

## EFFECTS OF ROAD CONSTRUCTION IN NEPAL

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### ABSTRACT

It is widely accepted fact that rural roads have the most significant role in poverty reduction as they provide physical access to the rural population. Without the physical access, the rural population is being deprived from obtaining different services like health, education, drinking water, etc. In addition, lack of link between the rural areas and the market also creates the constraints on agricultural production and other economic activities. There is the knowledge gap as how the rural people can be benefited from the rural roads and what economic advantages are accessible from it. Thus this study is an attempt to explore how rural road helps in the creation of employment opportunities, reduction of input costs, increase in production and decrease in wastage and provide access to market and helps in poverty reduction. This study reveals that the rural road in the study area has significant impact on poverty reduction. From F-test, T-test, correlation as well as regression statistical analysis, it was concluded that there is significant relation of increase in income, reduction in time to market, occupation, and number of working age family members with the increase in savings. It can be claimed that this study has met its objectives of studying the impacts of rural road in poverty reduction.

**Keywords:** roads - poverty - agriculture - employment - savings - physical access

### INTRODUCTION

The road sector is critical for a country's development since it connects various geographical and economic sectors. The Road Network is in charge of connecting a country's rural areas to markets in order to support various economic activities such as tourism, agriculture, industrial electrical and other sectors of the economy. It is in critical situation in underdeveloped countries since more modern modes of transportation are prohibitively expensive. As a result, improving the road network helps to expand economic activities and opportunities. According to Fan and Rao (2003), public spending in rural basic infrastructure is an effective tool that

the government can employ to support economic development and poverty cutback, and the road transportation is one of the most important among these services.

In a developing country like Nepal, a well-developed road transport industry is expected to energize the development process through a diversity of actions. The most important of these is the design of easy market access options for agricultural outputs. Market access is especially important in a country like Nepal, where the rural population makes up around 78.9% of the total population and is involved in both domestic and foreign manufacturing (World Bank 2020).

Furthermore, road transportation facilities have a part in every household's production plan and consumption expenses decisions in their daily life. Furthermore, improved public and private service provision, including banking and insurance services, is necessary for expanding and quality education, better health service provision, trade acceleration-both within a country and on an export market, and better public and private service provision. Roads are important infrastructural units in the world, providing connections between economic and social units as well as other means of transportation such as road train, water shipping, and airways.

The roads which provide direct access for rural communities to economic and social services are rural roads. They are expected to have positive impacts on rural inhabitants by enhancing the ability of people to access social services, creating job opportunities, providing access to markets, and therefore contribute to improving the living standards. For the developing country like Nepal, rural connectivity has been a major challenge, so majority of the population lack access to all-season roads. As per fifteenth periodic plan, eighteen percent of the total households in Nepal have no access to road facilities within thirty minutes' walk distance.

As per Rural road maintenance directive, 2064, rural roads are those motor able roads which remain under the right of local level for operation and maintenance and also the local level agricultural roads fall under rural roads. Such roads may have their surface earthen, graveled or even black topped. Rural roads provide convenience for the village people to market and other facility required to them.

## **OBJECTIVES OF THE STUDY**

This study is related with the road construction in the area and its effects on vicinity. It is related with the fulfillment of these objectives;

1. To analyze the trend and structure of road network in Nepal
2. To explore the causes and consequences of poor road network in Nepal

### **HYPOTHESES OF THE STUDY**

To make the study more scientific and logical, two hypotheses are set. It was planned to test by t-test with the related data collected from local households. Hypotheses are listed as;

$H_0$  = There is no relationship between road construction and change in income of people.

$H_1$  = There is yes relationship between road construction and change in income of people.

$H_0$  = There is no relationship between road construction and change in working hours of people.

$H_1$  = There is yes relationship between road construction and change in working hours of people.

### **REVIEW OF RELATED LITERATURE**

This section is developed to visualized variables related with road network. On the basis of various review, variables are selected to fulfill the above listed objectives.

According to Mitnik and Neumann (2001), public spending, such as road network improvement, has a beneficial impact on gross domestic product. Nevertheless, there is lack of clear causal relationship between gross domestic product and governmental spending. Their findings support the idea that public and private investments are mutually beneficial. Looney (1997) explore the effects of different types of public overheads (infrastructure) in Pakistan, applying time series statistics of specific variables for the US economy and co integration analysis, and concludes that community's infrastructures did not encouraged private segment growth, but showed a response to the sector's necessities.

According to Mamatzakis (2002), government infrastructure (air and water ports, trains, various roads, power stations, and communications centers) has a favorable impact on production and marginal efficiency of capital in the Greek industrial areas. He also discovers a two way link between public infrastructure and productivity of goods. Two economists look at the impact of different forms of infrastructure (social and physical)

in a group of countries. They reveal that, when infrastructure is associated with long-term economic prosperity, there is significant variance in various countries (Canning & Pedroni 2008).

Wang (2002) proposes a function of production paradigm for assessing the relationship between community's infrastructure extension, private production growth and externality impacts. Two variations of the dynamic sectors (municipal infrastructure vs. personal production) models are included in the framework. Both sectors are assumed to have its own production function along with to have a spillover impact on the each other. It was assumed that the public overheads (infrastructure) development has a spillover effect on the private part in the initial report. Dynamic growth equations are derived in the second version, and positive externality or spreads out effect are calculated. For the period 1979–1998, growth patterns are calculated and forecasted for seven Asian nations. Although the effects of the production of private sector on public overheads are substantially bigger, the empirical data demonstrate that two variants of the hypotheses concerning the presence of spillover impacts cannot be ignored. This means that for quick economic development, maintaining equilibrium between infrastructure construction and private segment growth is critical. The government's ability to effectively manage existing infrastructure assets is a prime issue.

Economists develop a model of structural growth for determining the interdependence of infrastructure and entire economy. The economic model explains how country traits and policies interact with GDP to produce variability in results. With equal (constant) returns to scale, model uses the Cobb-Douglas Production nature. The model's cross-country estimates show that infrastructure services contribute a significant amount to GDP and that the cost of supplying those services is normally bigger than the cost of providing those armed services (Esfahani & Ramirez 2003).

The model projected normal infrastructure with per capita gross domestic product expansion rates for seventy five countries based on data from 1965 to 1995. The results suggest that infrastructure has a crucial outcome on growth of gross domestic product. The results suggest that governments can gain a lot by increasing infrastructure investment and performance. The economic growth potential of this effect is determined by institutional and economic factors that influence asset-GDP ratios in the steady state with adjustment rates when wealth-GDP ratios go away from

their steady state values. The findings imply that institutional capacities that contribute legitimacy and efficacy to government policies play a key position in the expansion of infrastructure.

Milbourn *et al.* (2003) investigates whether public investment plays a unique role in economic growth. It employs an enhanced Solow–Swan growth path model which incorporates both human and physical capital to describe cross-country per capita income. Constant returns to scale represent aggregate production. It takes into account both the model's steady-state and transition-to-stability forecasts. There is lack of important influence of public spending on output level each worker in the steady state model. It analyzes a remarkable role and contribution to economic prosperity from public spending by employing ordinary least squares (OLS) methods which help to development of transition model. The associated standard errors are substantially bigger when instrumental variables approaches are utilized, and the role of public spending is statistically irrelevant.

Sahoo and Dash (2010) evaluated the result of infrastructure on economic development in India from 1970 to 2006 to study the influence of infrastructure development on output; the research creates an indicator of overheads stocks and estimates growth estimating models. The findings show that overhead (infrastructure) stocks, supply of labor force, and total investment play a significant effect in economic growth of India. Production function of Cobb-Douglas and neoclassical growth model are used to fulfill the objectives of this paper. Along with private capital and labor, it includes infrastructural stock as well as public capital as an input to the output process. Infrastructure development contributes significantly more to growth than private and public spending in India. Causality analysis reveals that there is unidirectional causality between infrastructure development and output growth. So that infrastructure development should be emphasis and prioritized to maintain higher and broad based economic growth.

The association between road as overheads promotion and economic prosperity is depicted by Law *et al.* (2019). The contribution of road as an infrastructure extension (i.e., the increase of road length per thousand populations) and various socioeconomic variables (i.e., exports, import, education, health, physical capital stock, and urbanization) to economic prosperity was investigated in this study. The study employs panel linear regression analysis employing time series as well as cross-sectional data from sixty nations from 1980 to 2010. All of the data and variables were secondary as well as data gathered from a variety of source.

The study's main finding was that increased length of road per thousand people, per capita export, per capita education expenses, and physical stock of capital per worker all assisted to economic development. It was discovered that urbanization and economic growth have an inverted U-shaped dependency connection, indicating that economic growth grows properly at low levels of urbanization but less after urbanization exceeds the assumed threshold level. Increases in road length per thousand people would also help with export growth. It implies that initiatives aimed at improving road infrastructure should be undertaken in tandem with long-term economic growth.

### **METHODOLOGY OF THE STUDY**

To make this study more systematic and to attain objective of the study, primary data was collected from the direct interview. The detailed methodology is as follows:

This study is descriptive as well as explorative in nature. It is mainly based on the study of road network. This study is designed to meet above mentioned objectives of the use and effect of road network on macroeconomic variables.

The targeted population of this research includes those households residing in ward no 22 of Bharatpur Metropolitan city of Chitwan district. But it is difficult to have study of whole households. Therefore, this study was limited in such area's household, which is selected by random sampling. There were 576 households (source: ward profile 2075) and 31 households were selected as a sample with the help of convenience sampling.

As the study is field research based, primary and secondary types of data were used. The required secondary data is collected from various government sources. Primary data was collected using tools like structural and unstructured questionnaire. The questionnaire is asked to the any member of the family. A simple procedure is used to fill up the structured questionnaire. In the questionnaire, various sources of income such as income from upgrade and construction of road was analyzed.

The analysis was qualitative and quantitative presented with the help of tables and excel software. To make the study more clear and specific, correlation between road network and income (before and after) was fitted.

The regression analysis was fitted with following multiple regression modeling.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 \quad (i)$$

Where,

Y= dependent variable (Income)

$\beta_0$  = intercept

$\beta_1, \beta_2$  = coefficients of road upgrade and construction of umbrella street respectively

$X_1$  = explanatory variable (New Road & Upgrade)

$X_2$  = explanatory variable (Employment)

This study aims to explore the trend and structure of road network in Nepal. The analysis was based on primary data from Bharatpur metropolitan – 22, chitwan and secondary data from central bureau of statistics, Nepal Rastra Bank as well as from Ministry of Finance.

To analyze causes and consequences of road network in Nepal, various studies from the side of scholar has taken as key sources. Thereafter, data has been managed and systematized on the basis of their nature in this research work. Data of various years were used to explore the trend and composition has been taken to analyze the road network and its benefits in the local area.

## RESULTS AND DISCUSSION

On the basis of data, it is cleared that road network became the way to bridge the gap among various geographical parts of Nepal. In the case of Nepal, where taxpaying capacity of people is too low because of low per capita income, contribution of people is less in the field of infrastructure development. Foreign loans basically from multilateral agencies like World Bank, ADB, IFD having long maturity period has great contribution in the development of road network and other activities. After restoration of democracy in Nepal, there is rapid increase in road network since it is taken as a gateway of increase in output.

The overall length of all types of road has reached 34,347 kilometers in the first eight months of fiscal year 2019/20, where 15,254 kilometers of blacktop, 9,251 kilometers of graveled, and 9,842 kilometers regarding to fair-weather roads. There were 32,879 kilometers of roads by the end of the fiscal year 2018/19, with 14,695 kilometers of blacktop, 8,594 kilometers of graveled roads, and 9,590 kilometers fair weather roads (MoF 2020). It can be displayed in a table as follows:

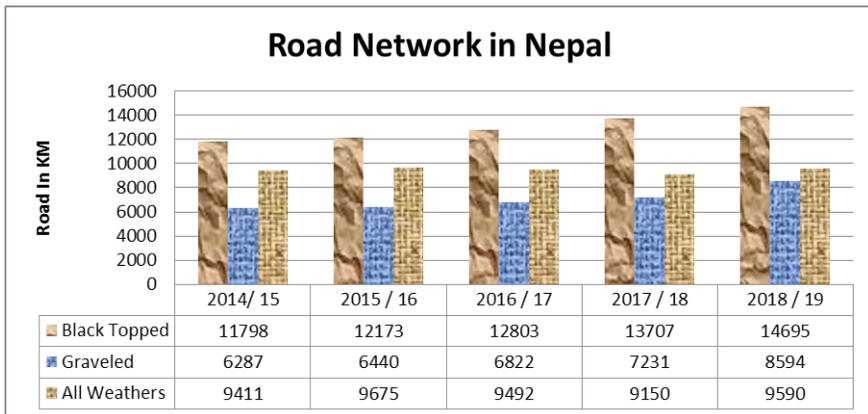
**Table 1:** Road network development in various fiscal years

Fiscal years	Road types		
	Black topped	Graveled	All weathers
2014/ 15	11798	6287	9411
2015 / 16	12173	6440	9675
2016 / 17	12803	6822	9492
2017 / 18	13707	7231	9150
2018 / 19	14695	8594	9590
2019 / 20 *	559*	657*	252*
Total	15254	9251	9842

\* Till mid- March

Source: Ministry of Physical Infrastructure and Transportation, 2019

There is increasing trend of road infrastructure in Nepal. It is increasing year after year. Increase in road length and employment are positively related to each other's. With extension of road, there is connection among various geographical reasons.



Source: Table 1

**Figure 1:** Road network in Nepal

In the diagram, it is cleared that the rate of change in different types of road is not remarkable. Nepal is running with mounting problems and resources are diverted to address such economic issues so it cannot channelize in the context of infrastructure development. Total road network is not extended in the desired places of Nepal. Even the total length of road is increasing. The ratio of change is not satisfactory. For rapid industrialization, development of road network seems to be inevitable.

Social overhead capital leads toward direct productive activities in various sectors of an economy.

The network density is low, with 14 kilometers per 100 square kilometers and 0.9 kilometers per 1,000 persons. The lowland (Terai) areas account for 60 percent of the road network. According to a survey conducted by the Department of Roads (DoR), half of the population in hilly areas still has to walk two hours to reach a Strategic Road Network road. Humla and Dolpa, two of the 77 district headquarters, have yet to be connected to the SRN.

Likewise the effects of road network in economic activities are ample and cannot quantify in few words. In the eyes of development economists, when there is development of social overhead capital (SOC), it invites direct productive activities (DPA) in the economy. it make more demand and more employment so that a country may move in the mainstream of development. The income of the people starts to increase where there is development of road network. One of the respondent said that the value of land in the area approximately doubled.

**Table 2:** Road construction and change in income

<b>t-Test: Paired Two Sample for Means</b>		
	<b>Variable 1</b>	<b>Variable 2</b>
Mean	290322.5806	338387.0968
Variance	11043225806	24913978495
Observations	31	31
Pearson Correlation	0.931079245	
Hypothesized Mean Difference	0	
Df	30	
t Stat	-3.75858581	
P(T<=t) one-tail	0.000368985	
t Critical one-tail	1.697260851	
P(T<=t) two-tail	0.000737969	
t Critical two-tail	2.042272449	

*Note: Author calculation from primary income data of after and before road construction.*

In the processing of data, it was observed that income of the people in the vicinity of road increase significantly. On the basis of their answers, due to the road construction more than dozen tourist hotel are constructed.

People are directly and indirectly benefited from the scheme in the Bharatpur – 22 of Chitwan district. Yearly income of 31 households before construction of road was Rs 290322.58 and after construction of a road, means income of 31 households reached at 338387.09. Probability value of this data seems to be significant since p value in the calculation is less than 0.01. Pearson correlation is 0.93 shows that there is direct association between road construction (New Road) and increase in income of people in the area. The hypothesis set in the time of study, there is no relationship between road construction and change in income of people is rejected.

After the construction of road, there was minimum increase in annual income of Rs. 25000 and maximum increase of Rs. 504000. The mean increase in annual income of the households is Rs. 208233.33 with the standard deviation of Rs. 114483 (Banskota 2020). Likewise, Wondemu and Weiss (2012) discovered that upgrading the quality of village roads in an African country Ethiopia increases household's average earning by up to 63%. As a result, the findings of this investigation are consistent with those of earlier studies.

**Table 3:** Relationship between road construction and total working hours of households

<b>t-Test: Paired Two Sample for Means</b>		
	<b>Variable 1</b>	<b>Variable 2</b>
Mean	26.6129	30.67742
Variance	43.44516	62.09247
Observations	31	31
Pearson Correlation	0.623896	
Hypothesized Mean Difference	0	
Df	30	
t Stat	-3.54599	
P(T<=t) one-tail	0.000653	
t Critical one-tail	1.697261	
P(T<=t) two-tail	0.001307	
t Critical two-tail	2.042272	

*Note: Author calculation from primary working hour data of after and before road construction*

On the basis of the collected data, working hour and road construction are correlated to each others. The average working hours before road

construction was 43.44 hour in a day while it is 62.09 hour after construction of road in the study area. Pearson correlation between these variables is 0.62 implies there is positive relationship between construction of new road and household working hour. There is positive effect of road construction since to some extent, unemployment problem can be minimized. P value is 0.001 (Two tail) indicates that it is (relationship between new road and working hour) statistically significant. Null hypothesis is rejected so that there is association between road construction and working hour of households.

The prevalence of substantial links between rural infrastructure spending, agricultural development, and scarcity alleviation, among other things, has been highlighted. Rural infrastructure investment, according to these writers, allows for the reduction of production and transaction costs, as well as the promotion of commerce and the division of labor and specialization, all of which are essential aspects for long-term economic progress (World Bank 1994). So that more working hour is the symbol of more wages, ultimately poverty reduces. Result of World Bank is similar with the finding of this research.

In the descriptive analysis, it is observed that due to the rural road there has been reduction in time to reach the market or administrative centre. Using correlation and regression analysis, we find whether the reduction in time has been significant to increase in annual savings and how much it explains the increase in annual savings.

**Table 4:** Correlation between reduction in time and increase in annual savings

		Annual increase in savings due to road facilities	Reduction in time
Annual increase in savings due to road facilities	Pearson Correlation	1	.383*
	Sig. (2-tailed)		0.037
	N	31	30
Reduction in time	Pearson Correlation		1
	Sig. (2-tailed)		
	N		30

\* Correlation is significant at the 0.05 level (2-tailed).

Note: Fieldwork, 2020

Therefore the null hypothesis that there is no significant relationship between reduction in time and increase in total annual savings is rejected. Hence, there is significant relationship between reduction in time and increase in total annual savings.

**Table 5:** Regression model Summary between reduction in time and increase in annual savings

Model	R	R square	Adjusted R square	Std. error of the estimate
1	.383a	0.147	0.116	87268.66955

*a Predictors: (Constant), Reduction in time*

*Source: Fieldwork, 2020*

The table 5 shows that the R Square is 0.147 which means that reduction in time explains 14.7 percentages of increase in annual savings. People can use their surplus time in other productive work so that their level of income increased and their level of income increased. Increase in income leads toward increase in saving in sampled households. Psychological law of consumption propounded and developed by well known British economics J.M.Keynes is true in this study. As income increase, consumption also increased but not as much as increase in their income because a part of increased income goes in saving.

**Table 6:** Regression analysis ANOVA<sup>a</sup> of reduction in time and increase in savings

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	36653687477	1	36653687477	4.813	.037b
	Residual	2.13243	28	7615820685		
	Total	2.49897	29			

*a Dependent Variable: Annual increase in savings due to road facilities*

*b Predictors: (Constant), Reduction in time*

*Source: Fieldwork, 2020*

The analysis of variance (ANOVA) table 5 shows that the p-value is 0.037 which is less than 0.05. This means that the test is significant and the regression result can be accepted. It justified that there is relationship between reduction in time for different productive work and level of saving in sample households.

## CONCLUSIONS

Roads in the urban and rural areas are very important as they provide transportation facilities. The use of vehicles takes less time to travel to the market and also reduces the cost of transportation. Surplus time can be used for productive work. This leads to the agriculture development through the easier access to market. The change in mode of transportation and decrease in cost of transportation motivates people to undertake productive activities and increase in production which helps in creation of farm self and wage and salary employment opportunities. This helps increase in savings and increases the rate of capital formulation. This has the significant impact on poverty reduction. Rural roads carry the wave of opportunities of investment in small business activities or the use of traditional skills for creation of non-agricultural employment opportunities. Such roads must be so constructed that it could provide its facilities to large number of people and ignite the economic activities so the problems prevailing income and poverty could be reduced. From this study the impacts of rural road on poverty through various factors affect the income and savings have been found out.

In essence it can be claimed that this research paper has met its objectives of studying the effect of roads and transportation facilities in the poverty reduction. It has explored that road network helps in the creation of employment opportunities, reduction of input cost, increase in production, decrease in wastage, increase in access to market and increase in savings of the households.

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