country is reached in federal democratic republican system of governance. There are three layers of governments in federal democratic republican system of governance i.e. central, province and local. In republican system of government, government capital expenditure is higher than Panchayat and democratic system.

But, ratio of real government transportation capital expenditure to real GDP is decreasing from Panchayat to democracy and from democracy to republican system as well as the ratio of RTR to RGDP is decreasing from Panchayat to democracy and from democracy to republican system. The ratio of RTC to GDP in panchayat period was 0.366, in democratic system was 0.209 and in republican period was 0.179. While the ratio of RTR to RGDP is less and decreasing. The ratio of RTR to GDP in panchayat period was 0.022, in democratic system was 0.010 and in republican period it increased to 0.029.

4.5 Trend and Nature of Real GDP

The mapping of Real GDP over time showed a constantly increasing trend. The positive trend is due to the decreasing inequality, embark on positive HDI, education, communication and other social inclusion. However country suffered the protest of different community and of student affiliated unions which decreased the increasing trend of GDP in 1979-80. The country's expenditure also crunches over 2014-15 due to economic embargo.

Figure 4.5: Trend and Nature of Real GDP of Nepal.



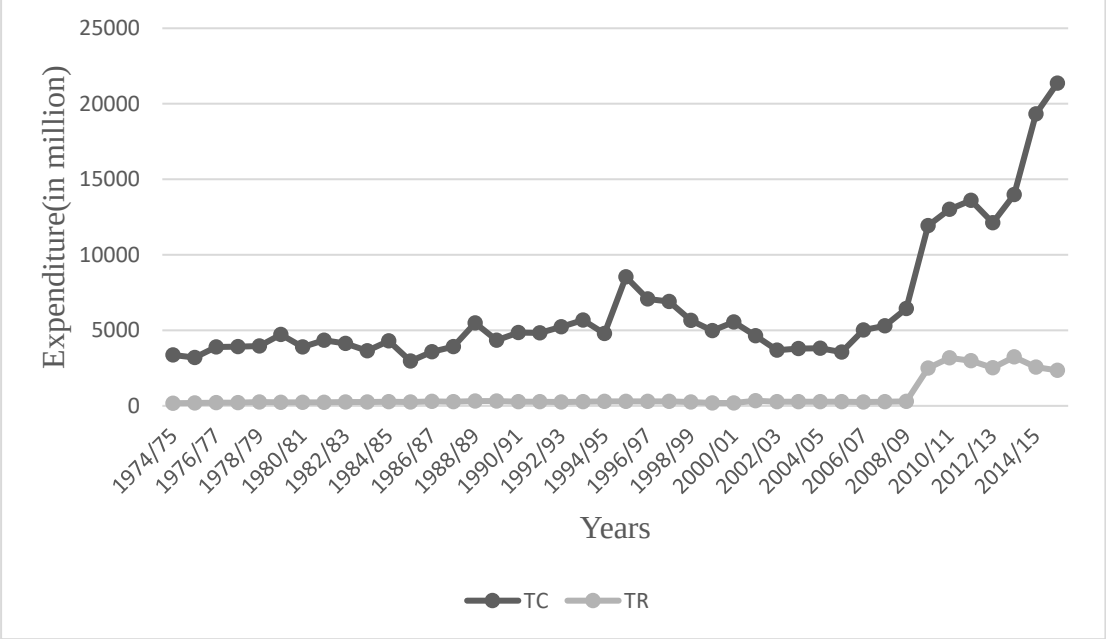
Source: Author's calculation through Excel.

In the above illustrated Figure 4.5, the real GDP is constantly increasing. The real GDP was approx. 1.5 million in 1975, whilst in the year 1979(4.5 million) there is break in the increasing trend. However, the decreasing trend did not last longer and recovered over time to reach 7.5 million in 2014-15.

4.6 Trend and Structure of Government RTC and RTR Expenditure

The government of Nepal performs investments in different sectors of the economy. The expenditure components includes capital as well as recurrent expenditures. Capital investments are the backbone of country's GDP growth. The figure exposed below shows the capital and recurrent expenditures of government investments in transportation sector.

Figure 4.6: Trend and Structure of Government RTC and RTR Expenditure



Source: Author's calculation through Excel.

The figure 4.6 illustrates the trend and structure of RTC and RTR investments done by the government. The trend shows that there was minimum expenditure in both case of RTC and RTR. In 1974-75 the capital were seem to have less than 5 million expenditure. This expenditure remain below 5 million until 2006-07. Small increment in 1994-95 is seen however a sudden decrease is seen in 1996-97. And eventually there is rise in the capital expenditure. This is the positive aspect that there is investment in transportation sector. This shows that there was minimal investments of government in Panchayat regime. However after democratic system the investment in government transportation sector is rapid.

CHAPTER V

DATA ANALYSIS AND RESULTS

5.1 Descriptive Statistics

The table 5.1 shows the result of the descriptive statistics of all variables which is carried out before entering into the time series analysis.

Table 5.1: Descriptive Statistics of All Variables

Measures	LN_RTC	LN_RTR	LN_RGDP
Mean	8.618969	5.935287	12.70429
Standard Error	0.077163	0.140516	0.082702
Median	8.476827	5.596229	12.73373
Standard Deviation	0.500075	0.910649	0.535973
Sample Variance	0.250075	0.829282	0.287267
Kurtosis	0.844952	1.37683	-1.29802
Skewness	1.305475	1.75225	-0.03561
Minimum	7.993259	5.158018	11.87116
Maximum	9.969907	8.081334	13.55088

Source: Author's Calculation through Excel.

The data set contains the 42 year of observation starting 1975 to 2016. The descriptive statistics shows that the mean of LN_RGDP is 12.70429 with standard deviation of 0.535973. This variable showed leftward skewed. Furthermore LN_RGDP exhibits Platykurtic. And the maximum value of LN_RGDP is 13.55088 while the minimum value is 11.87116.

Similarly, the mean of LN_RTC and 8.618969 and with standard deviation of 0.500075. This variables is leftward skewed. Furthermore LN_RTC exhibits Mesokurtic. And the maximum value of LN_RTC is 9.969907 while the minimum value is 7.993259.

Also, the mean of LN_RTR is 5.935287 with standard deviation 0.910649. This variable is rightward skewed. Furthermore LN_RTR exhibits Leptokurtic value. And the maximum value of LN_RTR is 8.081334 and minimum value is 5.158018.

5.2 Time Series Analysis

5.2.1 The Unit Root Test

The plots of time series generally provides the simplest method for checking stationarity. The results of stationary and non-stationary plots of the variables are provided in the appendix. To numerically conform the stationarity of variables, Augmented Dickey Fuller Test (ADF) was performed. To make the variable stationary, we should go for first differencing.

The Hypothesis is formulated as:

Null Hypothesis (H_0): Variable is not stationary or got unit root.
Alternative Hypothesis (H_1): All the data are stationary.

Table 5.2.1: ADF Test for the Variables

Variable Status	Variable Name	RWOCT	RWC	RWCT	Order of Integration
Original	Gross Domestic Product (Y)	11.8302 (1.0000)	0.0244 (0.9554)	-2.8198 (0.1988)	I(0)
	Capital Expenditure Transportation(X_1)	1.3869 (0.9563)	-0.0751 (0.9454)	-1.2692 (0.8816)	I(0)
	Recurrent Expenditure Transportation(X_2)	1.0355 (0.9184)	-0.5838 (0.8632)	-3.0670 (0.1311)	I(0)
1st Difference	Gross Domestic Product(Y)	-0.2696 (0.5821)	-7.2558*** (0.0000)	-5.8539*** (0.0001)	I(1)
	Capital Expenditure Transportation (X_1)	-7.0009*** (0.0000)	-7.3289*** (0.0000)	-7.4956*** (0.0000)	I(1)
	Recurrent Expenditure Transportation (X_2)	-5.5910*** (0.0000)	-5.6767*** (0.0000)	-5.6903*** (0.0002)	I(1)

Note: ***denotes variables stationary at 5 percent level of significance.
() indicates P-Value.
Source: Author's Calculation.

All the variables showed non-stationarity in levels that is all the variables are converted and made simpler taking log. Initially the data after logarithms are tested for their stationarity. Variables turned out to be non-stationary. Then after first difference again ADF test is verified. Eventually these variables showed stationarity on first difference. If the variables turned out stationary on level then the model is considered to be I (0). However, it showed stationarity in first difference. So, the test is integrated to I (1).

5.3 Regression Result

Table 5.3 provides the regression result which shows that both the variables are likely to effect the gross domestic product of the country.

Table 5.3: Regression Result

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	6.821242	1.543553	4.419182	0.0001
LN_RTC	0.614460	0.261704	2.347924	0.0240
LN_RTR	0.098906	0.143712	0.688222	0.4954

Source: Author's Calculation through E-Views 10.

Hence, the estimated regression model is,

$$LN\_RGDP_t = 6.82 + 0.61LN\_RTC_t + 0.09LN\_RTR_t$$

se	(1.54)	(0.26)	(0.14)
t-statistic	$(4.42)^{*}$	$(2.35)^{**}$	$(0.69)^{***}$

R^2=52.89% D.W. = 0.16

Note: * denotes coefficient is significant at 1 percent level of significance.

** denotes coefficient is significant at 5 percent level of significance.

*** denotes coefficient is not significant even at 10 percent level of significance.

The model shows the value of constant is 6.82 and it is significant. It means the RGDP is autonomously change by 6.82. The model suggest that 1 Percent rise in RTC, the RGDP rises by 0.61 Percent. The p-value of transportation capital expenditure is 0.024. This suggests that level of significance is less than 5 Percent i.e. real transportation capital expenditure significantly determines the real GDP of Nepal.

Similarly, the model suggest that 1 Percent rise in real transportation recurrent expenditure leads to 0.098 percent rises in GDP, other things remaining the p-value for real transportation recurrent expenditure is 0.49 which implies level of significance is more than 5 percent which doesn't signifies good significance.

Since, R^2 of the model is 52.89 Percent that is 52.89 Percent is explained by the two variables and remaining 41.11 Percent is explained by other variables. And also the Adjusted R-squared is 50.48 Percent. This also signifies that Transportation expenditure plays significant role for the increment or decrement of GDP or overall economic growth.

And again DW is equal to zero so the regression is not spurious. Alternatively, R^2 (0.52) > D.W. stat (0.16) this also signifies the regression model is not nonsense regression. The prob (F-statistic) is 0.00 (significant even at 1 percent level of significance). It means all the explanatory variables jointly can influence the dependent variable.so the model is largely determined by the variables (RTC and RTR).

5.4 Residual Diagnostics

5.4.1 Heteroscedasticity Test

To test the heteroscedasticity in residual, Breusch-Pagan-Godfrey Test has been used by setting following null hypothesis. The Breusch-Pagan-Godfrey test regressed the square residuals on the original regressors.

Null hypothesis (H_0): Residuals are not heteroscedastic that is homoscedastic

Alternative hypothesis (H_1): Residuals are heteroscedastic.

Table 5.4.1: Heteroskedasticity Test (Breusch-Pagan-Godfrey Test)

F_Statistic	0.075916	**Prob. F(1,41)**	0.7843
Obs *R-Squared	0.079473	**Prob.Chi-Square(1)**	0.7780
Scaled Explained SS	0.063140	**Prob.Chi-Square(1)**	0.8016

Source: Author's Calculation through E-Views 10.

Table 6.2 shows that the result of heteroscedasticity test. The corresponding probability values for F-test, observed R-squared and Scaled explained SS are more than 5 percent. It means that the null hypothesis is not rejected rather it is accepted. Hence it is concluded that the model is free from heteroscedasticity.

5.4.2 Serial Correlation

To test the serial correlation, Bueusch-Godfrey Serial Correlation LM test has been used by setting following null hypothesis.

Null hypothesis (H_0): Residuals are not serially correlated.

Alternative hypothesis (H_1): Residuals are serially correlated.**Table 5.4.2: Serial Correlation Test (Bueusch-Godfrey)**

F_Statistic	0.103083	**Prob. F(2,33)**	0.9023
Obs *R-squared	0.260763	**Prob.Chi-Square(2)**	0.8778

Source: Author's Calculation through E-Views 10.

Table 5.3.2 shows that the result of serial correlation test. The corresponding probability values for f-statistic and observed R-squared with degree of freedom 2 are more than 5 percent. It means that the null hypothesis cannot be rejected rather it is accepted. Hence it is concluded that there is no serial correlation.

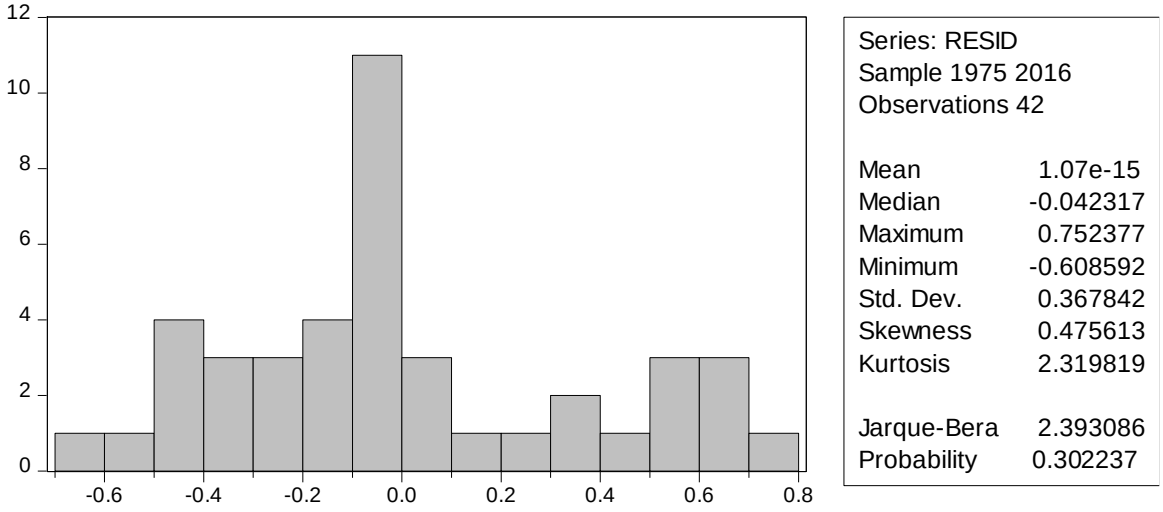
5.4.3 Normality tests

To test the normality of residuals, Jarque-Bera test has been used by setting following null hypothesis.

Null hypothesis: Residuals are normally distributed.

Alternative hypothesis (H_1): Residuals are not normally distributed.

Figure 5.4.3: Normality Test



Source: Author's Calculation through E-Views 10.

Figure 5.4.3 shows the result of Jarque-Bera (JB). The JB value is 2.39 with P-value 0.30. Since P-value is more than 5 percent level of significant, the null hypothesis is not rejected. It means the residuals are normally distributed.

Though the regression result showed spurious regression since R^2 (0.52) > DW (0.16) but its stationarity proved the regression is not spurious and also the residual test is free from error of Heteroscedasticity, result is normally distributed and model is free from serial correlation. This proved the variables of model are co-integrated or they have long run relationship or equilibrium relation exists between them.

5.5 Lag Length Selection

Lag length in this model is proceed through Akaike Information criterion. In this criteria optimal lag length is produced by looking into smallest value of AIC through E-views. The optimal lag length of the model is one. The following table illustrates the Lag Length Selection Criterion.

Table 5.5: Lag length selection for Johansen Cointegration Tests

Model		**Lag length selection**	
Dependent	**Explanatory**	**Lags**	**AIC**
LN_RGDP	LN_RTC, LN_RTR	1	-4.327651*

Note: * shows the minimum AIC value, where the corresponding entity shows the optimal lag length selection for the model.

Source: Author's Calculation through E-Views 10.

The table 5.5 shows the model in this study can be tested by using lag length 1 which is suggested by Akaike Information Criterion (AIC).

5.6 Johansen Co-integration

For the Johanson co-integration to run, all the variables should be non-stationary and should turn to stationary at I (1). This is the primary condition of Johansen test. It checks either the existence of long run relationship between the variables or not. The further tests are determined by the results of the Johansen Co-integration. The following hypothesis is formulated.

1) For Trace test

Null hypothesis (H_0): The number of cointegration vectors is $r = r^* < k$.

Alternative hypothesis (H_1): $r = k$.

2) For Maximum Eigen Value test

Null hypothesis (H_0): The number of cointegration vectors is $r = r^* < k$.

Alternative hypothesis (H_1): r = 1, 2, etc.

Table 5.6.1: Results of Johansen Co-integration (Trace statistics)

Hypothesized no. of CE(s)	Trace Statistics	P-Value for Trace Statistics	Max-Eigenvalue Statistics	P-Value for Max-Eigenvalue
None	0.183502	10.97501	29.79707	0.9618
At most 1	0.069132	2.865762	15.49471	0.9726
At most 2	6.57E-06	0.000263	3.841466	0.9891

Source: Author's Calculation through E-Views 10.

Table 5.5.2: Results of Johansen Co-integration (Maximum Eigen-value)

Hypothesized No. of CE(s)	Trace Statistics	P-Value for Trace Statistics	Max-Eigenvalue Statistics	P-Value for Max-Eigenvalue
None	0.183502	8.109248	21.13162	0.8969
At most 1	0.069132	2.865499	14.26460	0.9553
At most 2	6.57E-06	0.000263	3.841466	0.9891

Source: Author's Calculation through E-Views 10.

Since the p-value of none of the co-integration is greater than 5 percent, this implies the acceptance of null hypothesis that there are no co-integrating equations. Alternatively, in Unrestricted Co-integration Rank Test (Trace), trace statistics is less than critical value which accepts the null hypothesis. Further the maximum Eigen value test also signifies the rejection of alternative hypothesis and acceptance of alternative hypothesis.

So, it is possible to run VAR model for further analysis as there are no any co-integration relationship.

5.7 Granger Casuality Test/ Block Exogeneity Wald Test

The short-run causal relationship between the variables of the bivariate models which are found to be not co-integrated in the long-run are investigated. The variables as TC (Transportation Capital) and TR (Transportation Recurrent) are tested with short run with GDP. However, it is mandatory task for this study to go for the short-run causality investigation of the variables.

The hypothesis is formed as follows:

1. For GDP as dependent and TC and TR are independent
   Null Hypothesis (H_0): DLNTC and DLNTR cannot cause LNGDP
   Alternative Hypothesis (H_1): DLNTR and DLNTC can cause DLNGDP
2. For LNTC as dependent and DLNGDP and DLNTR are independent
   Null Hypothesis (H_0): DLNGDP and DLNTR cannot cause DLNTC
   Alternative Hypothesis (H_1): DLNGDP and DLNTR can cause DLNTC
3. For DLNTR as dependent and DLNGDP and DLNTC are independent
   Null Hypothesis (H_0): DLNGDP and DLNTC cannot cause DLNTR
   Alternative Hypothesis (H_1): DLNGDP and DLNTC can cause DLNTR

Table 5.7: Result of Granger Causality/Block Exogeneity Wald Tests

Model	Dependent Variable	Explanatory Variable	Chi-Square Statistics	P-Value	Direction of Causality
1	DLN_RGDP	DLN_RTC, DLN_RTR	1.9726	0.3729	Both DLN_RGDP and DLN_RTR can cause DLN_RTC
2	DLN_RTC	DLN_RGDP, DLN_RTR	7.289836	0.0261	
3	DLN_RTR	DLN_RGDP, DLN_RTC	0.189212	0.9097	

Source: Author's Calculation through E-Views 10.

The table 5.7 shows the results of Vector Auto Regressive (VAR) tests for short-run causality has been performed. It is found that DLN_RTC and DLN_RTR jointly cannot cause DLNGDP. However, there exist short run causality that DLNGDP and DLNTR can cause DLNTC. Hence, the causality is unidirectional taking the level of significance to 5 percent.

CHAPTER VI

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary

This study has tried to analyse the trend, and pattern of transportation expenditure in Nepal. The trend, and pattern of transportation expenditure in Nepal is shown through the line graph. It shows the total revenue and total Government expenditure are rising simultaneously. Furthermore, the graph revealed rapid growth for revenue collection while capital expenditure plunged to the bottom of the trend.

The impact of public investment in economic growth several of tests are used. Firstly, least square multiple regression model has been used to find the significance. The real government expenditure growth is used as dependent variable. The independent variables are specified by considering recurrent transportation expenditure and capital transportation expenditure. In such a way there are, in total, two explanatory variables to run the multiple regression model.

This study uses the AIC model for co-integration test. And log linear regression model had been used to find out the government expenditure elasticity with respect to GDP in Nepal.

To ensure the stationary of time series data the Augmented Dickey-Fuller unit root test of all variables has been done. If the data are not stationary at level, then they are made stationary by first difference. And the Schwarz Info Criterion had been used for automatic lag selection.

The regression result shows that significance relationship between the expenditure on transportation capital GDP in Nepal. While expenditure on transportation recurrent does not show the significant relationship with GDP in Nepal. The coefficient of RTR and RTC are 0.09 and 0.61 respectively. It means 1 percent raise in RTC that results 0.61 percent increase in RGDP and 1 percent raise in RTR that results 0.09 percent increase in RGDP.

The original data are too large to perform tests hence they are converted to logarithm taking Natural Log and the data are converted to first difference to ensure the

stationarity of data. The lag length selection was performed using Akaike Information Criterion and there result is the selection of Lag length 1.

Furthermore, Johansen Cointegration test showed the rejection of Long run relationship that is the model supported short run relationship. Hence, VAR Granger Casuality/Block Exogeneity Wald test is performed for the casual relationship between the variables and found that there is unidirectional causal relationship between change in gross domestic product to change in transportation capital and change in transportation recurrent to change transportation capital at 5 percent level of significance.

6.2 Conclusion

The purpose of this study is to primarily explain the relationship between economic growth and public investment in transportation expenditure in Nepal using a time series data collected between 1975 and 2016. The following conclusions are made based on thesis.

i. Gross domestic product (GDP) of Nepalese economy has been steadily growing over the entire study period. But in case of real GDP, it in only decreased in the year 1979. In the year, real GDP is decreased because of series of protests amongst the student community in the country. The clashes that occurred had a significant historical impact, as they forced the monarchy to concede to holding a referendum on the possibility of a multi-party system in the country. On the other hand, it is increasing over the study period. Because, on the span of time there was development of lots of things such as; electricity, ability of new and advance technology in the international market, access of road, drinking water in rural areas etc. and improvement in the education, health conditions of the people, and also the improvement in the Human Development Index (HDI). There is also positive improvement in social indicators of development, which impact is the effect of increase in real GDP over the period of time.
ii. There is positive and statistically significant relationship between real government transportation capital expenditure and GDP while there is minimum significance of real transportation recurrent expenditures. Both the government capital expenditure and GDP having the increasing trend, RGDP is increasing

in increasing rate and real government capital expenditure is also increasing with slower rate than RGDP.

iii. Unidirectional causality between the government transportation capital expenditure, government transportation recurrent expenditure and economic growth has been found. For this purpose an endogenous variable is considered as exogenous variable. The study shows GDP and government transportation recurrent expenditure Granger Cause government transportation capital expenditure while RTC doesn't Granger Cause GDP and RTR.

6.3 Recommendations

Following recommendations are made based on the study.

i. The trend in public investment on transportation is increasing through Panchayat to Republic system. The result is quite favourable though not satisfactory in quantity of road expansion and its quality. Therefore, it recommended that concern authority should focus on quality of transportation than only in amount of expenditure.
ii. The study shows change in GDP causes the change in transportation expenditure but the change in transportation expenditure does not causes the change in GDP in Nepal. From this conclusion, it is recommended that government should bring the transportation sector in mainstream as a factor determination of economic growth. Unless and until transportation sector bring as a key sector, the desired economic growth will be difficult to fulfill.
iii. Since the public investment and economic growth co-move towards short run equilibrium, the GoN should constitute strong monitoring and evaluation mechanisms to evaluate government financed projects in transportation infrastructures in order to bring the transportation sector in mainstream as a factor determination of economic growth.
iv. This study, however, applied the VAR Granger Causality/Block Exogeneity Wald Tests as the main econometric model in explaining the relationship between GDP growth and public expenditures. For future studies, researchers should consider using multivariate analysis for different expenditure variables

and run VECM for long run equilibrium using a panel data to estimate the effect of expenditures of public investments on economic growth.

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APPENDIX A

PUBLIC INVESTMENT IN NEPAL: A CASE OF TRANSPORTATION EXPENDITURE

S. N	Objectives	Research Questions	Hypothesis	variables / Indicators/	Sources of Data	Tools of Data analysis
1	To identify the trend and structure of transportation expenditure of public investment.	How is the trend and structure of transportation expenditure of public investment in Nepal?	-	GDP, TC, and TR	Secondary	Bar diagram, Line Graph
2	To examine the relationship between transportation expenditure of public investment in economic growth.	What is the relationship between transportation expenditure of public investment and economic growth in the context of Nepal?	Null Hypothesis (H_0): There is no significant relationship between the Public investment and economic growth. Alternative Hypothesis (H_1): There is significant relationship between the Public investment and economic growth.	TC(X_1), TR(X_2) and GDP (Y)	Secondary	Regression Model, Johanson Cointegration, and VAR approach (VAR Granger Causality/ Block Exogeneity Wald Tests).

APPENDIX B

All are Nominal (Rs. In Million)

FY	TC	TR	GDP
1974/75	379	19.5	16601
1975/76	357.3	20.4	17394
1976/77	446.4	23.3	17280.3
1977/78	498.8	26.9	19727
1978/79	520.1	31.9	22215
1979/80	682.4	34.2	23351
1980/81	637.9	36.6	27307
1981/82	784.2	40.1	30988
1982/83	853	50.8	33821
1983/84	801.4	54.6	39290
1984/85	984.3	61.3	46587.02662
1985/86	783.5	66.4	55734.30852
1986/87	1072	86	63864.49972
1987/88	1301.8	88	76906.11895
1988/89	1973.1	115.9	89269.61831
1989/90	1717.5	127.4	103415.8284
1990/91	2099.5	120	120370.273
1991/92	2529.5	148.5	149487.1365
1992/93	2992.8	148.8	171491.8913
1993/94	3528.5	165.3	199272
1994/95	3202.8	192.3	219175
1995/96	6180.2	211.7	248913
1996/97	5532.6	227.4	280513
1997/98	5864.2	244.3	300845
1998/99	5344.1	232.8	342036
1999/00	4870.3	174.9	379488
2000/01	5550.9	196	441518.5456
2001/02	4771.1	341.5	459442.551
2002/03	3968.2	303.3	492230.7791
2003/04	4255.1	297.1	536749.0549
2004/05	4466.5	316.9	589411.6732
2005/06	4511.8	333.7	654084.1284
2006/07	6715.9	333.8	727826.9666
2007/08	7577.47	398.6	815658.201
2008/09	10383.3	489.6	988271.5269
2009/10	21022	4412	1192773.574
2010/11	25159.1	6155.3	1366954.067
2011/12	28463.7	6236.3	1527343.566
2012/13	27884.6	5800.5	1695011.104
2013/14	35062.6	8107.4	1964539.577

2014/15	51945.6	6914.9	2130149.574
2015/16R	63165.8	6918.5	2247426.569

Source: NRB, (Current Macroeconomic and Financial Situation, 2017)

APPENDIX C

At Constant 2000/01 Prices (Rs. In Million)

FY	TC	TR	GDP
1974/75	3378.340269	173.8196181	143079.641
1975/76	3207.102819	183.109145	148042.041
1976/77	3901.387753	203.6342622	149537.677
1977/78	3921.420579	211.4799791	154214.782
1978/79	3953.049285	242.4577431	157499.994
1979/80	4724.473701	236.7775507	155131.183
1980/81	3895.02827	223.4802237	170692.716
1981/82	4336.527243	221.7479501	178222.768
1982/83	4131.613934	246.0562577	178948.973
1983/84	3653.797791	248.9360611	194692.056
1984/85	4309.168014	268.365335	205170.154
1985/86	2960.929598	250.9326424	214537.709
1986/87	3576.526304	286.9228192	218184.317
1987/88	3920.203504	265.0006978	234977.212
1988/89	5485.642515	322.2269361	245146.316
1989/90	4352.708895	322.8734284	256508.936
1990/91	4845.380193	276.9448074	272839.399
1991/92	4822.456703	283.1131925	284047.874
1992/93	5241.19558	260.5887137	294974.486
1993/94	5671.735571	265.7043758	319219.146
1994/95	4782.008126	287.1175729	330291.094
1995/96	8533.332671	292.3055122	347920.755
1996/97	7067.338864	290.4805801	366224.751
1997/98	6915.191564	288.0838476	376999.38
1998/99	5658.040707	246.4759036	393902.977
1999/00	4987.203615	179.0981895	417992.153
2000/01	5549.032244	195.9340503	441518.486
2001/02	4635.540486	331.7970858	442048.988
2002/03	3680.646556	281.3215313	459488.315
2003/04	3796.306733	265.0660925	481004.318
2004/05	3811.897006	270.4556501	497738.958
2005/06	3566.569622	263.7892378	514485.633
2006/07	5013.131849	249.1674104	532038.155
2007/08	5300.863834	278.8429811	564516.897
2008/09	6451.926503	304.2253634	590107.201
2009/10	11920.98453	2501.921022	618529.147
2010/11	13022.1731	3185.939962	639694.08
2011/12	13601.63375	2980.071759	670279.357
2012/13	12131.38423	2523.54684	697954.233
2013/14	13984.31936	3233.544311	739754.358

2014/15	19323.71835	2572.33683	764335.696
2015/16R	21373.50721	2341.023301	767491.576

Source: Author's computation

APPENDIX D

All values in Logarithm Form

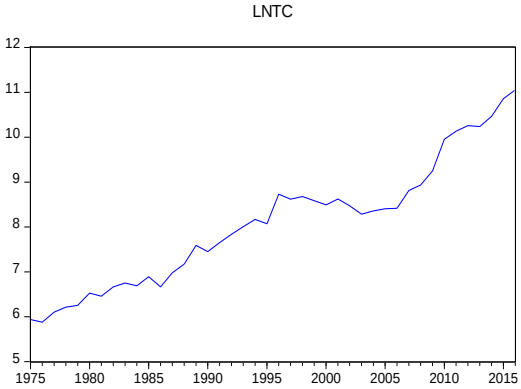
Year	lntc	lntr	Lngdp
1974/75	8.12514	5.158018	11.87116
1975/76	8.073123	5.210082	11.90525
1976/77	8.269088	5.316326	11.9153
1977/78	8.274209	5.35413	11.9461
1978/79	8.282243	5.490827	11.96718
1979/80	8.460511	5.467121	11.95203
1980/81	8.267456	5.409323	12.04762
1981/82	8.374829	5.401541	12.09079
1982/83	8.326423	5.50556	12.09486
1983/84	8.203522	5.517196	12.17917
1984/85	8.3685	5.592349	12.23159
1985/86	7.993259	5.525185	12.27624
1986/87	8.182147	5.659213	12.2931
1987/88	8.273899	5.579732	12.36724
1988/89	8.60989	5.775256	12.40961
1989/90	8.378554	5.77726	12.45492
1990/91	8.485781	5.623818	12.51664
1991/92	8.481039	5.645847	12.5569
1992/93	8.564305	5.562943	12.59464
1993/94	8.64325	5.582384	12.67363
1994/95	8.472616	5.659892	12.70773
1995/96	9.051735	5.6778	12.75973
1996/97	8.863239	5.671537	12.811
1997/98	8.841476	5.663252	12.84
1998/99	8.640833	5.507264	12.88386
1999/00	8.514631	5.187934	12.94322
2000/01	8.621379	5.277778	12.99798
2001/02	8.441508	5.804524	12.99918
2002/03	8.210844	5.639498	13.03787
2003/04	8.241784	5.579979	13.08363
2004/05	8.245882	5.600108	13.11783
2005/06	8.17936	5.57515	13.15092
2006/07	8.519816	5.518125	13.18447
2007/08	8.575625	5.630649	13.24373
2008/09	8.772134	5.717769	13.28806
2009/10	9.386056	7.824814	13.3351
2010/11	9.474409	8.066503	13.36875
2011/12	9.517945	7.999703	13.41545
2012/13	9.403551	7.833421	13.45591
2013/14	9.545692	8.081334	13.51407
2014/15	9.869089	7.85257	13.54676

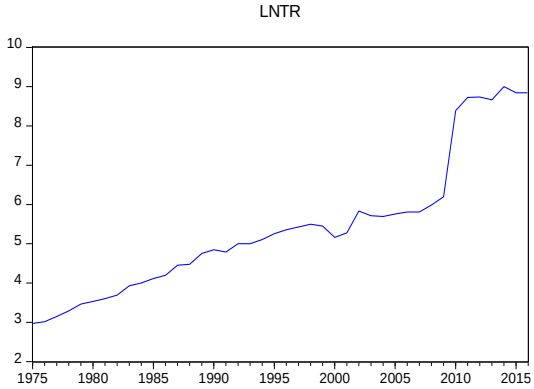
2015/16	9.969907	7.758343	13.55088

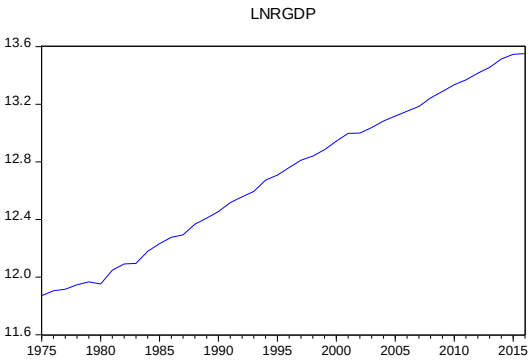
Source: Author's computation

APPENDIX E

Correlogram plots before first differencing



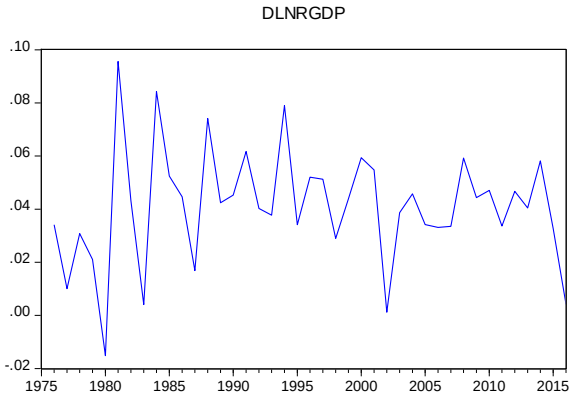


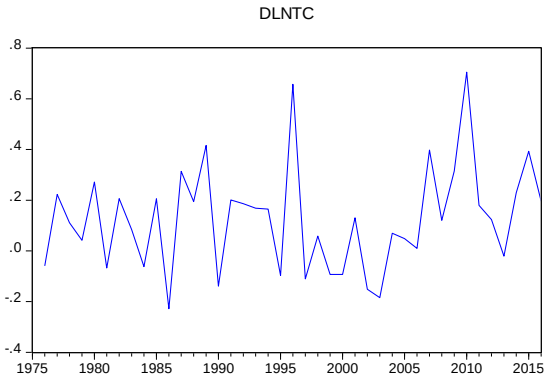


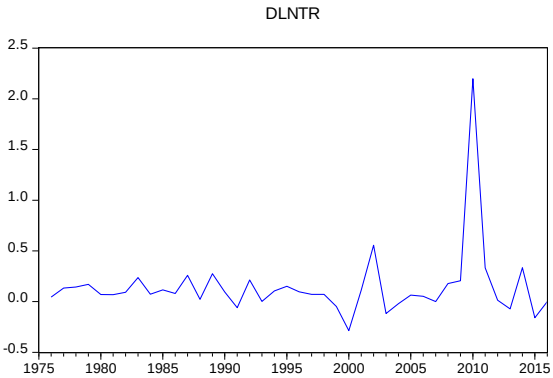
Source: Author's Calculation through E-Views.

APPENDIX F

Correlogram plots after first differencing







Source: Author's Calculation through E-Views.

APPENDIX G

Fig: Regression Result

Dependent Variable: LN_RGDP

Method: Least Squares

Date: 03/29/18 Time: 16:38
Sample: 1975 2016
Included observations: 42

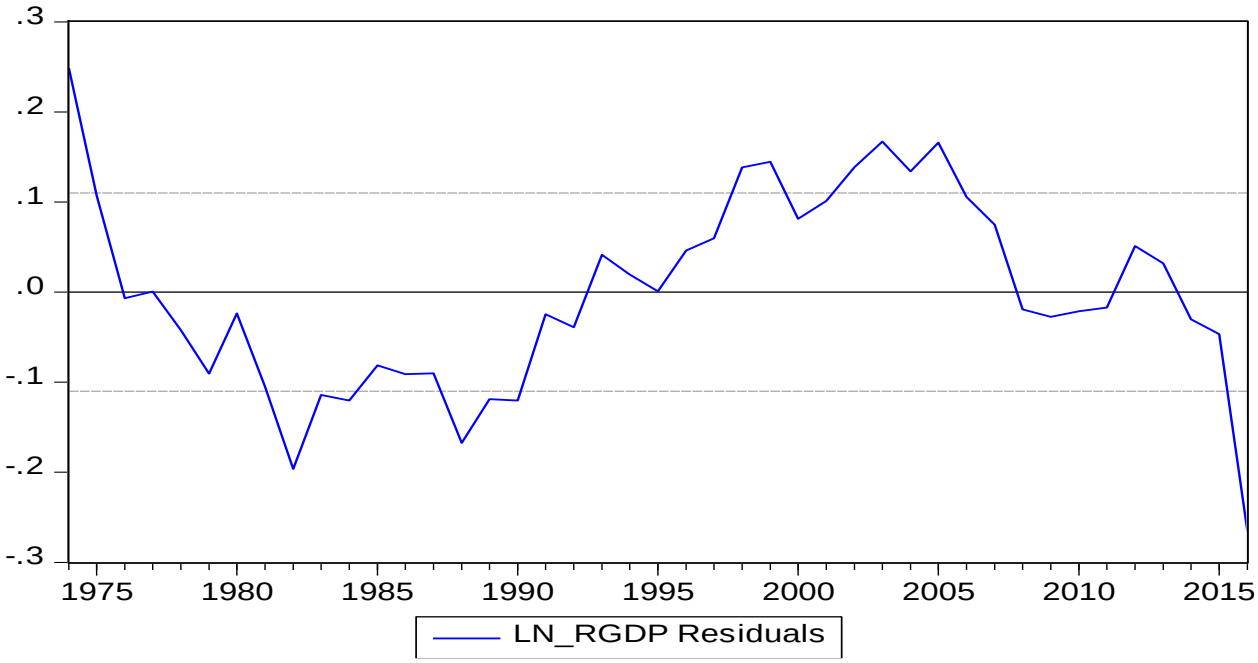
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.821242	1.543553	4.419182	0.0001
LNTC	0.614460	0.261704	2.347924	0.0240
LNTR	0.098906	0.143712	0.688222	0.4954

R-squared	0.528983	Mean dependent var	12.70429
Adjusted R-squared	0.504828	S.D. dependent var	0.535973
S.E. of regression	0.377156	Akaike info criterion	0.956434
Sum squared resid	5.547622	Schwarz criterion	1.080553
Log likelihood	-17.08511	Hannan-Quinn criter.	1.001929
F-statistic	21.89976	Durbin-Watson stat	0.162161
Prob(F-statistic)	0.000000		

Source: Author's Calculation.

APPENDIX H

Figure: Regression Residuals



Source: Author's Calculation through E-View.

APPENDIX I

Lag Length Selection Criteria

Vector Autoregression Estimates
Date: 03/31/18 Time: 15:56
Sample (adjusted): 1976 2016
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

	LN_RGDP	LNTC	LNTR
LNGDP(-1)	1.002241	0.133702	0.192183
	(0.00977)	(0.08570)	(0.15172)
	[102.595]	[1.56006]	[1.26670]
LNTC(-1)	0.000403	0.686575	0.177960
	(0.01810)	(0.15882)	(0.28116)
	[0.02224]	[4.32296]	[0.63295]
LNTR(-1)	-0.002134	0.118438	0.804095
	(0.00889)	(0.07803)	(0.13814)
	[-0.23990]	[1.51781]	[5.82091]
C	0.021658	0.342541	-2.748088
	(0.12026)	(1.05508)	(1.86781)
	[0.18008]	[0.32466]	[-1.47129]
R-squared	0.998241	0.850221	0.859339
Adj. R-squared	0.998098	0.838076	0.847934
Sum sq. resids	0.019467	1.498281	4.695506
S.E. equation	0.022937	0.201231	0.356238
F-statistic	6999.276	70.00994	75.34778
Log likelihood	98.70240	9.663214	-13.75367
Akaike AIC	-4.619629	-0.276254	0.866033
Schwarz SC	-4.452452	-0.109077	1.033211
Mean dependent	12.72461	8.631013	5.954245
S.D. dependent	0.525997	0.500081	0.913532

Determinant resid covariance (dof adj.)	2.01E-06
Determinant resid covariance	1.48E-06
Log likelihood	100.7168
Akaike information criterion	-4.327651
Schwarz criterion	-3.826117
Number of coefficients	12

Source: Author's calculation through E_views

APPENDIX J

Johanson Cointegration Result

Date: 04/01/18 Time: 14:59
Sample (adjusted): 1977 2016
Included observations: 40 after adjustments
Trend assumption: Linear deterministic trend
Series: LNTR LNTC LNGDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.183502	10.97501	29.79707	0.9618
At most 1	0.069132	2.865762	15.49471	0.9726
At most 2	6.57E-06	0.000263	3.841466	0.9891

Trace test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.183502	8.109248	21.13162	0.8969
At most 1	0.069132	2.865499	14.26460	0.9553
At most 2	6.57E-06	0.000263	3.841466	0.9891

Max-eigenvalue test indicates no cointegration at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LNTR	LNTC	LNGDP
2.646226	-3.838226	-0.140380
-0.149358	2.999456	-2.749635
-0.796979	3.278968	0.533112

Unrestricted Adjustment Coefficients (alpha):

D(LNTR)	-0.073233	-0.076724	0.000220
D(LNTC)	0.045236	-0.043186	0.000104
D(LNGDP)	-0.000333	-0.001181	-5.40E-05

1 Cointegrating Equation(s):		Log likelihood	99.18851

Normalized cointegrating coefficients (standard error in parentheses)

LNTR	LNTC	LNGDP
1.000000	-1.450453	-0.053049
	(0.46031)	(0.37739)

Adjustment coefficients (standard error in parentheses)

D(LNTR)	-0.193790
	(0.15260)
D(LNTC)	0.119706
	(0.08690)
D(LNGDP)	-0.000880
	(0.00963)

2 Cointegrating Equation(s):		Log likelihood	100.6213

Normalized cointegrating coefficients (standard error in parentheses)

LNTR	LNTC	LNGDP
1.000000	0.000000	-1.490335
		(0.71616)
0.000000	1.000000	-0.990922
		(0.45063)

Adjustment coefficients (standard error in parentheses)

D(LNTR)	-0.182331	0.050954
	(0.14893)	(0.27371)
D(LNTC)	0.126156	-0.303163
	(0.08486)	(0.15596)
D(LNGDP)	-0.000704	-0.002266
	(0.00963)	(0.01770)

Source: Author's calculation through E_views

APPENDIX K

VAR Granger Causality/Block Exogeneity Wald Tests

Date: 04/03/18 Time: 14:19
Sample: 1975 2016
Included observations: 40

Dependent variable: DLNGDP

Excluded	Chi-sq	df	Prob.
DLNTC	1.914451	1	0.1665
DLNTR	0.573811	1	0.4487
All	1.972664	2	0.3729

Dependent variable: DLNTC

Excluded	Chi-sq	df	Prob.
DLNGDP	6.790352	1	0.0092
DLNTR	0.204237	1	0.6513
All	7.289836	2	0.0261

Dependent variable: DLNTR

Excluded	Chi-sq	df	Prob.
DLNGDP	0.171079	1	0.6792
DLNTC	0.001126	1	0.9732
All	0.189212	2	0.9097

Source: Author's calculation through E_views