PUBLIC EXPENDITURE ON TRANSPORTATION AND ITS CONTRIBUTION ON ECONOMIC GROWTH IN NEPAL

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By

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LETTER OF RECOMMENDATION

This thesis entitled **Public Expenditure on Transportation and its Contribution on Economic Growth in Nepal** has been prepared by Mr. Bishwas Pandit under my guidance and supervision. I hereby recommend this thesis for examination by the Thesis Committee as partial fulfillment of the requirements for the Degree of Master of Arts in Economics.

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Date: 2 January, 2023

APPROVAL LETTER

We certify that this thesis entitled **Public Expenditure on Transportation and its Contribution on Economic Growth in Nepal** submitted by Mr. Bishwas Pandit to the Central Department of Economics, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the Degree of Master of Arts in Economics has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

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Bishwas Pandit

TABLE OF CONTENTS

Page No.

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ADF	Augmented Dickey Duller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
ECT	Error Correction Term
EU	European Union
FF	Fiscal Framework
FY	Fiscal Year
GCE	Government Capital Expenditure
GDP	Gross Domestic Product
GE	Government Expenditure
GNS	Gross National Saving
GR	Government Revenue
HDI	Human Development Index
HQ	Hannan-Quinn
JB	Jarque-Berra
MoF	Ministry of Finance
OLS	Ordinary Least Square
RCE	Real Capital Expenditure
RGDP	Real Gross Domestic Product
RSS	Residual sum of square
SC	Schwarz Information
TPE	Total Public Expenditure
TSS	Total Sum of Square
VAR	Vector Auto Regression
VECM	Vector Error Correction Model

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Transportation is the movement of goods and people from one place to another. Since the development of world's earliest civilization, people have needed to move themselves and their goods from one place to another. Transportation infrastructure is the underlying system of public works designed to facilitate movement. In the ancient times, people crafted simple boats out of logs, walked, rode animals and later devised wheeled vehicles to move from place to place. They used existing waterways or simple roads for transportation. Past people such as the ancient Egyptians, built ports in coastal areas for bringing and receiving goods. Ancient people also constructed artificial waterways called canals to move good from place to place. Automobile ownership became widespread by the mid-1900s, particularly in the United States and Europe and people with cars soon demanded better roads. These roads would allow them to move away from cities and the need for mass transportation. Communities and government rebuilt their roads, and major highway systems developed over time. European countries were the first to develop highway systems (Todaro &Smith ,2012).

There is no doubt that transportation system is undergoing a dramatic change and traditional transportation industry is keenly interested in understanding the new paradigm. The introduction of new transportation innovations has been explosive in recent years. The technologies completely upended the transportation sector status quo. Transportation works as technology that encompasses the tools, improvements and methods that move people, animals and goods across the globe. Transportation technology uses vehicles and infrastructure like railways and highways to support travel and covers movement via land, water, air and even space that saves time and resources. Innovations in transportation technology are essentially born out of three necessities: efficiency, ease and safety. These new technologies get more people to their destination faster, safer and with the fewest amount of resource possible. An efficient means of transport is a prerequisite for rapid growth . Goods and services do

not move by themselves from the place of supply to the place of demand. Moving these goods and services from the place of supply to the place of need requires transportation. Transportation is critical to the smooth operation of economic activities as well as to ensure the social well being and demographic cohesiveness. People's daily movement is ensured by transportation, which is also critical for the production and distribution of commodities. However, a good infrastructure is a must for transportation systems to work. A robust transportation network is also necessary for a country's economic and social welfare. Highway, streets, railroad lines, transit systems, ports and other transportation fixed assets enable the movement of people and goods. Investment in transportation fixed assets helps build and maintain these critical resources. Investment is defined as spending on assets that take more than a year to consume and include transportation structures, motor vehicles, and other equipment's. Transportation systems are the lifeblood of our economy and when properly maintained and supported can be catalyst for economic growth(World Bank, 2018). These systems allow people to get to jobs and allow businesses to access wider pools of labor, suppliers, and customers. Without the efficient transportation, economies stagnate. It is needed to protect, preserve and invest in our transportation infrastructure to ensure it can meet our present and future demands. Traditionally, innovation has been a hallmark of progress in transportation. Challenges today may be different from past, but the role of technology and innovation is just as important. Technology will be central to improve safety, reduce congestion and manage transportation infrastructure more effectively. Transportation infrastructure is critically important to the nation's economic health.

The development of transportation systems take place in socio-economic context. The economic activities cannot take place without an infrastructure base. Because of the intensive use of infrastructures ,the transport sector is an key indicators of economic development. This is even more so in a global economy where economic opportunities have been increasingly related to the mobility of people. High-density transport infrastructure and highly connected networks are commonly associated with high levels of development(Barro &Sala,1992). When transport systems are efficient, they provide economic and social opportunities and benefits that result in positive multiplier effects such as better accessibility to markets, employment and additional investments. When transport systems are deficient in terms of capacity or reliability,

they can have an economic cost such as reduced or missed opportunities and lower quality of life.

Transportation is very vital for generating the economic growth. Sound transportation investments lower the costs of moving people and goods. This increases economic productivity ,which roughly can be measured as the output of goods and services of private and public investment. And improved productivity leads to higher standard of living. Because productivity is a central component of economic growth.it should be of major concern when assessing the value of transportation expenditures. High productivity transportation investments increase connectivity and reduce congestion and by doing so they improve economic well being.

Transport development has been recognized as one of the core strategies for an accelerated economic growth in Nepal after the decades of conflict and political turmoil(NPC,2019). It is an important sector of economic activity and investment compared to other sectors. It is vital for giving access to health, education and agricultural extension services. This work is an intensive work of government. Hence, public investment has a greater degree of implication.

Public expenditure is expenditure made by the state, social security administrations, local authorities and the administrations and bodies attached to them. They can be classified into three main categories:(a)Operating expenses, which are used to ensure the smooth running of public services (current staff and maintenance costs, purchase of supplies, etc.).(b)Redistribution expenditure: cash benefits paid to households e.g.: retirement pensions, family allowances, minimum social benefits etc.), subsidies paid to companies and households, etc.(c)Investment expenditure, which aims to renew or increase public productive capital e.g research and development expenditure, arms purchases, construction of buildings and infrastructure etc.)It is clear that transport plays an important part in rural development, it provides the means by which local communities can access the opportunities and necessities which can enhance their livelihoods. Thus transport connects the community with markets and farm input suppliers, education and employment opportunities, health and social welfare facilities(Todaro &Smith,2012). Transport also supports family and community development by providing the necessary access to gatherings outside of the locality. Through these mechanisms, improved transport can contribute not only to a improved

economic growth but also to a higher degree of social well being within both individual families and the community.

The main objective of the government is to provide maximum social welfare in the society through the economic development to ensure fulfillment of this objective. Government allots its expenses in order to speed up economic growth and sustain the stability(Bhusal,2014). Hence, public expenditure is an important tool of the economy. In underdeveloped countries, where the basic infrastructure for the development have not been created, it can be done by public expenditure.

Furthermore, public expenditure has arisen historically from the need to provide certain goods, infrastructure or services that are deemed to be of vital national interest. Private sector is reluctant to these projects due to their high startup cost both financial and national to infrastructure capital development(Shikha,2016). The strategic vision for the development of the country is determined by 3I'S for growth: Investment, Infrastructure and Inclusion. Investment is the foundation of the sustainable growth model but in Nepal the state, firms and households are lowering the investment. Unless investment is done, there is no economic growth. Hence, there is positive relationship between the public expenditure and growth. Stiglitz (2000) also pointed these two factors as a critical subject for development analysis and possessed inter-relation between them.

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. 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 2026.With the preparatory period of five years, Nepal will graduate to a middle income developing country by Dec 2026.To achieve the ambitious target and high rate of economic growth National Planning Commission (NPC) has pointed some new policy options such as change in resource allocation pattern, increase in absorption capacity of the economy, ensuring the development friendly policy and so forth. NPC has also estimated the need for investment to achieve this goal.

The transport sector is identified as a major sector of investment (NPC,2019). Since the 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 the issues, challenges and strategies for the transport development for the rapid economic development. Nepal's transport infrastructure mainly consists of roads and civil aviation. It is dominated by road subsector which provides for the movement of approximately 90 percent of all passengers and freight within the country.

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

1.2 Statement of the Problem

In the context of Nepal, public transportation remained the most basic means of mobilization for the majority of the population. Road transportation plays a vital role in Nepal as it is rapidly increasing with the growing urbanization. As the National Action Plans for Electric Mobility reported more than 90 percent of the total domestic movement of goods and passenger in Nepal depends on public road transportation. However, various studies reflected that existing quality and system of road transportation have not been passenger friendly. The latest scenario indicates that the concerned authorities and stakeholders have not been aware of promoting the existing quality and means of transportation expenditure.

Nepal's transportation sector is greatly in need of development. But its geographical location vests the nation with potential and also provides opportunities. Nepal is a landlocked country. Its nearest outlet to the sea, Kolkata, India, is more than a thousand km away. Because of the nation's often difficult terrain, road transport and aviation are the most popular of very few modes of transportation, the other includes

ropeways and railroad. However, ropeways currently are developing as tourist attraction rather than the means of transportation.

Nepal being developing country with low GDP, higher public expenditure is planned every year but inadequate implementation capacity (lack of skilled manpower, political instability) and bottlenecks (lack of adequate investment, limited availability to capital, lack of good governance, improper policy in place and its weak implementation, unfriendly administrative environment, dirty politics over the use of water, lack of infrastructure) continue to impede spending. Furthermore, its suffers from huge structural problems (geography, a landlocked country). The hesitation of private investment in any sectors capital formation is mainly due to limited availability of public goods, particularly physical infrastructure. Therefore, a thorough identification or policy measures is necessary for public expenditure in various sectors such as agriculture, education, health, transportation and other sectors in the country.

The majority of research ,supports a significant and positive relationship between public infrastructure and economic growth .Nevertheless, there is 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 (Aschauer, 1989).However ,the contribution of public expenditure on transportation and its contribution on economic growth in Nepal is vague(Dhungel,2015).

The study is based on the following research questions:

i) How is the trend and structure of transportation expenditure as public investment in Nepal?
ii) What is the relation of economic growth with public transportation expenditure in the context of Nepal?

1.3 Objectives of the Study

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

i) To present the trend and structure of transportation expenditure as public investment.
ii) To analyze empirically the impact of transportation expenditure as public investment in the economic growth of Nepal.

1.4 Hypothesis of the Study

The hypothesis of the study is as below:

Null Hypothesis(H0): There is no significant impact of transportation expenditure as public investment in economic growth.

Alternative Hypothesis(H1): There is a significant impact of transportation expenditure as public investment in economic growth.

1.5 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 expenditure can boost growth and provide the right infrastructure to promote private investment.

Why is the public expenditure done? The first may be: so called public utilities have been granted governmental franchise monopolies because they are thought to be natural monopolies. A natural monopoly is said to occur when production technology, such as relatively high fixed costs cause 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 natural monopoly. Higher prices will result if more than one producer supplies the market(Khotz,2006).

The second reason might be to control the monopoly power in developing countries i.e. direct government control has been wished for ensuring that prices are not set above the marginal cost of products. Another factor for acquiring public expenditure is capital formation, which is chiefly important at the early stages of development when private savings are small. 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 creation of SOEs include the desire of some government to gain national control over the strategic sectors of the economy such as defense over foreign owned enterprises or over key sectors for development purposes.

1.6 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. Only annual time series data set shall be used for the 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 partnership, securitization and multi government bonds which won't be included in the study. Another limitation of this study is that it covers only the data from 1974 to 2019 of Nepal which may not provide the conclusion for all.

1.7 Outline of the Study

The study will be 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 the 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 with the research methodology with the framework of research, research design and various econometric description and introduction of the model.

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

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

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

CHAPTER II

REVIEW OF LITERATURE

2.1 Introduction

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

2.2 Theoretical Review

Growth theories can be traced back to the Adam Smiths “Wealth of Nations” that explained the growth of nation is only possible to be through the 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”.

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 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 et al., 2012).

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. 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 et al., 1992).

Press and Journal (2010) showed that technological change accounted for almost 90 % of economic growth in the late 19^{th} and early 20^{th} centuries. The increase in the factors of production (capital and labour) 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 finding suggests that technological progress allows the greater options for input combinations to improve efficiency, leading to the higher level of economic growth. However, Solow's model failed to explain how or why technological progress occurs.

The modified form of the Harrod- Domar model of growth in the notion of 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 come close to real situation prevailing in underdeveloped economies, it can be applicable to both the developed and developing economies' model gives two alternatives either raising values of technological progress coefficients or control of population are of great significance.

Smith (1937) suggested that economic growth is the result of the profit motive and therefore, classical economists proclaimed the idea of free markets. They argued 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.

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 (1980) dealt 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 and increase in government consumption. So, please effect is relevant in developing countries.

Peacock et al. (1961)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.

Rahn Curve(1996) 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.

2.3 Empirical Review

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.

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, 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.

Aschaeur (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 is 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(1996) conducted 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 increase in the share of consumption expenditure have a significant positive effect on economic growth whereas increase in the share of public investment expenditure have a significant negative effect. The negative effect holds for each of the major components of public investment including transportation and communication.

Clark et al.(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 programs, 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 et al. (2003) examined to find the role of public investment on economic growth considering both the prediction 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 the 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.

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.

Ghani and Din (2006) explored the role of public investments in the process of economic growth. The model consists of four variables; public investment, private investment, public consumption and GDP for the period of 1973- 2004 for Pakistan. Time series and VAR modelling approach was used for the study and it

was found that growth is largely driven by private investment than public investment. And that public investment crowds out private investment.

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 defense 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 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.

Reungsri (2010) studied the impact of public investment of infrastructure on economic growth of Thailand. 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 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 recommends 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.

Kharel and Adhikari (2021)examined the relations of government expenditure and economic growth of Nepal over the period of 1990-2019.The government expenditure of Nepal hass been significantly increasing during the study period. The pattern of government spending of Nepal seems to be focused on regular expenditure and widening the budget deficit of Nepal each and every years. The track of capacity of government expenditure utilization has mostly found less efficiency which has historical tendency of Nepalese government. As per size of economy expanding, the gap of fiscal deficit has been expanding in Nepal. The objective of this study is to analyze the impact of government expenditure on economic growth of Nepal by using simple and multiple linear regression models. Descriptive and analytical research design has been used by using secondary data. The finding of the study shows that there is significant/insignificant impact of government spending on economic growth of Nepal during the study periods and addresses to be focused on increase the mobilization of capital expenditure for the expansion of development activities with rational manner of the country.

2.4 Infrastructure and Development Issues in Nepal

According to the World Bank Report 2010, 'infrastructure' is an umbrella term for many activities and plays a pivotal role in industrial growth, adding up to the overall economic growth.

Economist's and the inner-city people are able to distinguish infrastructure into two types namely, economic infrastructure and social infrastructure. Economic infrastructure generally defines as the infrastructure that promote economic activities such as of highways, roads, airports, railroads, electricity, water supply, telecommunications and sanitation. In same manner social infrastructure are the infrastructure that fosters education and health, cultural standards of the population through activities that have a direct or indirect impact on the welfare such as libraries, schools, universities, clinics, hospitals, courts etc(Younis,2014)

Reviewing within the fact that the economic growth of the country generally means the infrastructure development within the country. Infrastructure development in Nepal started since a long period of time and since then government is making efforts to provide increased access to communication, education, transportation, health and services, electricity etc. Regardless of having the effort in infrastructure development Nepal remains one of the poorest countries. In today's date one of the major controlling challenges of Nepal is to develop the basic infrastructures to accelerate its pace of development. For which transportation, health and education sector play a crucial role in overall development and socio economic transformation of a country(Pokhrel and Acharya,2015). Among these road transport has predominant role because it is the only means for public transportation except the limited air service to some part of the country which is not affordable to common people. Therefore, road infrastructure serves as a major foundation for an overall socio-economic development.

Discussing on the roadways development, the condition of road in Nepal is not good. Although the number of vehicle is significantly growing and the fact of unchanged and forever same road length, the condition of the road is getting worst day by day. Due to which locals are facing many problems such as they are

not able to reach on time, patients travelling through ambulance couldn't meet the doctors as well the scenario of accidents is also rapidly increasing. Nepal so called heart city i.e. Kathmandu is also facing major problem in general that is the current road infrastructure in the city is not sufficient for the increasing numbers of vehicles. Because of which the notorious traffic jam is increased. And hence the individual is not able to reach office on time, students are not able to reach to their colleges and even we have seen many critical patients couldn't reach to the hospital and had to lose their life on the way. Even the passenger who are travelling get more mental pressure/stress(Shrestha,2009). So, in a bid to tackle the problem, the authorities initiated a programme of road widening to reduce traffic jams, especially during peak hours this is still not sufficient.

The major infrastructure and development issues are to maintain a balance between technology, cost and quality of construction of road infrastructure in view of limited availability of investment and also address the challenging geological and geographical conditions. However, Constitutionally agreed on the mandates of all three levels of government about road construction, high priority for the development and strengthening of the road network in the governments long term vision and favourable environment for the construction of road and the protection of road property collaboration among all the three levels of government are the major opportunities.

Air transport is considered a fast and reliable means of international and regional transport connectivity. Due to Nepal's unique geopolitical location ,air services play an important role in maintaining direct access to the global market. Geographical diversity has made domestic air services indispensable. Modern technology infrastructure ,efficient management of the national flag carrier Nepal Airlines Corporation (NAC) and effective regulation of the sector are necessary to ensure safe ,reliable and accessible civil aviation services. Inadequate modern technology and infrastructure required for civil aviation inadequate skilled human resources in the regulatory sector, lack of technical and managerial capacity ,insufficient expansion of international air service as expected can be pointed as major issues(Koirala,2017).Similarly the development of rail transport has been emphasized with the objective of managing the contribution made by the

transport sector towards the overall economic and social development of the country under the concept of integrated transport management. Lack of policy ,legal and operational standards for the construction and operation of rail transport ,difficulties in acquiring and compensating for the lands identified through feasibility studies, lack of skilled human resources related to rail transport, absence of a plan for attracting and encouraging much needed investments are the major problems.

In the context of huge potential for the utilization of water resources of the country, identification of water transport has added a new dimension to the overall development of the transport sector. This hints for developing water transport as a complementary sector to other transport services. In Nepal water transport has evolved as a viable alternative to domestic and international transport. Operation of safe, convenient, reliable and well managed water transport can increase the competitiveness of the country ,reduce the cost of business, increase employment opportunities, contribute to domestic tourism and make it significant contribution to the GDP. Lack of experience and skilled human resources in water transport ,the excessive flow of water during the rainy season and low water level during winter, lack of required infrastructure and complexities related to domestic and international coordination are the major problems.

In general ,lack of well managed ,accessible ,safe ,and reliable public transport system increase in pollution due to the use of broken and old vehicles, increase in accidents due to lack of professionally trained drivers and standards to regulate their labor hours,frequent road damages due to movement of overloaded vehicles, poor compliance with the traffic rules, lack of institutional capacity and technology friendly management system for vehicles are the major issues in transportation sector development of Nepal.

The constitution of Nepal envisions increased investment in the transport sector to ensure smooth, accessible and equal access of citizens to transport services. Environmental friendly technologies will be prioritized in the promotion of public transport and private transport will be made safe, orderly, inclusive and diability friendly through regulatory measures. Although, the necessary infrastructure has

been developed to some extent, the transport service is yet to be sustainable and reliable. Therefore,it is necessary to manage this sector properly. Nepal has not yet fully developed the infrastructure to boost the rapid economic growth. So poor the infrastructure leads to the poor ranking in the development sector among the existing countries.

2.5 Research Gap

By studying above literatures, it is concluded that there has not been any empirical study on the public expenditure in Nepal in the 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 Expenditure on Transportation and its contribution on Economic Growth.

Though there are some studies on the relationship between the government expenditure and economic growth, till now no study is conducted 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.

3.1 Research Design

A research design is a clearly planned procedure for carrying out the research. When particular research area has been identified, research problem defined and the related literature in the area have been reviewed the next step is to construct the research design.

This study aims to show the relation between the government expenditure transportation and its contribution on economic growth. To complete this study different techniques and planned procedures have been carried out and employed. Mostly the quantitative techniques have been used in the research. The time series data have been collected to achieve the research objectives.

Firstly, to show the trend and nature of the study, summation of the expenditures in different regimes will be conducted separately and 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, regression analysis and time series analysis including unit root test, normality test ,lag length selection, johansen cointegration test and VAR analysis has been done to show the contribution of public expenditure on transportation on 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 Conceptual Framework

Public expenditure is pertinent for economic growth of a country. The conceptual framework for the study is as illustrated in fig 3.1:

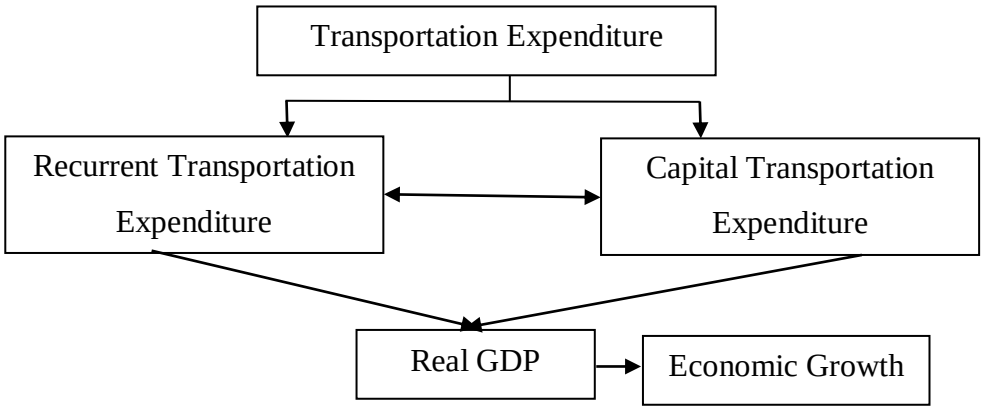


Figure 3.1: Conceptual Framework

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 2019), current macroeconomic and financial situation published by NRB (Current Macroeconomic and Financial Situation, 2019) and various economic surveys published by Ministry of Finance of Nepal (Economic Survey).

3.4 Sample Period

To analyze the relationship between public investment on transportation sector and economic growth, the study has used the annual data from July 1974- July 2019(end of the fiscal year) of Nepal.

3.5 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 26.8 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 2019.

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 $Y(t) = f(K(t))$

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

$$Y = f(RTC, RTR) + u \quad (3.4a)$$

Where, Y=Gross Domestic Product

RTC= Real Capital Expenditure of transportation

RTR= Real Recurrent Expenditure transportation

u = Stochastic error term

Hence, the linear econometric model in the logarithm form:

$$LN\_RGDP_t = \beta_0 + \beta_1 LN\_RTC_t + \beta_2 LN\_RTR_t + u_t \quad (3.4b)$$

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.

3.6 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.

3.6.1 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 has 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.

3.6.2 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);

$$\lambda_{\text{Trace}}(r) = T\sum_{i=r+1}^{g} \ln\left(1-\hat{\lambda}_i\right) \qquad (3.5.2)$$

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

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.

3.6.3 Granger Casuality 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).

$$\Delta LN\_RGDPt = \sum_{i=1}^{n} bi\ \Delta LN\_RTC(t-i) + \sum_{j=1}^{n} ci\ \Delta LN\_RGDP(t-j) + e2t \quad (3.5.4)$$

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

And

$$\Delta LN\_RGDPt = \sum_{i=1}^{n} bi\ \Delta LN\_RTC(t-i) + \sum_{j=1}^{n} ci\ \Delta LN\_RGDP(t-j) + e2t \quad (3.5.6)$$

$$\Delta LN\_RTCt = \sum_{i=1}^{n} gi\ \Delta LN\_RTC(t-i) + \sum_{j=1}^{n} hi\ \Delta LN\_RGDP(t-j) + e3t \quad (3.5.7)$$

3.6.4 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);

$$\Delta LN\_RGDP_t = \beta_0 - \beta_1 \Delta LN\_RTC_t + \gamma_1 \Delta LN\_RGDP_{t-1} + \gamma_2 \Delta LN\_RTC_{t-1} + u_{vt} \quad (3.5.8)$$

$$\Delta LN\_RTC_t = \beta_0 - \beta_1 \Delta LN\_RGDP_t + \gamma_1 \Delta LN\_RGDP_{t-1} + \gamma_2 \Delta LN\_RTC_{t-1} + u_{xt} \quad (3.5.9)$$

And

$$\Delta \text{LN\_RGDP}_t = \beta_0 - \beta_1 \Delta \text{LN\_RTR}_t + \gamma_1 \Delta \text{LN\_RGDP}_{t-1} + \gamma_2 \Delta \text{LN\_RTR}_{t-1} + u_{vt} \quad (3.5.1a)$$

$$\Delta \text{LN\_RTR}_t = \beta_0 - \beta_1 \Delta \text{LN\_RGDP}_t + \gamma_1 \Delta \text{LN\_RGDP}_{t-1} + \gamma_2 \Delta \text{LN\_RTR}_{t-1} + u_{xt} \quad (3.5.1b)$$

3.6.5 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.

CHAPTER IV

TREND AND STRUCTURE OF TRANSPORTATION EXPENDITURE AS PUBLIC INVESTMENT

The Government of Nepal has been continuously engaged from the early stages till now for the development of transportation. Various plans and policies are put forward for the connection with the boarders of neighbouring countries through the various means odf transportation. However, unsuccessful implementation and loop holes in the policy hindered the government's plan. The development of transportation infrastructure in Nepal under various regimes and changes in the political system and government has been enormous. Transportation infrastructure development only got space from the fifth five year development plan.Before this ,Panchayat regime government implemented various projects through the direct interference of Government. Construction of the Mahendra (East-west) Hiighway was the main achievement on transportation sector during this regime.

Fifth Five Year Plan (1975-1980)

- Regional headquarters were established and road construction proceeded by those regional office.
- District and local roads were constructed through Panchayat by providing grant and technical support.
- 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 transportation and communication" of Asia and Pacific Region.

After 2047 B.S, King Birendra promulgated the new constitution and abolished the constitution of 2019 B.S. Constitution of Kingdom 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(Constitution of Nepal,2015). In this regime the transportation development moved formulating Eight Five-Year Plan which is illustrated as below:

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 (1997-2002)

- 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 (2002-2007)

- 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.

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).

Eleventh-three -year plan (2007-2010)

- 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-three-year plan(2010-2013)

- 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 -three-year plan(2013-2016)

- Construction of international standard airports in Bhairahawa and Pokhara will have been started.
- Capacity of Tribhuvan International Airport will have been enhanced and the runways of 22 domestic airports will have been blacktopped.
- Detailed Project report on all 994 km of Mechi-Mahakali Railway will have been completed .
- The Biratnagar-Katahari Railway will have been built and the Jayanagar-Janakpur-Bardibas Railway will have been upgraded.
- The detailed project report for the operation of metro rail services in Kathmandu valley will have been prepared as well as feasibility studies for the operation of cable car services in 10 different places in the country.

Fourteenth three-year plan 2016-2018

- Reconstruction of 350 KM road infrastructure demolished by earthquake.
- Enhancing the capacity of Tribhuvan International Airport
- Provisioning of one helipad in each VDC
- Feasibility study of Metro Railway in Kathmandu
- Upgradation of Banatha-kathari and Jayanagar -Janakpur-Bardibas Railway Track

Fifteenth Five Year Plan 2019-2024

- The number of households with access to transport within a distance of 30 min will have increased from 82 to 95%.
- A total of 1078 km of national highways including East-West highway,Kathmandu-Terai Madesh Expressway will have been upgraded to four or more lanes.
- A total of 400 concrete bridges on national and provincial highways and 1200 concrete bridges on local roads will have been constructed.
- Roads connecting to Manang,Mustang,Mugu,Dolpa,and Humla District headquarters will be blacktopped.

- Construction of Gautam Buddha International Airport and Pokhara International Airport will have completed and operations started.
- Vehicle fitness Test Centers will have been established in all seven provinces and brought into operation.
- An online system will have been used for the delivery of transport services.
- GPS will have been implemented.

Present Context of Transportation Infrastructure Development In Nepal

During the past five years, Nepal's transport sector has grown at an average rate of 6.9%. Currently the sector accounts for 10.6% of Real GDP. Because transport infrastructure development promotes economic growth and promotes employment. It also contributes the improved living standards. Today the transportation industry directly provides employment to almost 20000 people. Over the next five years the government hopes to mobilize US$ 8.2 billion for road infrastructure, rail connectivity and transport sector management. The country has total road network of 80,078 km. Out of 77 total, only 67 district head quarter's roads are linked with all-weather roads. Most of these work only as basic road connectors and require regular maintenance, upgrading, and further road connection to other districts. The other means of transportation, Nepal's railway line has total length of 57 km out of which only 5 km is currently operating. The country has 1 international airport and 56 domestic airports. In the transport sector, Nepal must market itself as a profitable transit destination for goods coming from India. In addition, Nepal can become transit route connecting India and China. Annually, this could attract as much as US$ 70.25 billion (trade between India and China, 2021) per year of business through Nepal. A trade route through Nepal could also be extremely valuable for the two principals, taking into account that the elevations of border crossing points in Nepal are lower than those on the India-China border(G0N,2019).

Access to road service is a basic requirement for economic development and ease of life. Nepal's road network is growing but there is an enormous need for more investment. Because Nepal is landlocked, it relies on its transport links with China and India for trade. But there is only one dependable road link between the Kathmandu Valley and India at present. As such, development of a new routes

connecting both India and China shall bring enormous economic benefits. Highways, bridges, tunnels are all crucial to Nepal's economic growth and development. Government of Nepal is committed to improve the country's road connectivity. It has adopted a decentralized approach to efficiently utilize the road network. The country has total road network of 80,078 km, comprised of 26,935 km roads constructed and being maintained by the Department of Roads (DoR) and 53,143 km roads constructed by the government local bodies. The quality and quantity of roads in Nepal are low as compared to countries with similar income. Nepal's road density is one of the lowest amongst the South Asian countries. This shows the need to prioritize investment in the development of road infrastructure development of new highways, developing international trade routes, associated infrastructures, and improving major district road networks. Recently, the government initiated the following major road projects:

The Naghdunga Tunnel (Sisne Khola to Naghdunga total 2.5 km) is the first tunnel project in road sector. The Japanese International Cooperation Agency (JICA) has agreed to provide assistance. The estimated construction cost for the project is US$ 150 million. The contractor of the project is Hazama Ando Corporation. The project is scheduled to be finished by April 2023.The Banepa- Sindhuli- Bardibas Road (160 km) connects Kathmandu to Eastern Terai. The road has been built with grant assistance from Japan. The road project has been divided into four sections Bardibas-Sindhuli (37 km), Sindhuli Bazaar-Khurkot (36 km), Khurkot-Nepalthok (37 km) and Nepalthok-Dhulikhel (50 km). The highway was constructed at the cost of over US$ 210 million. A Chinese construction contractor has received the award to widen and upgrade the 27 km Kathmandu's ring road section. This will upgrade the existing 2 lane road to 8 lanes along with bicycle lanes and footpaths on both side. The upgradation of Koteshwor-Kalanki road has already been completed and handed over to the Government of Nepal. In the second phase ,the upgradation of Kalanki-Maharajgunj road has started and will be completed by 2024. The road infrastructure in Nepal includes the Strategic Road Network (SRN) at central level. It is the principal artery of Nepal's road system and the Department of Roads is responsible for its development and maintenance. The network includes national highways and feeder roads. Out of total 26,935 Km SRN Nepal's road network 11,349 km is paved, 6,192 km is graveled, and 9,394 km are earthen (fair) weather roads. Nearly half of

Nepal's SRN, primarily a two- lane roads which remains unpaved. The poor quality of the road means that it cannot currently support fast travel . Upgrading all of the SRN remains a priority. The Department of Local Infrastructure Development and Agricultural Roads, together with Local District Development Committees are responsible for Local Road Network (LRN). The LRN consists of district roads, urban roads and rural roads including village access roads and village trails. District roads are arterial roads linking two district headquarters or the main trading centers. Urban roads are roads serving urban municipalities and are administered by Municipal administration. Rural roads are managed by the Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR). These are mainly unimproved roads which generally pass through the SRN and urban roads. Village Access Roads connect district roads and villages. They also include firm roads, and roads leading to rivers. Village trails are non-motor able trails and are used to connect various parts of villages(Shrestha and Shahi,2014).

The North South Corridor Road shall provide easy access and improved mobility between Terai, the Hills and Himalayan Region. By connecting India and China this road will facilitate the easy movement of goods and people. 8 different trade and transit corridors are planned and being developed from North to South. Out of this, corridor from Birgunj-Naubise-Kathamndu-Tatopani-Nyalam (393km) (which falls in the central region of the country) is already operating. Initiatives are being taken to upgrade this corridor. Likewise, the track of the corridor from Birgunj-Galchi-Rasua-Syafrubesi (340 km) has opened recently. Among the 8 North South Corridors certain portion of some of the corridors such as the Koshi corridor, Kali- Gandaki corridor and Karnali corridor are prioritized to be constructed by the government.

Koshi Corridor project intends, within two years to open a track of the Koshi Corridor Road connecting Khandbari with Kimathanka and paving it within five years. This road will start in Basantapur and connect to Kimangthanka on the northern border via Terathum, a total distance of 195 km. The estimated project cost of US$ 58.5 million will be funded by the national budget. Kaligandaki corridor project is being constructed by the Nepalese Army and intends to construct 225 km road from Gaindakot to Baglung, as well as a 190 km road from Baglung to Korala of the corridor. In addition, the Ramdi-Jomsom section (202 km) of Kaligandaki Corridor

Road will be paved and the Jomsom-Korala section (100 km) will be graveled within three years. When completed, this will be the shortest route between India and China. The corridor will also pass through places with religious, historical and tourism values in the Dhaulagiri, Palpa, Mustang and Gulmi districts. The work is estimated to cost more than US$ 254 million.

Under the Karnali Corridor (Mid-western), a total of 288 km of road was constructed in two parts. The first part from Khulalu to Simikot while the second connect Hilsa and Simikot. The Nepali Army handed over the newly constructed Karnali corridor to the Department of Roads (Dahal,Poudel and Khatiwada,2014).

The Mid-hill Highway, one of the National Pride Projects, travels east to West across the country through mid-hills/mountains. It will connect Chiyabhanjyang of Panchathar District in the East to Jhulaghat in the Baitadi District in the Far-west, a distance of 1776 km. In total it will connect 24 districts, 225 VDCs and directly affect the lives of 7 million people. The road is expected to contribute to the nation's economic, cultural, societal and educational improvement. It's cost is projected to be US$ 430 million and completion is projected to require 5 years. The Government's 2022/23 budget has allocated US$ 28 million to the project. The government is planning to develop ten model cities along the Mid-hill Highway. Such development may be facilitated by way of PPs(GON,2018).

Another National Pride Project, Kathmandu-Terai, a six-lane road will start in Kathmandu and end in Nijgadh. Already, the Nepal Army has opened single lane of this highway. The World Bank has estimated that the project will cost US$ 1.5 Billion. The government intends to finance and build the project itself. Nijgadh is closer to the dry port at Birgunj which supplies 40% of the total goods to Kathmandu. The fast-track road will reduce the transit time from Birgunj to Kathmandu by 4–5 hours and the distance by 155 km. The fast track is also focused to facilitate the second international airport so, it will join the Mahendra Highway (East West corridor) at Nijgadh, where an international airport is planned to be built. This improved trade corridor between Terai and Kathmandu will significantly improve trade between Nepal and India and can also be used for Chinese goods originating from the Tibet Autonomous Region.

Kathmandu-Kulekhani Hetauda Tunnel Highway Project includes a 58 km highway with three tunnels. According to the Detailed Plan Report (DPR), 90 % of the project will lie in the Makwanpur district. The expressway will run from Balkhu of Kathmandu to Hetauda. The detailed design and EIA of the project has been completed. The existing Hetauda-Mugling-Kathmandu highway is one of the busiest road corridors in the country. Currently it runs 227 km and requires a travel time of approx. 6-8 hours. In contrast, the proposed highway will connect Kathmandu with Hetauda in an hour. The government has issued a license to develop the project on a BOOT (build, own, operate and transfer) basis. According to the agreement, the project will be handed over to the government after a period of 30 years. In 2012 the project cost was estimated to be US$ 348 million.

The Postal Highway, also a National Pride Project, is 1,792 km long and will connect the eastern part of Nepal to the far western part. This highway will be located near the Indian border, parallel to the present Mahendra Highway running through terai districts (plain areas). This project will require upgrading of much of the existing road network in the Terai region and to construct some new ones. When completed, it will support development in the region's health, agriculture, industry, and tourism sectors. The total estimated cost of the project is US$ 205 million. It will reduce the distant of travel from east to west of terai region. Currently, only 67 km Lamki-Tikapur section (27.5 km) and Seti-Bhajani section (40 km) are paved. Similarly, 58 bridges are in various stages of construction while work on 46 bridges has not yet begun. The government is likely to consider the PPP model as an option for the rapid completion of the project.57% of construction of the road has been completed until November 2020(Baral,2017).

Air transport is one of the most reliable modes of transportation in Nepal, owing to its difficult terrain and topography. In difficult terrain like that of Nepal, although comparatively expensive, air transport facilitates tourism and trade as it is safe reliable and cost effective.

Tribhuwan International Airport (TIA) at Kathmandu is the only International Airport in the country. It serves a number of airlines connecting to international routes. International passenger movement at Tribhuvan International Airport has increased by 12 percent in 2018 compared to previous year.. TIA is currently being modernized in

4 phases. The total estimated cost for TIA's upgrade is USD 605 million. For the phase 1, the contractual scope includes the enlargement of the existing runway, construction of new taxiways, extension of the apron, installing new lighting in the airfield, reformation of the international terminal, and installation of a new system for baggage carriage. The Government of Nepal has signed Bilateral Air service Agreements and MOUs with 39 different countries. Bilateral air service agreements contain provisions on; the routes airlines can fly, including cities that can be served within, between and beyond the bilateral partners, also the number of flights that can be operated or passengers that can be carried between the bilateral partners and many other clauses addressing competition policy, safety and security. The bilateral agreement with India calls for the provision of 30,000 seats per week and unlimited air cargo flights between six metropolitan cities of India and Nepal. Similarly, there are 10,000 seats per week to seven Chinese cities under that bilateral agreement, with two further points, namely Osaka and Seoul.

Of Nepal's 56 Domestic Airports including 6 Airports under construction, 32 are offering regular service. The small airports link remote areas to the international airport in Kathmandu. Nepal adopted an open sky policy. This allows private sector participants to provide domestic air service. Internal flights are managed by private operators which carry internal passengers and tourists. Domestic flights link most of the areas within the country, through two principal airports, namely Kathmandu and Nepalgunj. Pokhara Regional Airport (PIA) situated in one of the most favorite tourist destination in Nepal is being upgraded to a regional airport. The construction of the new regional airport began in April, 2016 and should be completed within 2023 . Upon completion, the planned airport will have a 3000 meter-long runway, an apron, international and domestic terminal buildings, an air traffic control tower, a cargo terminal building along with an airport hangar and take-offs of aircraft as big as Boeing 757 and Airbus A320. The government acquired the required land and the Environment Impact Assessment (EIA) Report for the project was approved. Nepal has signed a soft loan agreement with China for the funding. Out of the project's total estimated cost of US$ 214.7 million, Having an additional international airport encourages more involvement of the private sector in airlines as it helps to bring about improvement in quality of services(Sahayogee,n.d).

Gautam Buddha Regional International Airport will serve as a gateway to the birthplace of Buddha. This project will transform a local, domestic airport into a regional, international gateway. After the completion the new facility will have a 3,000-metre runway and the capacity to serve 760,000 passengers annually. Of the USD 90.6 million project cost, the civil works component is valued at USD 63 million. Asian Development Bank has provided USD 58.5 million (USD 42.75 in loans and USD 15.75 million in grants), the OPEC Fund for International Development has provided loan of USD 15 million and the Civil Aviation Authority of Nepal (CAAN) bears the rest of the cost as counterpart funding.

The present TIA is insufficient to cater the need of growing number of passengers and airlines. Hence, another international airport at Nijgadh, Bara district, is also under consideration. The proposed Kathmandu-Terai Fast Track will connect the airport to the Kathmandu city with travel time being approximately one hour. Once operational, it is expected to increase tourism and ease transportation. The process of land acquisition, estimated to cost USD 1.2 billion has commenced. The total project cost is USD 6.7 billion (including the development of airport city). The international airport will be designed to handle 15 million passengers annually and accommodate the largest jets. According to the feasibility study prepared in April 2011, the airport would cover 3,000 hectares of land: 2,000 hectares for the airport itself and the remaining 1,000 hectares for an airport city. The government has decided to mobilize resources on its own to build this airport. Participation of more airlines will be encouraged as the flow of tourist will be high after operation of the airport. Private sector involvement for the construction, operation and maintenance of the airport will be encouraged(Pathak,2018).

The Government of Nepal intends to expand the nation's railway network. Currently, Nepal has only 57 km of railway lines, 53 km of which are owned by Nepal Railway Company (NRC). This railway line is divided into two sections, 32 km from Janakpur in Nepal to Jainagar in India; and 21 km from Janakpur to Bijalapur, but neither section is currently operating. There is a 5 km line operating at the Inland Clearance Depot in Birgunj, Nepal which acts as a connector to the Indian Railways. For a landlocked country like Nepal, a rail network because of its low cost of operation, should be of prime importance, both for domestic and international routes. Realizing

the importance of railways in carrying freight and passengers, Nepal has embarked on a plan to construct railway line that runs the entire length of Nepal, from east to west. Currently, Jainagar Janakpur- Bardibas rail link is being constructed. When realized, the plan to connect to India from 6 different locations through EW Electric Railway (ap_prox. 113 km) will significantly improve trade between two countries as well as in the South Asian Region. It is expected that the project to establish an electric railway in six different locations will be realized in the form of one or more PPPs.

The present urban transport system is congested, inefficient and environmentally unfriendly. Kathmandu valley, which includes the capital city as well as other emerging cities, has a population of about 5 million and even more commuters. Therefore, Kathmandu desperately needs to develop sustainable mass transit systems to address the needs for increased mobility and to reduce fuel dependence. Efficient public transportation accelerates economic growth and promotes national and international trade. The development of public transport will substantially reduce travel time, as well as the number of vehicles on road. Green energy vehicles will cut emissions, reduce imports of crude oil, improve energy security and save lives. The following projects are given the highest priority: Railways (MRT, LRT, and Monorail) , Bus Rapid Transit (BRT) (Electric BRT (eBRT) ,Flyovers , Tunnel-ways and Cable car.(Koirala,2017)

4.1 Trend of Government Transportation Expenditure in Different Political Regime

Trend of government transportation capital and recurrent expenditure, in different political period of time is analyzed in the figure as illustrated in Table 4.1

Table 4. 1: Trend of Public Expenditure (Total in Panchayat, Democracy and Republican System)

(Rs. In Million)

Regime	TC	TR	RGDP	TC/RGDP	TR/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 (2007-2020)	626725.70	77628.20	21535692	0.0291	0.0036

Source: Author's Calculation through Excel.

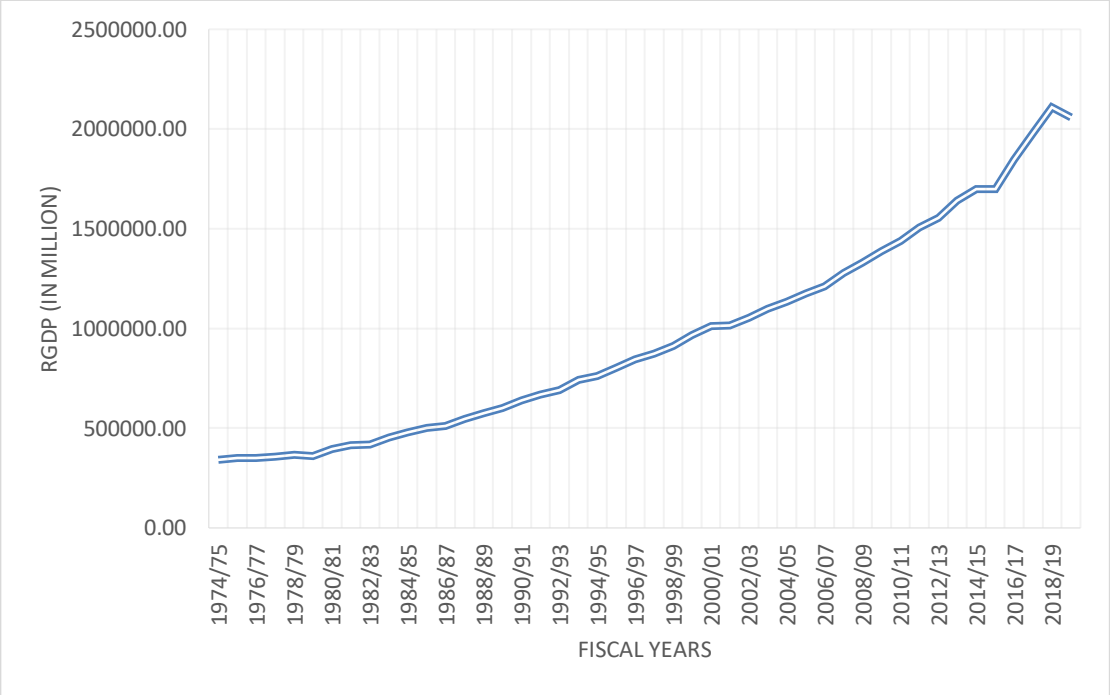
It can be clearly seen from the above table that the government transportation capital and recurrent expenditure has been increasing from the Panchayat to democracy to the republic regime. Real GDP is taken under the base of 2001 and expenditure is adjusted with the base price published by Nepal Rastra Bank. From the table, it is clear that total transportation capital expenditure in democratic system is higher than that of Panchayat system and the transportation capital expenditure in republican system is higher than that of democratic system. After the promulgation of new constitution in 2015 AD, Nepal was proclaimed as the federal democratic Republic state and has the three levels of Government namely Federation, Province and the local level. There is substantial increase in total capital and recurrent transportation expenditure along with the GDP. However ,the total capital transportation expenditure is more as compared to the recurrent transportation expenditure during the period.

The ratio between the government transportation capital expenditure to real GDP is decreasing from Panchayat to republic as well as the ratio of government recurrent expenditure to real GPD is also decreasing from Panchayat to republic system.

4.2 Trend and Nature of Real GDP

The graph below depicts the growth of GDP over the period of time.The mapping of Real GDP over the time showed constantly improving and increasing trend despite some small constricts during the year 2015 and late 2019.The Positive trend is due to the improved used of available natural resources, proper utilization of human resources, capital formation and technology. There is also the decreasing inequality, positive Human Development Index, development of communication and social inclusion. However, there is some setbacks in the increasing trend of GDP during the year 2015 due to devastated earthquake and unofficial economic blockade imposed by India .But the decreasing trend did not last longer and recovered well over the period of time.

Figure 4. 1: Trend and Nature of Real GDP of Nepal

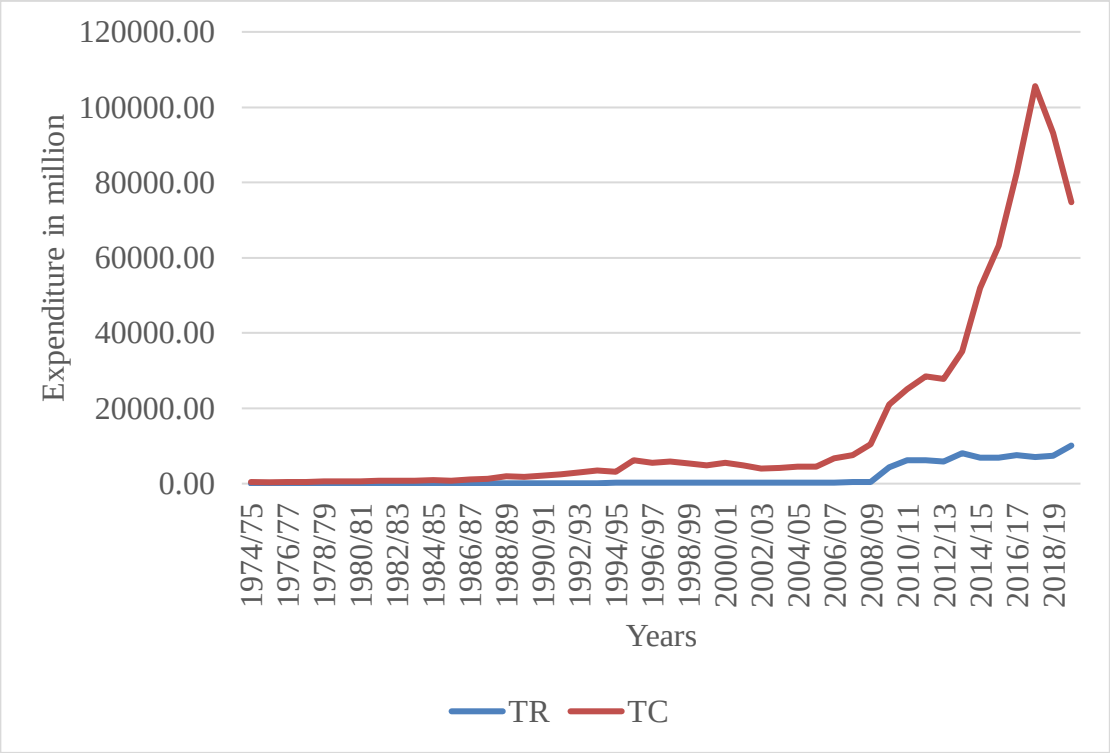


Source: Author's calculation through Excel.

4.3 Trend and Structure of Government TC and TR Expenditure

The government of Nepal performs investments in different sectors of the economy. The expenditure components include 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. 2: Trend and Structure of Government TC and TR Expenditure



Source: Author's calculation through Excel.

The figure illustrates the trend and structure of Transportation capital expenditure and transportation recurrent expenditure done by the government. The graph shows that there is minimal expenditure on transportation during the Panchayat and democratic regime. Both the expenditure on capital and recurrent transportation expenditure investment seems to be less than 4 million until 1990 .Eventually there is rise in the capital expenditure in 1995 and recurrent expenditure on 2008.The investment in the transportation capital expenditure is at peak till 2015 and it falls down sharply after 2015.

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_RGDP	LN_TC	LN_TR
Mean	13.62336	8.371511	5.712042
Median	13.6638	8.380117	5.316642
Maximum	14.56185	11.56733	9.222239
Minimum	12.74152	5.878576	2.970414
Std Dev	0.567721	1.643068	1.956852
skewness	-0.05085	0.379195	0.603853
kurtosis	1.762758	2.171509	2.13141
Jarque-Bera	2.953794	2.417978	4.241594
Probability	0.228345	0.298499	0.119936
sum	626.6746	385.0895	262.7539
sum sq Dev	14.50388	121.4853	172.3172
Observations	46	46	46

Source: Author's Calculation through Excel.

The data set contains the 46 years of observation starting from 1975 to 2019.The descriptive statistics shows that the mean of LN_RGDP is 13.62336 with standard deviation of 0.567721. And the maximum value of LN_RGDP is 13.55088 while the minimum value is 11.87116.

Similarly ,the mean of LN_TC is 8.371511 with the standard deviation of 1.643068.Also the mean of LN_TR is 5.712042 with the standard deviation of 1.956852.

5.2 Time Series Analysis

5.2.1 The Unit Root Test

The plots of time series generally provide the simplest method for checking stationarity. 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: Unit Root Test Results Table (ADF)

Null Hypothesis: Series in non- stationary

At Level

		LN_RGDP	**LN_TC**	**LN_TR**
With Constant	t-statistic	0.1699	0.0686	-0.0396
	Prob.	0.9676	0.9597	0.9496
		No	No	No
With Constant and Trend	t-statistic	-3.0494	-1.803	-1.8667
	Prob.	0.1308	0.6868	0.6550
		No	No	No
At First Difference (Δ in log)				
		d(LN_RGDP)	**d(LN_TC)**	**d(LN_TR)**
With Constant	t-statistic	-6.9759	-6.5953	-5.8705
	Prob.	0.0000	0.0000	0.0000
		*	*	*
With Constant and Trend	t-statistic	-4.0465	-6.5046	-5.8355
	Prob.	0.0145	0.000	0.0001
		**	*	*

Note:

(*) Significant at the 1%; (**) Significant at the 5%, and (no) Not Significant

All the variables showed non stationary in levels that is all 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 the first difference again ADF test is verified. Eventually these variables turned out to stationary on first difference.

5.2.2 Regression Result

Table 5. 3: Regression Results

Variables	Coefficient	std. Error	t-statistic	Prob
C	10.72541	0.2280	47.05162	0.000
LNTC	0.362245	0.059131	6.1261	0.0000
LNTR	-0.02356	0.04965	-0.474574	0.6375

The estimated regression model is,

LN_RGDP=10.72+0.362LN_TC + (0.02)LN_TR

Se 0.22 0.059 0.049

t-statistic 47.05 6.126 - 0.474574

R^2 = 93.95% D.W=0.28

The model shows the value of constant is 10.72 and it is significant. This implies that the RGDP is autonomously changed by 10.72.The estimated model suggests that 1 percent rise in TC ,the RGDP rises by 0.362 percent. The estimated p value is less than the 5 % level of significance. Hence ,the transportation capital expenditure significantly determines the real GDP of Nepal.

Similarly ,the model suggests that 1 percent rise in transportation recurrent expenditure leads to 0.02 percent decrease in GDP. The p value of transportation recurrent expenditure is more than 5% level of significance.

The R^2 of the model is 93.95% which implies that 93.95% is explained by the two variables and remaining 6.05% is explained by other variables. This signifies transportation expenditure plays significant role for the increment or decrement of GDP or overall economic growth.

R^2 (0.93) is greater than DW (0.28).This also signifies the regression model is not nonsense. All the explanatory variables jointly can influence the dependent variable .

5.3 Diagnostics Test

5.3.1 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: Heteroscedasticity Test (Breusch-Pagan- Godfrey Test)

F-statistic	0.290581	Prob.F(2,42)	0.7493
Obs *R-Squared	0.079473	Prob.Chi-square(1)	0.778
Scaled Explained SS	0.06314	Prob.Chi-square(1)	0.8016

Here in the above table ,the corresponding probability values for F-test ,observed R-squared and Scaled explained SS are more than 5 percent. It means the null hypothesis is not rejected rather it is accepted. Hence, it is concluded that the model is free from heteroscedasticity.

5.3.2 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. 5: Serial Correlation (Bueusch-Godfrey)

F-Statistic	1.209322	Prob.F(2,40)	0.3091
obs*R-Squared	2.565829	Prob.Chi-square (2)	0.2772

The above table shows the serial correlation test. The corresponding probability values for f-statistic and observed R-squared with degree of freedom 2 are more than

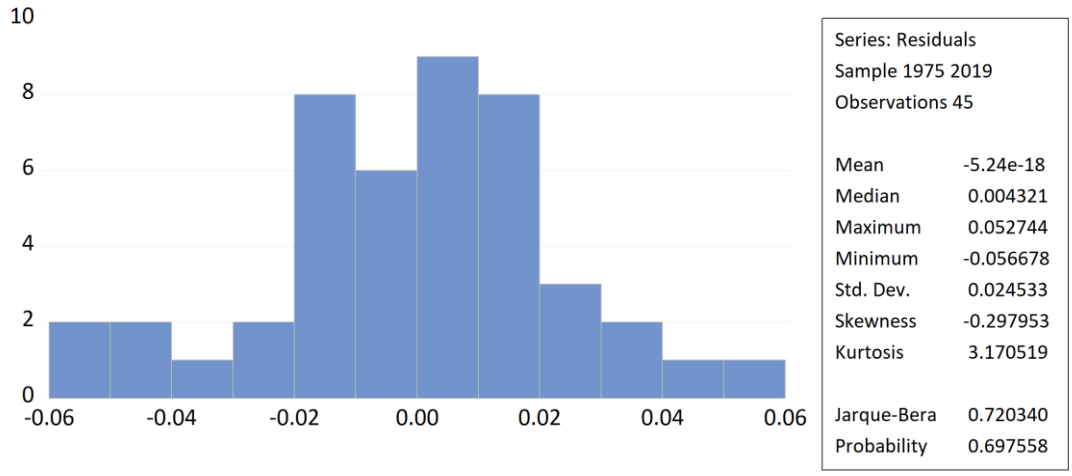
5 percent level of significance. It means null hypothesis cannot be rejected rather it is accepted.

5.3.3 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. 1: Normality Tests



The above figure shows the result of Jarque-Bera (JB).The JB value is 0.720340 with the P-value 0.69.Since the P-value is more than 5 percent level of significant ,the null hypothesis is not rejected. It means the residuals are normally distributed.

The residual test is free from error of heteroscedasticity ,result is normally distributed and model is free from from serial correlation. This proved the variables of models are cointegrated or they have long run relationship or equilibrium relation exist between them.

5.4 Lag Length Selection

Before performing cointegration test and VEC modelling, we need to first determine the optimal number of lags .Here, we proceed the lag length selection through looking at the smallest value of AIC with the help of E-views. The optimal lag length here is one.

Table 5. 6: Lag Length Selection

Model	**Lag length selection**		
Dependent Variable	Explanatory variable	Lags	AIC
LNGDP	LNTC,LNNTR	1	-4.028609

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

5.5 Johansen Co-integration

After performing the stationarity test ,there are three likely outcomes:

- Series are integrated of order 0. That is, stationary in level (this requires no differencing).
- Series are integrated of order 1. That is, stationary after first difference.
- Series are integrated of different orders. That is, having a combination of I(0) and I(1) series.

Here, in this scenario, it is shown earlier that variables are stationary in first difference ,that is, they are I(1) series integrated of order one .Performing a cointegration test is necessary to establish a long run relationship.

The hypothesis is stated as:

H0: There is no cointegrating equation
H1: H0 is not true.

Table 5. 7: Results of Johansen Cointegration (Trace Statistics)

Hypothesized no of CE(s)	Trace statistics	P value for trace statistics	Max Eigen value statistics	P value for max Eigen value
None*	0.210459	14.40405	29.7907	0.8172
At most 1	0.069132	4.00668	15.49471	0.903
At most 2	0.001078	0.047452	3.841465	0.8275

Table 5.9: Result of Johansen Cointegration (Maximum Eigen-Value

Hypothesized no of CE(s)	Trace statistics	P value for trace statistics	Max Eigen value statistics	P value for max Eigen value
None *	0.210459	10.39737	21.13162	0.7067
At most 1	0.069132	3.959228	14.2646	0.8636
At most 2	0.001078	0.047452	3.841465	0.8275

Here, the p value is greater than 5 percent ,which implies that we cannot accept null hypothesis that there is no cointegrating equations. Alternatively there are at most 2 cointegrating equation as shown in the Table for trace statistics and Eigen Value. Hence ,we can say that there is long run relationship between the dependent and the two independent variables. Further, we can compute the VAR model to note the short run relationship between the variables.

5.6 VAR ANALYSIS

Vector Autoregression model shows the short run casual relationship between the variables of the bivariate models which are found to be not co-integrated in the long run. The Variables as TC (Transportation Capital) and (Transportation Recurrent) are tested with short -run with GDP.

Each Variable is a function of its past lags and past lags of the other variables. It predicts bidirectional relationship. VAR model is used to predict the relationship that affects each other to time.

The hypothesis is formed as follows:

1. For LNGDP as dependent and LNTC and LNTR are independent
   Null Hypothesis (H0): DLNTC and DLNTR cannot cause DLNGDP
   Alternative Hypothesis (H1):DLNTC and DLNTR can cause DLNGDP
2. For DLNTC as dependent and DLNGDP and DLNTR are independent
   H0:DLNGDP and DLNTR cannot cause DLNTC
   H1:DLNGDP and DLNTR can cause DLNTC
3. For DLNTR as dependent and DLNGDP and DLNTC are independent
   H0:DLNGDP and DLNTC cannot cause DLNTR
   H1:DLNGDP and DLNTC can cause DLNTR

Table 5. 8: VAR ANALYSIS

Model	Dependent Variable	Explanatory Variable	Chi-square statistics	P-value	Direction of Casuality
1	DLNRGDP	DLNTC,DLNTR	1.952477	0.0263	Both DLNTC and DLNTR can cause DLNRGDP
2	DLNTC	DLNRGDP,DLNTR	1.191912	0.3792	
3	DLNTR	DLNRGDP,DLNTC	1.82956	0.873	

The above table shows the results of Vector Auto Regressive test for short run casualty has been performed. It is found that there exist short run causality DLNTC and DLNTR can cause DLNRGDP.

5.7 Discussions/Analysis Comparing and Contrasting the result with Previous Empirical Result Reviewed

The cointegration test employed by Okoro(2013) revealed that there is long run relationship between the variables (capital expenditure) and recurrent expenditure mostly on the issues that should attract the economic growth. This paper also identifies that there are at most two cointegrating equations in trace statistics and Eigen Value under Johansen Cointegration test. There is long run relationship between the dependent(Real GDP) and the two independent variables(transportation capital expenditure) and (transportation recurrent expenditure).This study also

recommends that increase in the transportation capital expenditure attracts economic growth however the impact of recurrent transportation expenditure is quite insignificant. It also implies that recurrent transportation expenditure is complementary to the capital transportation expenditure.

Also reviewing the literature of Younis (2016),it was concluded that there is inefficiency of infrastructural investment in Pakistan. The investment should be diverted from economic infrastructure to social infrastructure in the motive to gain increasing growth rate. In contrast to this ,this paper concludes that investment in the transportation infrastructure in Nepal aided for the significant development of social infrastructure. It has thus contributed in the overall economic growth of the nation. Simiyu (2016) results displayed no casual relationship between public expenditure and economic growth. But this paper concluded with the unidirectional causality between government transportation capital expenditure ,government recurrent transportation and economic growth. However, both the study used the Johansen Co-integration Test and VAR model in the time series data to estimate the short run and long run relationship between the public expenditures and economic growth.

CHAPTER VI

SUMMARY, CONCLUSION AND RECOMMENDATION

6.1 Summary

This study has tried to analyse the trend and structure of transportation expenditure as public investment. Also, the impact of transportation expenditure as public investment in economic growth has also been assessed. The pattern and trend of Real GDP of Nepal and the structure of government transportation capital expenditure as well as government recurrent expenditure has been reflected in the graph. The graph revealed increasing trend of Real GDP over the year from 1974-2019.The investment in the transportation capital expenditure is at peak till 2015.

The impact of public investment in the form of transportation expenditure in economic growth is also assessed with the help of regression mode. The regression model signifies that the transportation expenditure plays significant role for the increment or decrement of overall economic growth. However, the recurrent transportation expenditure does not show the significant relationship with GDP in Nepal.

The study uses the AIC model for cointegration test. To ensure the stationary of time series data the Augmented Dicky Fuller unit root test of all the variables has been done. If the data are not stationary at level, then they are made stationary by first difference.

The original data extracted 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 stationary of data. The lag length selection was performed using Akaike Information Criterion and their result is the selection of lag length 1.

Furthermore, Johansen Cointegration test showed at most two cointegrating variables. It also implied the long run relationship between the variables. VAR/Granger Causality test was done to go for the short run causality investigation of the variables. It was found that there is unidirectional casual relationship between change in gross

domestic product transportation capital expenditure and transportation recurrent expenditure at 5 percent lvel of significance.

6.2 Conclusion

The main objective of this study is to know the trend and structure of transportation expenditure as public investment in Nepal. It has also focused to explain the relationship between the economic growth and transportation expenditure in Nepal using the time series data between 1974-2019.

The following conclusions can be drawn from the above study:

- The Gross Domestic Product of Nepalese economy has been consistently growing over the period of time. It was found that the GDP of Nepal only show decreasing trend in the year 1979 and 2015.The historical fact of the long protest of holding a referendum on the possibility of multiparty system in the country might be the cause of declining GDP over the year in 1979.Also catastrophic earthquake and the economic blockade imposed by India led to the declining GDP in the year 2015.However over the period of time the GDP is increasing steadily. Over the span of time there was development of various infrastructures, international market, improvement in Human Development Index as well. The positive improvement in the various social indicators shows the increase real GDP over the period of time.
- There is a positive and statistically significant relationship between real government expenditure and GDP while the relationship between recurrent expenditure and GDP seem statistically insignificant. Both the government transportation capital expenditure and GDP have the increasing trend .
- Unidirectional causality between the government transportation capital expenditure ,government recurrent transportation expenditure and economic growth has been found.

6.3 Recommendation

Some of the recommendation made on the basis of the study are:

The trend in public investment on transportation is increasing throughout the different regime Nepal went through. Although the quantitative aspect of development of transportation sector is assessed here ,focus should also be give to the qualitative aspects of transportation infrastructure expansion and also should focus on the environmental sustainability.

Since there is significant role of investment in transportation sector to capitalize the economic growth of the country as well as a way to develop other essential infrastructure it is recommended that government should bring the investment in transportation sector in mainstream as a factor determination of economic growth. The result shows that the desired economic growth will be difficult to fulfil unless and until the transportation sector is invested.

The Government of Nepal should also constitute the strong monitoring and evaluation mechanism to evaluate the government finance projects in transportation sector through appropriate distribution among the three levels of government through various institutional mechanism and structure.

The study used the time series data and cointegration, VAR econometric modelling in explaining the relationship between GDP growth and public expenditures. However, researcher can go for multivariate analysis for explaining the expenditure variables and also use the panel data to estimate the effect of expenditures of public investments on economic growth.

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APPENDIX A

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	
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	

Data

FY	TC	TR	GDP
1974/75	379.00	19.50	341642.90
1975/76	357.30	20.40	350616.00
1976/77	446.40	23.30	349456.80
1977/78	498.80	26.90	358000.50
1978/79	520.10	31.90	366179.40
1979/80	682.40	34.20	361327.90
1980/81	637.90	36.60	395545.80
1981/82	784.20	40.10	415016.20
1982/83	853.00	50.80	417119.90
1983/84	801.40	54.60	454729.60
1984/85	984.30	61.30	480275.00
1985/86	783.50	66.40	502862.10
1986/87	1072.00	86.00	511013.00
1987/88	1301.80	88.00	546661.30
1988/89	1973.10	115.90	574998.80
1989/90	1717.50	127.40	600695.70
1990/91	2099.50	120.00	639301.00
1991/92	2529.50	148.50	668511.40
1992/93	2992.80	148.80	689450.80
1993/94	3528.50	165.30	742666.80
1994/95	3202.80	192.30	762351.30
1995/96	6180.20	211.70	804757.60
1996/97	5532.60	227.40	845767.40
1997/98	5864.20	244.30	872915.40
1998/99	5344.10	232.80	912029.60
1999/00	4870.30	174.90	966783.80
2000/01	5550.90	196.00	1012952.00
2001/02	4771.10	341.50	1014578.00
2002/03	3968.20	303.30	1052817.00

2003/04	4255.10	297.10	1099260.00
2004/05	4466.50	316.90	1134813.00
2005/06	4511.80	333.70	1177125.00
2006/07	6715.90	333.80	1209506.00
2007/08	7577.50	398.60	1279603.00
2008/09	10383.30	489.60	1329567.00
2009/10	21022.00	4412.00	1386181.00
2010/11	25159.10	6155.30	1439532.00
2011/12	28463.70	6236.30	1507172.00
2012/13	27884.60	5800.50	1553502.00
2013/14	35062.60	8107.40	1642711.00
2014/15	51945.60	6914.90	1700405.00
2015/16	63165.80	6918.50	1700448.00
2016/17	82471.70	7641.70	1846506.00
2017/18	105590.70	7112.20	1982653.00
2018/19	93164.80	7321.50	2109263.00
2019/20	74834.30	10119.70	2058149.00

Descriptive Statistics

	LNGDP	LNTC	LNTR
Mean	13.62336	8.371511	5.712042
Median	13.66380	8.380117	5.316642
Maximum	14.56185	11.56733	9.222239
Minimum	12.74152	5.878576	2.970414
Std. Dev.	0.567721	1.643068	1.956852
Skewness	-0.050847	0.379195	0.603853
Kurtosis	1.762758	2.171509	2.131410
Jarque-Bera	2.953794	2.417978	4.241594
Probability	0.228345	0.298499	0.119936
Sum	626.6746	385.0895	262.7539
Sum Sq. Dev.	14.50382	121.4853	172.3172
Observations	46	46	46

Dependent Variable: LNGDP
Method: Least Squares
Date: 11/25/22 Time: 22:22
Sample: 1974 2019
Included observations: 46

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNTC	0.362245	0.059131	6.126100	0.0000
LNTR	-0.023562	0.049650	-0.474574	0.6375
C	10.72541	0.227950	47.05162	0.0000

R-squared	0.939564	Mean dependent var	13.62336
Adjusted R-squared	0.936753	S.D. dependent var	0.567721
S.E. of regression	0.142776	Akaike info criterion	-0.992088
Sum squared resid	0.876553	Schwarz criterion	-0.872829
Log likelihood	25.81803	Hannan-Quinn criter.	-0.947413
F-statistic	334.2485	Durbin-Watson stat	0.285069
Prob(F-statistic)	0.000000		

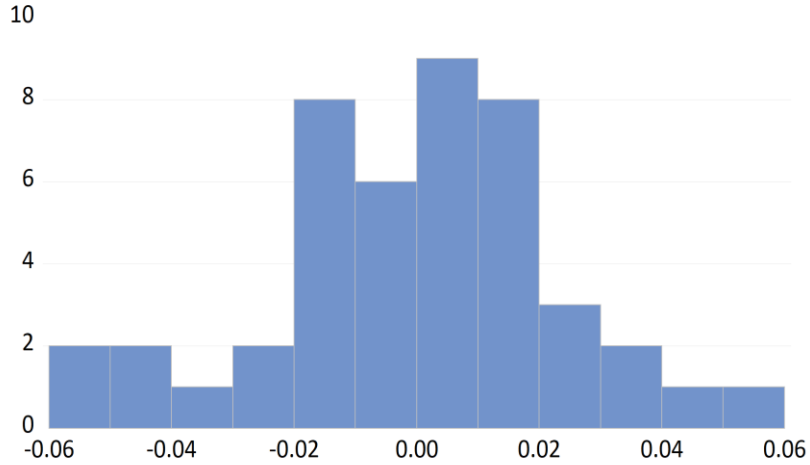
Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	0.290581	Prob. F(2,42)	0.7493
Obs*R-squared	0.614174	Prob. Chi-Square(2)	0.7356
Scaled explained SS	0.580629	Prob. Chi-Square(2)	0.7480

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.209322	Prob. F(2,40)	0.3091
Obs*R-squared	2.565829	Prob. Chi-Square(2)	0.2772

Test Equation:



Series: Residuals
Sample 1975 2019
Observations 45

Mean	-5.24e-18
Median	0.004321
Maximum	0.052744
Minimum	-0.056678
Std. Dev.	0.024533
Skewness	-0.297953
Kurtosis	3.170519
Jarque-Bera	0.720340
Probability	0.697558

VAR Lag Order Selection Criteria
Endogenous variables: LNGDP LNTC LNTR
Exogenous variables: C
Date: 12/04/22 Time: 22:07
Sample: 1974 2019
Included observations: 42

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-80.05286	NA	0.010476	3.954898	4.079017	4.000393
1	96.60078	319.6590*	3.58e-06*	-4.028609*	-3.532132*	-3.846630*
2	100.9603	7.265854	4.50e-06	-3.807633	-2.938798	-3.489171
3	105.7671	7.324669	5.60e-06	-3.607957	-2.366765	-3.153011
4	113.5969	10.81254	6.13e-06	-3.552232	-1.938682	-2.960802

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Date: 12/05/22 Time: 21:54
Sample (adjusted): 1976 2019
Included observations: 44 after adjustments
Trend assumption: Linear deterministic trend
Series: LNGDP LNTC LNTR
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	0.210459	14.40405	29.79707	0.8172
At most 1	0.086053	4.006680	15.49471	0.9030
At most 2	0.001078	0.047452	3.841465	0.8275

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	0.210459	10.39737	21.13162	0.7067
At most 1	0.086053	3.959228	14.26460	0.8636
At most 2	0.001078	0.047452	3.841465	0.8275

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):

LNGDP	LNTC	LNTR
1.209845	-3.426120	2.564871
-7.392545	2.477358	0.094690
0.754500	0.333983	0.065170

Unrestricted Adjustment Coefficients (alpha):

D(LNGDP)	-0.000576	0.002654	0.000732
D(LNTC)	0.059473	-0.041205	0.002687
D(LNTR)	-0.064643	-0.088992	0.001916

1 Cointegrating Equation(s): Log likelihood 103.6602

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNTC	LNTR
1.000000	-2.831866	2.119999
	(0.78123)	(0.65286)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	-0.000697
	(0.00467)
D(LNTC)	0.071954
	(0.03860)
D(LNTR)	-0.078208
	(0.06458)

2 Cointegrating Equation(s): Log likelihood 105.6398

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNTC	LNTR
1.000000	0.000000	-0.299076
		(0.04887)
0.000000	1.000000	-0.854234
		(0.05972)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	-0.020315	0.008547
	(0.02871)	(0.01621)
D(LNTC)	0.376562	-0.305842
	(0.23382)	(0.13197)
D(LNTR)	0.579666	0.001011
	(0.38532)	(0.21748)