

# Examining the Influence of Rural Road Network Development on Livelihood - A Case Study on Kilinochchi District

Nirubikaa Ravikumar<sup>1</sup>, Kuhaneswaran Banujan<sup>2</sup>, and A. Aginthini<sup>3\*</sup>

<sup>1</sup>Department of Software Engineering, Faculty of Computing, Sabaragamuwa University of Sri Lanka, Sri Lanka

<sup>2</sup>Department of Computing and Information Systems, Faculty of Computing, Sabaragamuwa University of Sri Lanka, Sri Lanka

<sup>3</sup>MG-ECL Joint Venture Project Office, Kilinochchi, Sri Lanka

niru@foc.sab.ac.lk<sup>1</sup>, bhakuha@gmail.com<sup>2</sup>, aginthi03@gmail.com<sup>3\*</sup>

## Abstract

The population of Sri Lanka, an island country in the Asian zone, is projected to be about 22 million in mid-2030. In Sri Lanka, the transportation economy plays a significant role. Roads provide the benefits to enhance the socio-economic conditions of communities. Roads are linked to locations, individuals, and social and economic activities. Better road conditions promote better connections between rural and social and economic activities. While rural road investment is widely believed to reduce poverty, there has been little systematic analysis or evidence on whether rural roads affect people experiencing poverty or the impact. After the war ended in 2008, the government carried out some road projects nationwide. Kilinochchi district is also not exceptional. This study focused only on rural roads and how they relate to livelihood. A questionnaire survey was conducted, covering four dimensions; impact on (i) Transportation Services, (ii) Traveling Patterns, (iii) Village Profile, and (iv) Income and Welfare before and after the road projects in Kilinochchi District. One hundred twenty-two families were selected for the research. For the change in the aesthetic value of the village after the road development, none of the respondents rated it as reduced or reduced dramatically. Around 100 respondents accepted that school connectivity has significantly improved after road development. The study proves that road development positively impacts people's social and economic practices.

Keywords: Rural Road Network, Livelihood, Transportation Services, Traveling Patterns, Village Profile, Income and Welfare

## 1 Introduction

The population of Sri Lanka, an island country in the Asian zone, is projected to be about 22 million in mid-2030 (PopulationPyramid.net, 2019). According to recent figures from the Census and Statistics Department, the bulk (almost 17 million) of the population lives in peri-urban and rural parts of the country. Because of the lack of vibrant commercial activities and opportunities, most people in these areas remain dependent on an agricultural economy and thus earn a low income. One of the critical reasons for this turnaround is the lack of all-weather connectivity to socio-economic centers. In the 2014 Integrated Road Improvement Program (iRoad Programme), the Government of Sri Lanka (GoSL) established the need to enhance connectivity between the rural community and social-economic centres to (i) improve road conditions for selected rural and socio-economic communities and (ii) improve road

capability. GoSL has asked the Asian Development Bank (ADB) to fund the Multi-tranche Financing Facility (MFF) investment scheme (RoadDevelopmentAuthority, 2017).

In Sri Lanka, the transportation economy plays a significant role, contributing about 11% of the GDP and 20% of the service sector. Road transport is also an essential aspect of transport, and freight and rail traffic accounts for nearly 92%. The entire Sri Lanka Road network system comprises national roads (11,600 km, 12.5%), regional roads (16,500 km, 17.8%), and rural roads (64,600 km, 69.8%). Since developed countries have become more involved in the construction and growth of road transport networks and have preserved road transport infrastructure than other transport sectors (Shantha, 2019).

Roads provide the beneficiaries with socio-economic benefits. Roads are linked to locations, individuals, and social and economic activities. The

construction and extension of the road network contribute to improved ease of access and speedy mobility while reducing road expenses and travel time, and points to the need to allow the most of the economic capital required for preparing and making decisions regarding the development of roads (ADB, 2012). Road infrastructure may play an essential role in changing the socio-economic conditions of people of the area by complex externalities often created by this development (Iimi, Lancelot, Manelici, Ogita, 2015).

As well as the rural economy, with its main business activities focused on agriculture, tourism and the services sector, Sri Lanka's economy is a high priority. While almost 65% of the population lives in rural areas, the national economy makes a substantial contribution. Accordingly, road infrastructure construction in rural areas is essential. The importance of the rural road network should be commonly recognised as the country's fundamental improvement, thereby reducing the country's vulnerability. It also facilitates the supply to economic centres of its goods and improves farm efficiency by reducing user prices. Better roads will significantly reduce the cost of inputs such as fertiliser, seeds, and extension facilities for agriculture (Fan Chan-Kang, 2005). Outside, improved roads expand the reach of productive commerce, stimulating investment in agriculture to expand agricultural productivity (Cook, Duncan, Jitsuchon, Sharma, Guobao, 2004). The weak road connectivity means rural communities have less contact with the socio-economic centers.

Better road conditions promote better connections between rural and socio-economic populations. Rural road construction is, therefore, very critical for achieving fast economic growth: better road networks and more rural residents who make great efforts to ensure the country's successive survival. Therefore, Sri Lanka is critical as a developed country that realises any growth of the country. Especially projects for road growth. Rural road investment is one of GoSL's principal considerations as strategies for achieving the goals of sustainable growth. The Government of Sri Lanka contributes to this concern by introducing a major rural road investment program for all-weather access to applicable housing in rural Sri Lanka (Shantha, 2019).

The bulk of the population of Sri Lanka lives in rural and semi-urban areas. Over the past few

years, the poor focus has been paid to compulsory rural service services. The rural inhabitants experienced too many challenges when participating in economic and social practices due to the weak road conditions in the transport system. Also, lousy road infrastructure has a profoundly disconnected economic history for rural people, reducing access and competitiveness to socio-economic centers. The circumstance not only hampers quick access to essential markets but also hinders the export of their goods and high profits. By introducing a sizeable rural road investment program across the region, the GoSL has addressed this serious issue. The iRoad Program is one of the most significant projects to improve the network of rural roads and the well-being of residents. The RDA initiated the Comprehensive investment program as the project's implementation body under the direction of the Ministry of Higher Education and Highways. They emphasised improving the transport link between rural and social and economic activities (Shantha, 2019).

While it is widely believed that rural road investment reduces poverty, there has been little systematic analysis or evidence as to whether rural roads affect people experiencing poverty or how the impact is (AsianDevelopmentBank, 2002). Improved roads and infrastructure will build economic development opportunities and poverty reduction through numerous mechanisms (Khandker, Bakht, Koolwal, 2009). Rural roads and urban growth literature have highlighted impacts and consequent impacts on travel costs and rates. Rural roads will, for example, allow farmers in remote rural areas to increase their product prices and reduce their input and consumable goods prices (Mu Van de Walle, 2011).

After the war ended in 2008, the government carried out some road projects nationwide. Kilinochchi district is also not exceptional. Further, no study has been conducted on the impact of rural road network development on livelihood in Kilinochchi District. Considering this as a research gap, the proposed research was planned to assess the impact of the development of rural road networks on livelihood as a case study in the Kilinochchi District.

The Government of Sri Lanka is implementing the iRoad to improve the connectivity between rural communities and socio-economic centres by improving the transport efficiency on selected

national, provincial, and local roads. Kilinochchi District in Northern Province is the selected province for implementing the iRoad program. Kilinochchi is one of the worst conflict-affected regions, emerging from nearly three decades of war. The damage to physical infrastructure has been severe and extensive, particularly the road network in total disrepair. People in this district no longer have access to markets or essential social services as they once had, and the transport of goods has dramatically slowed. The government was reestablishing linkages to social services and markets through a robust road network essential for normal socio-economic activities and civil life to return.

In light of the transformative potential roads hold for socio-economic landscapes, especially in post-conflict zones like Kilinochchi District, this study delineates specific objectives centered around understanding the nuances of rural road development and its consequences. The primary aim is to discern the impact of the rural road network's expansion on the livelihoods of the inhabitants of Kilinochchi District. This encompasses more granular objectives: firstly, to gauge the influence of rural road development on travel patterns and transportation services; secondly, to comprehend the shifts it brings about in the village profile; and lastly, to evaluate its ramifications on income and welfare dynamics. By narrowing its scope to rural roads, the research seeks to illuminate the intricate relationship between infrastructure development and livelihood, offering insights that could inform future infrastructural decisions and interventions.

## 2 Literature Review

Rural roads and urban growth literature have highlighted impacts and consequent impacts on travel costs and rates. Rural roads, for example, can allow farmers in distant (and often poor) rural areas to obtain higher production prices and reduce input and consumer prices. This way of thinking about the impacts of rural roads says little or nothing about how rural roads can affect economic activity geographically as well and, in particular, the effect of road improvements on the local economy and institutional growth related to the economy (Mu Van de Walle, 2011). Initial circumstances are also distinguished by extremely geographically incomplete and inexistent markets in distant, poor regions. Given the high shipping

rates, these regions' goods are not affordable. Rural road project proponents also highlight their advantages in improving business growth (Gannon Liu, 1997). Rigorous proof does not seem to exist (Mu Van de Walle, 2011).

Poverty is described here as a lack of critical assets and rights and is vulnerable to frequent physical and economic shocks and seasonal crises. It also explains a state of voicelessness and the incapacity to control rural subsistence systems, organisations, and procedures. The fieldwork revolved around studying livelihoods using a methodology focused on capital assets. Five critical categories of capital assets were expected to exist, and the comparatively high vulnerabilities of such assets assessed vulnerability, shock resistance, and capacity to engage in larger institutions and processes (Asian Development Bank, 2002).

When considering the transport literature, the transport mode can be classified differently. Besides, most travel modes allow land surface, water bodies, and air services. The classification of transport (Duncan, 2007) is defined as "mode" depending on the form of transport used and is referred to as road, rail, water, pipelines, and so forth. Road transport plays a significant role in the country among those five modes. Their support for the transport sector is essential. Road transport contributes significantly to socio-economic growth (Fan, Hazell, Thorat, 1999). The socio-economic effects of road infrastructure can be described as negative and positive impacts.

On the other hand, it should be analysed primarily explicitly and implicitly. Road transportation typically included expenses for road users and expenses for road operators. Road usage charges cover car service and cost maintenance. Due to the bad traffic conditions, travel is inconvenient, and the cost of road users is rising. Effect evaluations thus consist of the systemic recognition of positive or negative improvements impacts on people, families, organisations, and the environment triggered by a particular development project such as the road program (Chongvilaivan, Taniguchi, Rabanal, 2016).

However, it can be further clarified that the socio-economic effect of the road construction project is short-term and long-term and that it is possible to infer that local, regional and national impacts also involve efficiency, technology, and

extension regarding construction. It was noted that construction impacts social sector efficiency, and the continuity of the economic operation leads to multidirectional growth by cutting transport costs and improving the environment by eliminating inadequate roads (Ravallion Jalan, 1999). Socio-economic impact evaluation for road construction discusses the various socio-economic model styles for calculating impacts (Gibson Rozelle, 2003).

A household survey based on the pre-project baseline NH2 road in India was carried out by Raychaudhuri (2004). The research architecture consisted of two-stage stratified sampling methods for probability. The village and households were two-stage units. According to the study's findings, 30 variables were described and grouped into seven dimensions. Of the 30 outcome factors, only 15 obtained a simple expectation that socio-economic well-being was higher in the vicinity of NH2. Between 1989 and 2006 (Balisacan, Pernia, Asra, 2003), 56 research areas were undertaken in Thailand to explore the linkages between road network growth and land cover dynamics, with specific regard to the province of Lop Buri. Network analysis and graph theory were used to research networking on the path. The Tau (T) test from Kendall (Ferguson, Genest, Hallin, 2000) and the pair test from Wilcoxon (Woolson, 2007) were utilized. The results suggest that the overall length of roads in the research area has been expanded, but there was no improvement in accessibility as they wished. Established or renovated roads may not be linked to existing roads.

Van de Walle (2000) conducted a Rural Road Impact Research System. questionnaires from 288 farm households were reviewed and basic knowledge was collected through interviews. Van de Walle (2000) wanted to estimate if it affected rural household production and revenue. The Ordinary Least Square technique was developed to approximate the critical parameters. According to the author's findings, rural roads have significant implications for on-farm production, lower transportation costs, and raise rural profits. In addition to an excellent positive input on production, revenue is due to increased road safety. Ravallion and Jalan (1999) concluded that the A7 motorway and the regional GDP growth positively impacted in 2000. Motorways were a significant contributor to total regional GDP and raised the income of people and property valuation. Chongvilaivan et al.

(2016) indicate that it saves travel time for work thanks to better road conditions.

Road upgrades cause primary and indirect impacts and can affect them at state, global, or international levels. Thanks to improvements in road networks, the categories of beneficiaries are expanded. Local farmers, urban residents, domestic manufacturers, and international visitors are considerable sites for human well-being and indirect consequences. Better road standards continue to lift households' or individuals' wealth and well-being. It contributes to lower household vulnerability. (Health, schooling, social interactions and engagement, new work opportunities). Ravallion and Jalan (1999) clarified whether the program on rural roads in Peru brought about gender transition. The study revealed that their travel time has decreased because rural roads have been improved. It has participated in access to health care and education. However, excessive drug rates discourage women from using these facilities.

Progress is the most critical global development target. To this end, he highlighted the relationship between transport and growth. Transportation is thus the main part of the growth of every nation or culture (Balisacan et al., 2003). "Transports can, therefore, be regarded as an important component of the economy which affects the development of population welfare" (Balisacan et al., 2003). Good transportation management leads to more significant economic and social opportunities and benefits. If the transport sector is ineffective, people must bear financial and social costs and reap lost opportunities (Shantha, 2019).

Various approaches are used for assessing various hypotheses and methodologies for measuring the effects of road infrastructure construction. Most observations are similar, and the analysis dilemma has the same effects. Due to the growth of road infrastructure, the socio-economic progress of human well-being and many impacted lifestyle areas are modified. However, less of the scientific context in this field is that the current theory has not yet improved under recent changes. The outcomes of the road investment program would make specific improvements for the people living in the region of the investment scheme. This improved their quality of living and changed regional growth that correlates to national development. The theoretical context should incorporate new findings

and discussions (Shantha, 2019).

The paper by Mu and Van de Walle (2011) focuses on three issues. The first concerns the average effect of rural road restoration on local business growth. The program of the World Bank coincided with a period of fast economic growth in Vietnam. Access to different types of markets has significantly improved over the study period. How much improvement can be due to road interference in neighbourhoods covered by the project? Another similar concern is how impacts differ over time. If the cost savings on transportation are adequate and the types of costs and agglomeration effects noted above occur, we plan to increase the impacts of the road project over time. There is no evidence on this issue. Our data allow us to assess whether this is the case (Mu Van de Walle, 2011).

Their second collection of questions concerns cross-communal variations in the project's effect on local markets and the reasons for those variations. The economic, social, and political characteristics of the society where road interventions exist may rely on the heterogeneity of the impacts. They aim to assess heterogeneity and define contingent factors' main effects (Mu Van de Walle, 2011).

In this sense, it is theoretically necessary to understand whether higher levels of initial growth increase or decrease their impacts. Should we prioritise well-off areas and business institutions required for more economic growth since their results are higher, or should we concentrate our efforts on areas without those attributes? In reality, contractor selection always seems to be attempting to benefit poor regions and poor road conditions. Poor places seem to start with less business growth. This alone would suggest that the effect of roads on business growth in deprived areas is more likely. However, deficient regions are often saddled with characteristics that may discourage markets from attracting them. The extent to which lousy road conditions correlate with other primary bottlenecks for expanded growth and business operation, such as inadequate agro-climate resources, a low population density, low educational quality, high risk, low-functioning credit, and other markets, would mediate the consequences of community-wide road enhancement. There is no clear explanation of why TILD would improve location in poor areas with poor roads. The project design will also need to consider complementary inputs and policies to

obtain all possible benefits from the route, based precisely on how the route benefits depend on the initial conditions (Mu Van de Walle, 2011).

This refers to our third series of questions that contribute to the structure of the inter-common effect disparities. At least in theory, it is well understood that the same action will have varying consequences, based on their features, on various places and buildings. However, where several results of significance occur and cannot be merged into one consequence (as is always the case in the project assessment), the policy consequences of such a variability depend essentially on whether they have a similar framework through the various outcome variables. For example, suppose communes with better-trained households tend to have greater effects on superior access in all forms of markets. In that case, a strong inference may be taken on the benefits of targeting specific communal covariates. If the related causes of cross-community effect variations vary considerably across several results, variability is challenging to manipulate to ensure better ventures (Mu Van de Walle, 2011).

### 3 Methodology

Since the research focuses on survey analysis, the generic steps were followed in survey research (Palvia et al., 2004).

#### 3.1 Description of Study Area

Kilinochchi district is selected as the study area of the research. Kilinochchi is one of the worst conflict-affected regions, emerging from nearly three decades of war. The damage to physical infrastructure has been severe and extensive, particularly the road network in a state of total disrepair. People in this district no longer have access to markets or basic social services as they once had, and the transport of goods has dramatically slowed. The government was reestablishing linkages to social services and markets through a robust road network essential for normal socio-economic activities and civil life to return.

Kilinochchi District belongs to the Northern Province of Sri Lanka. Kilinochchi District is situated in the middle of the Northern Province. The borders of the district are as follows;

- The North boundary is Jaffna District,
- East and South Boundary is Mullaitivu District,
- The west and South boundary is Mannar District.

It has four Divisional Secretariat Divisions (DSD) under it, with an area of 1349.5 km<sup>2</sup> (NPC, 2017). The following are the four DSDs in Kilinochchi District: (i) Karachchi DSD, (ii) Kandawalai DSD, (iii) Poonakary DSD, and (iv) Pachchilapalli DSD. Figure 1 shows the Administrative Map of Kilinochchi District with DS Divisions.

The iRoad program connected 1000 Divisions (GNDs) as rural hubs of the country through better road network conditions. The project mainly focused on rehabilitating existing carriageways to correspond to all weather conditions. The developments have been done within the available corridor of the selected roads. Also, this project avoided the land acquisition and Involuntary Resettlement (IR). The ADB's Multi Tranche Financing Facility (MFF) has provided loans to Sri Lanka for the Integrated Investment Program (Shantha, 2019).

### 3.2 Sampling Method and Sampling Procedure

According to the Annual Performance Report and Accounts Report, Kilinochchi District by District Secretariat – Kilinochchi, the total population in Kilinochchi District is 142,681, with 44,326 families in 2017.

A stratified random sampling method was chosen for the research. In this method, the population is first divided into subgroups (or strata) in this system that all share a common characteristic. It is used where the interest calculation can reasonably be assumed to differ between the various subgroups, and we want to ensure representation from all the subgroups. Stratified random sampling, by reducing sampling bias, increases the precision and representativeness of the results.

In the context of Kilinochchi, the four DSDs, (i) Karachchi DSD, (ii) Kandawalai DSD, (iii) Poonakary DSD, and (iv) Pachchilapalli DSD, are the strata. Then, the families were selected randomly to represent each stratum in the ratio of

the existing families. A total of around 160 families were interviewed to fill out the questionnaire. However, due to data inconsistency and incompleteness, only 122 families were incorporated into the study.

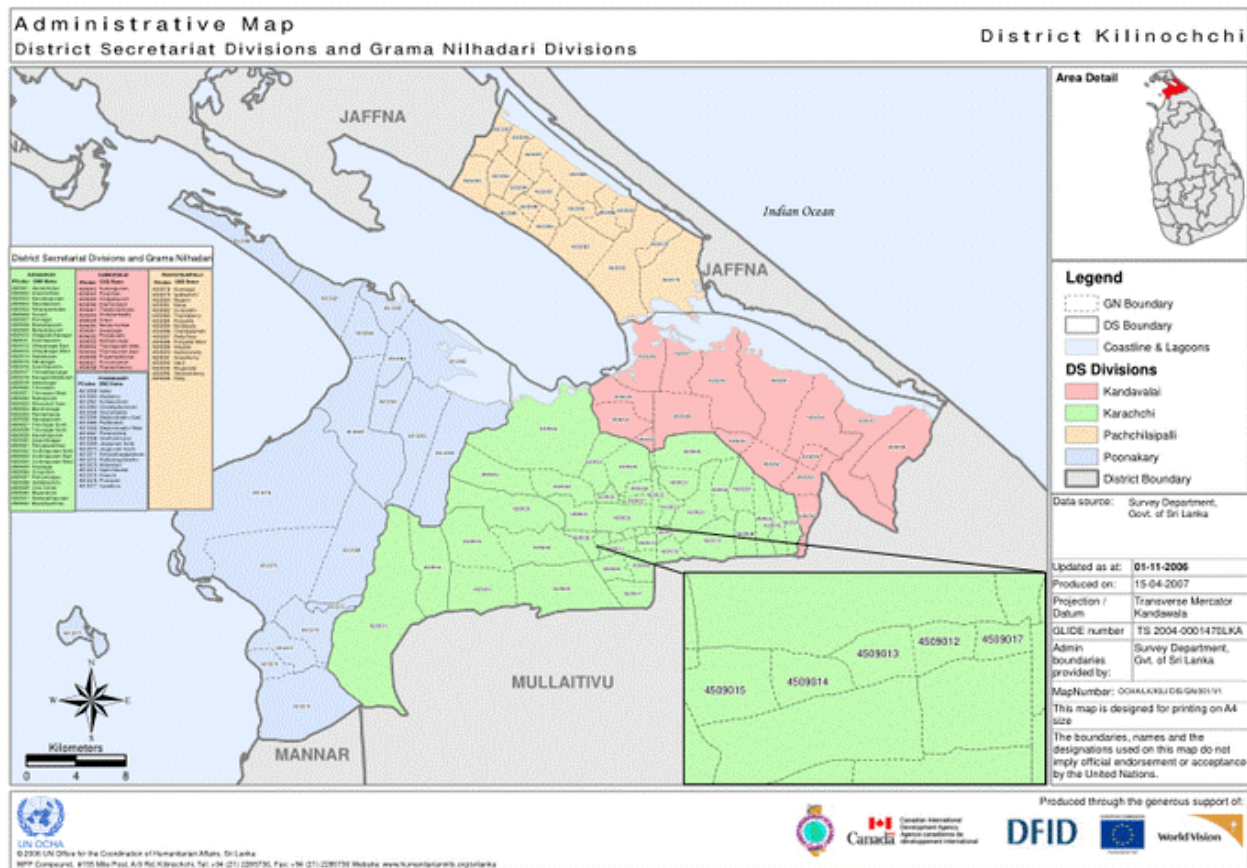
Here, it was planned to have the samples in the ratio of families in each DSD with a total of 200 families. That is, 110 families from Karachchi DSD, 36 from Kandawalai DSD, 32 from Poonakary DSD, and 22 from Pachchilapalli DSD to improve the accuracy and representativeness of the results. However, due to the limitations of the current situation and workload in the office, it was unable to achieve.

### 3.3 Instrument and Scaling

The questionnaire (Appendix A) is employed as the study instrument. A questionnaire is “A technique for gathering statistical information about a population’s attributes, attitudes, or actions by administering standardised questions to some or all of its members” (Preston, 2020). Questionnaire surveys are a technique for gathering statistical information about a population’s attributes, attitudes, or actions by a structured set of questions. After the extreme literature review on related studies (AsianDevelopmentBank, 2002; Corral Reardon, 2001; Escobal Ponce, 2008; Iimi et al., 2015; Khandker et al., 2009; Mu Van de Walle, 2011; Shantha, 2019; Van de Walle, 2000), along with the indigenous knowledge of the area (since the researcher lives in Kilinochchi), the questionnaire for the survey was formulated.

The questionnaire contains five main parts. In Part A, question number 1 to 7 comprises demographic details such as the number of family members, highest education qualification of correspondence, and family income sources. Here, correspondence of the house was taken as the family’s representative. The remaining questions were divided into four parts to reflect the research objectives.

Part B consists of questions reflecting the transportation services, while Part C comprises questions to analyse the travel patterns of the households. The model of vehicle of the children to school before and after the development of rural road network, the Likert scale to rate the improvement in cost for transportation (own vehicles) after the development of rural road network, the Likert scale to rate the impact on travel time after the development of rural road network, the Likert scale



**Figure 1:** Administrative Map - Kilinochchi District - DS Divisions

on to rate the improvement on the road safety after the development of rural road network are some of the questions utilised in the above parts. (RO: To find the impact of the development of rural roads on travel patterns and transportation services.)

Part D contains questions to analyse the Village Profile. The value of the land of your area per “Parappu” (1 acre = 16 parappu) before and after the development of the rural road network, the Likert scale on the connectivity of the schools, hospitals from the respondent’s house before and after the development of rural road network, the Likert scale on improvement in the aesthetic value of the village after the development of rural road network are some of the questions utilised in the above parts. (RO: To find the impact of the development of rural roads in the village profile)

Part E consists questions reflecting the change in income and welfare. The Likert scale to rate the increment in household income after the development of rural road networks and the Likert scale to rate the reduction in the cost of living after the development of rural road networks are some of

the questions utilised in the above parts. (RO: To find the impact of the development of rural roads on income and welfare.)

### 3.4 Data Analysis

The questionnaire was analysed for summary details using spreadsheet software to visualise the results. Different types of graphs were utilised for this purpose.

## 4 Findings and Discussion

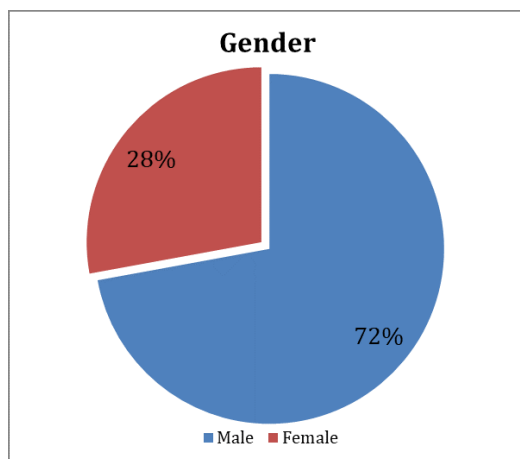
The research survey does not seek to calculate household revenue or consumption spending. Various authors have discussed the relationship between poverty reduction and rural infrastructure provision from a macro perspective. Among others, point out the existence of strong linkages between rural infrastructure investment, agricultural growth, and poverty reduction. These studies draw evidence from Southeast Asian countries like Indonesia or Malaysia, where a massive increase in rural infrastructure was followed by a long period of economic growth and a dramatic reduction in rural

poverty. Although the causal connection is not established, they suggest this would have happened due to the impact of infrastructure investment on the rise of agricultural productivity and the creation of new job opportunities.

This section explains the main impacts that can be expected shortly after road improvement and other time-consuming impacts, along with the results obtained. The proof of each form of result from independent research sites offers valuable hints on how project strategies can impact poverty-related problems caused by road construction alone and other problems that need additional poverty reduction steps.

#### 4.1 Demographic analysis of sample households

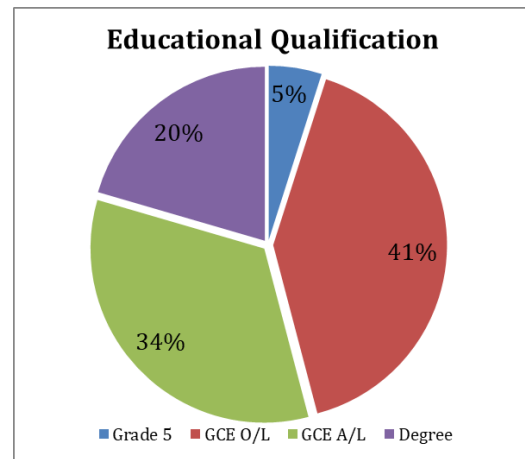
Figure 2 shows the gender ratio of the respondent. There were 72



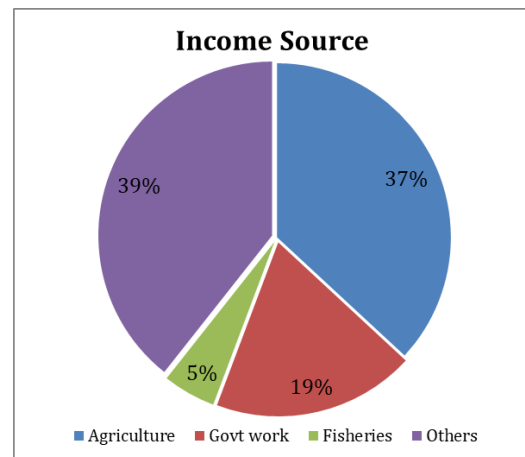
**Figure 2:** Gender of the respondents

Figure 3 depicts the maximum educational qualification of the respondents. There were 20% degree holders and 34% with GCE A/L as their maximum educational qualification. While talking to the respondents, most of those with less than GCE O/L as their educational qualifications mentioned that they discontinued their education because of the civil war.

Income is money (or any equal value) earned by a person or corporation, usually in return for providing a product or service or by spending cash. Figure 4 shows the primary income source of the respondents. The primary income source of 37% of respondents falls in the agriculture category. Since Kilinochchi is situated in the middle of the island, there were fewer fishing sources of income.



**Figure 3:** Maximum educational qualification of the respondents



**Figure 4:** Primary income source of the respondents

#### 4.2 Impact on Transportation Services

A widespread conventional theory guiding rural road growth is that investment in infrastructure will spontaneously lead to the provision of transport facilities to the private sector, and this, in turn, will lead reasonably rapidly, by competition, to the provision of cheaper and improved transport services for all (Shantha, 2019). Case studies show that many transport modes have appeared at all project sites, and travel time has dropped dramatically. By extension, rural roads also cover remote areas, where there might be long stretches to more urbanised centres, low population density, and imperfect consumer data and demand. The sustainability of the dominant transport markets depends heavily on both the growth of available transport and lower transport rates. There is no opportunity for transport suppliers to develop their

quality or pass their cost savings on to customers without competition.

Figure 5 illustrates the analysis of transportation to school before and after road development. Walking is the primary method of transport, but people experiencing poverty still use bicycles where they can obtain access to them. Poverty is exacerbated for those in control zones where remoteness and alienation are stronger. Further, it can be recognized that the mode of transport has been shifted to motorcycles, public vehicles, and three-wheelers after road development.

Figure 6 portrays a reduction in the cost of transportation after road development. 16% and 29% of respondents mentioned the high cost reduction, respectively. When the data were analysed along with the respondents' conversation, those who said the cost reduction is low, very low, or the same as previous are travelling less distance than others.

### 4.3 Impact on Traveling Patterns

Figure 7 shows the impact on travel time after road development. Eighty-nine respondents stated that the travel time was reduced after the road development. According to the discussion with respondents, those who travel long and short distances felt that travel time is reduced.

Figure 8 depicts the rate of accident records after road development. Forty-nine respondents mentioned that there is an increase in road accidents. Further, when it was discussed with them, it was mentioned that because the roads are of good quality, most youngsters tend to drive faster. Besides, some of the roads' borders were not correctly flattened. Therefore, it also paved the way for the accident. 48% of respondents believed that road accidents were reduced. Their arguments say that the quality of the roads helps to drive peacefully.

Men and women have varying domestic duties in all of the sample areas. As such, they still had diverse habits and needs for transport and travel. Responses confirm that women are perceived to be mainly responsible for household activities and are expected to spend more time on these activities. Men and women have varying travel habits, duties, and obligations within and outside society.

### 4.4 Impact on Village Socio-economic Profile

Improved roads boost general purchasing and sale opportunities and the climate, especially for visiting buyers. Further, improved roads pave the way for quick access to important places such as schools, markets, and hospitals. Therefore, it will automatically favour the demand of the land. Road investments have had significant indirect impacts on the general level of economic development. Improved roads and the capacity to transport goods offer opportunities for those who can afford the investment to open a small village shop or buy or produce their village items and sell them in local market centres. In their former jobs, they still save people time, encouraging others with the skills and savings to participate in other small businesses.

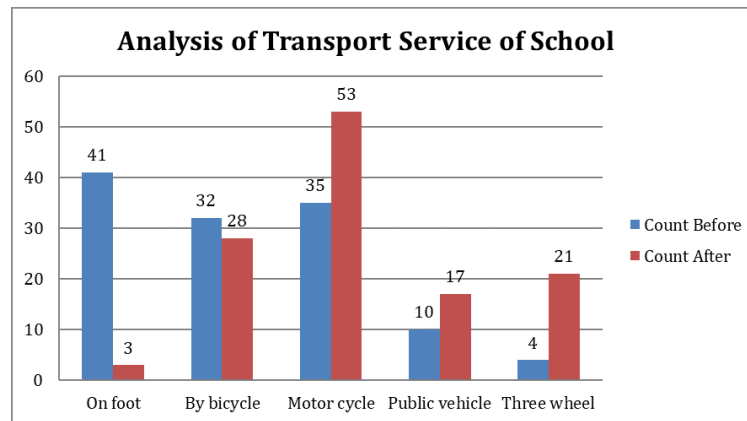
Figure 9 illustrates the land's value estimate before and after the road development. From the figure, it is seen that the price of the land increased higher values when compared to before the road development. Agricultural lands show considerable variation. The graph is scattered because of the price variation in various areas.

Figure 10 shows the connectivity to various places before and after road development. In the study, the researcher mainly focused on schools, hospitals, government institutions, and workplaces.

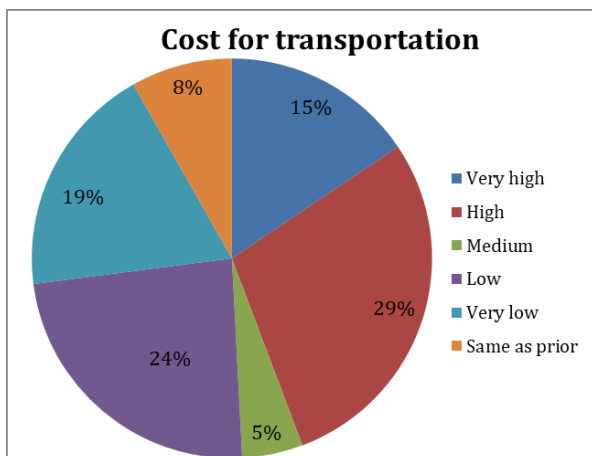
According to the above figure, it is clear that there is no selection of "Poor" after the road development. Also, around 30% of respondents mentioned that connectivity is very high for schools. Here, connectivity is measured in the context of the respondents' homes. Figure 11 describes the village's aesthetic value change after the road development. No wonder none of the respondents rated for reduced or reduced dramatically.

Figure 12 depicts the results of respondents in the change in infrastructure development of the village after the road development. None of the respondents also rated for 'reduced dramatically'. But 0.02% of respondents had chosen 'reduced'. As they mentioned, in their area some of the trees were removed because of the road project.

The responses to the change in the development of industrial sectors in the village after the road development are shown in Figure 13. As expected,



**Figure 5:** Analysis of transportation to school before and after road development



**Figure 6:** Reduction in cost of transportation after the road development

none of the respondents rated for 'reduced' or 'reduced dramatically'.

#### 4.5 Impact on Income and Welfare

A more excellent supply and mix of transport networks and an improved movement of goods and services have been noted. The studied project sites are predominantly farming populations and, thus, are vulnerable to natural shocks or product price fluctuations. Therefore, their capacity to diversify into other sources of income is necessary to minimise poverty. Of course, those who are more comfortable and have savings can make the maximum use of the possibilities improved roads can offer. The multidimensional concept of poverty used in the study assumes that the reduction of poverty will benefit from improvements in sources of income and greater exposure to social services. Income diversification will mitigate exposure to external shocks. Improving rural roads will create

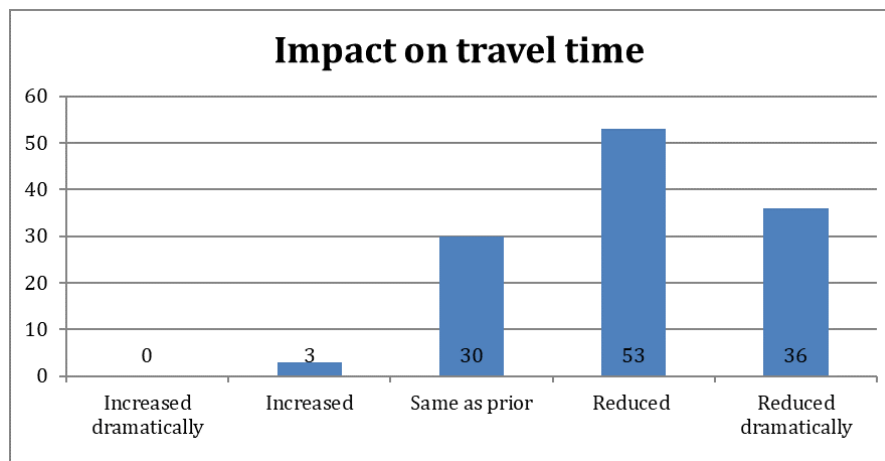
new income-generating opportunities and increase access to critical services. This chapter provides data from case research on improvements in sources of income and healthcare and how these changes apply to various social classes.

Figure 14 describes the ratings for the increment in the household income of the village after the road development. 84% of the respondents proved that their income had increased more than the previous.

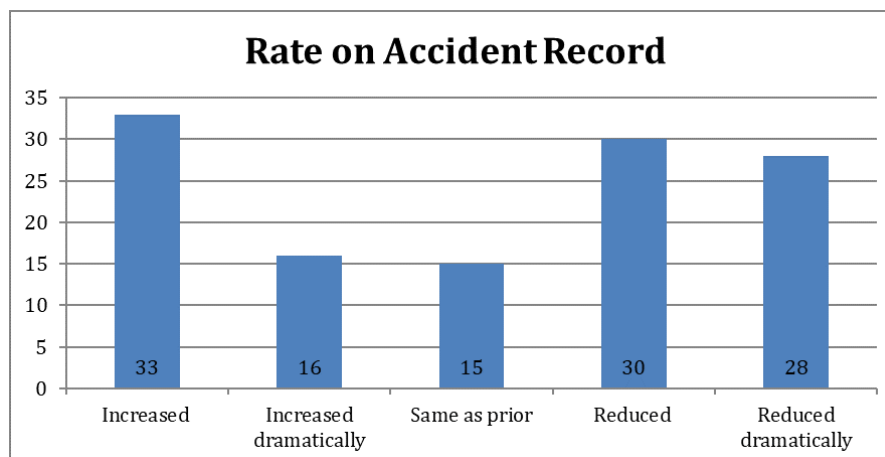
The reduction in the cost of living in the village after the road development is depicted in Figure 15. Approximately 10% of respondents indicated that their poverty has only slightly decreased their cost of living. Here, a reduction in the cost of living increased means the cost of living has reduced.

Numerous authors have addressed the link between poverty reduction and the provision of rural infrastructure from a macro perspective (Ahmed Donovan, 1992; Chongvilaivan et al., 2016; Corral Reardon, 2001; Iimi et al., 2015; Shantha, 2019). Most of them point to solid ties between investment in rural infrastructure, development in agriculture, and poverty reduction. These studies are focused on evidence from countries worldwide, such as Indonesia, Brazil, and Malaysia, where long periods of economic growth and a drastic decline in rural poverty have accompanied a significant increase in rural infrastructure. Although the causal relation is not well known, they propose that this may have resulted as a result of the effect of improvements in infrastructure on the growth in agricultural production and the development of new employment opportunities.

Development in agriculture and poverty re-



**Figure 7:** Impact on travel time after the road development



**Figure 8:** Rate on accident records after the road development

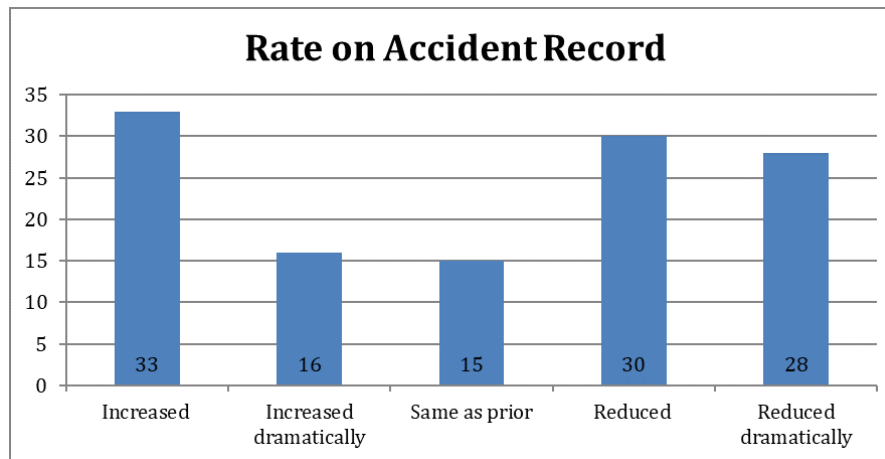
duction is the major outcome catalysed by improvements in travel patterns and transportation services, village profile improvements, and income and welfare. Via several methods, better roads and utilities will generate opportunities for economic development and poverty reduction. Roads minimise the cost of travel and the cost of buying and manufacturing goods and services. Improved roads will also expand farm and non-farm production with better access to markets and technologies through the improved supply of related inputs and lower input costs.

Most residents have a greater understanding of the socio-economic consequences associated with road upgrades. They almost agree with the improvements in these impacts. Improving road safety, saving travel time, reducing housing costs, improving social infrastructure, and developing transit services are 100% of the social and economic impacts perceived. They already know about the

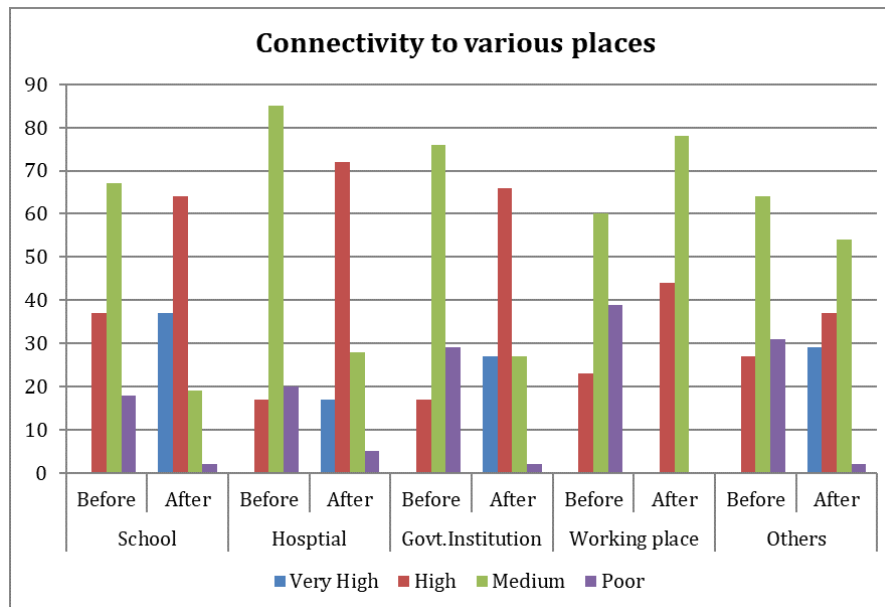
benefits of better highways, according to the locals,

According to the report of Enumeration of Vital Events, Northern Province by the Department of Census and Statistics Ministry of Finance and Planning, the total population in Kilinochchi District is 104,029, with 34,384 families in 2011. Further, according to the Annual Performance Report and Accounts Report, Kilinochchi District by District Secretariat – Kilinochchi, the total population in Kilinochchi District is 142,681, with 44,326 families in 2017.

In 2011, immediately after the civil war ended, there was less population than the latter. The researcher assumes that the development of the rural road network also paved the way for the increase in the population in different ways.



**Figure 9:** Estimate of the value of the land before and after the road development

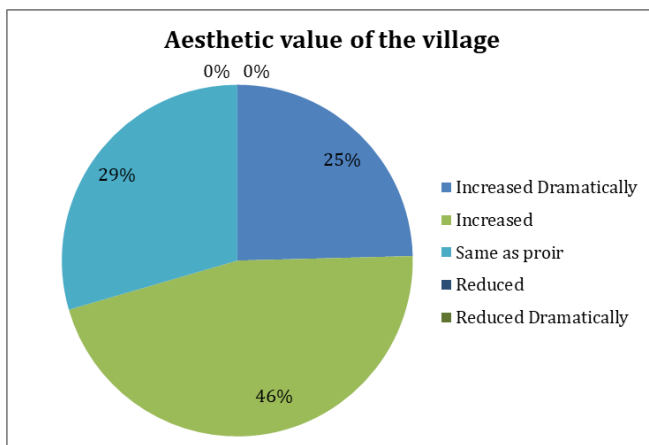


**Figure 10:** Connectivity to various places before and after the road development

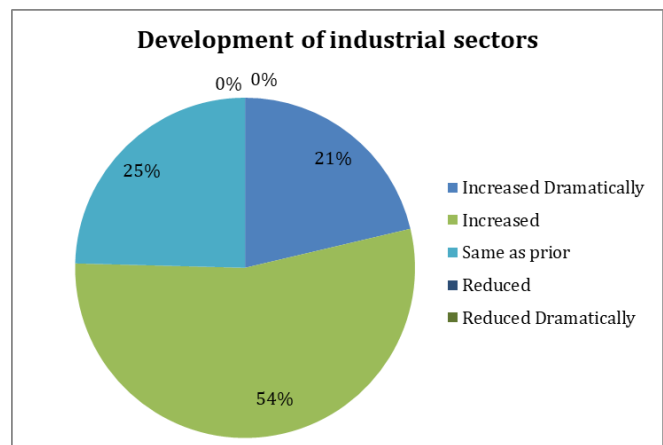
## 5 Conclusions and Recommendations

The study established that, as a major source of livelihood, the study region is predominantly concerned with agricultural activities. Nevertheless, some are pushed to employ numerous jobs in which the agricultural sector has been stable. The study shows that household income has increased relative to the prior and current duration of the road construction program. As well as the majority of families, since the Road Improvement initiative, their family income has risen. Since road improvement, residential, industrial, and farmland prices around the study area have risen dramatically.

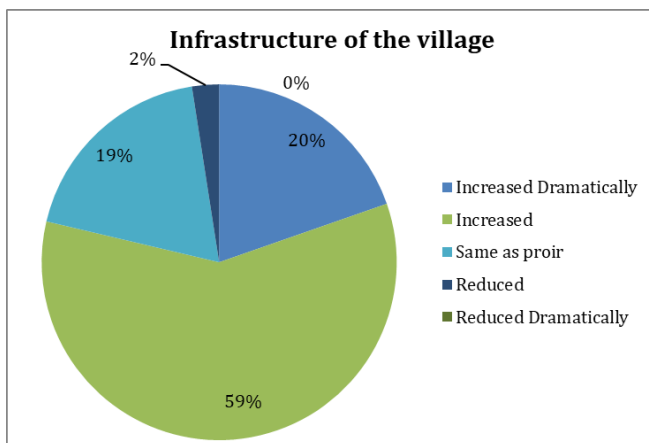
In comparison, people in the project region must drive a significant distance (2 km to 20 km) to access socio-economic centres. The study offers proof of improvements in the mode of travel and progress in using private cars. By using their motorbikes, most road users have modified their usual mode of transport and migrated to a simplified mode of transport. Owing to higher bus fares, the use of private cars is cheaper than the use of public transit. The study shows that road users' expense has decreased due to improving road conditions. The study depicts that road users' expense has decreased due to improving road conditions. The research studied the reduction in travel time of beneficiaries who use better roads by contrasting the preceding and existing road conditions.



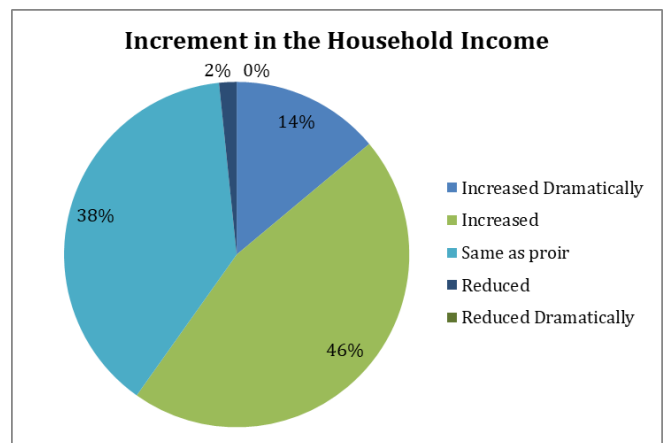
**Figure 11:** Aesthetic value of the village after the road development



**Figure 13:** Development of industrial sectors in the village after the road development



**Figure 12:** Infrastructure development of the village after the road development



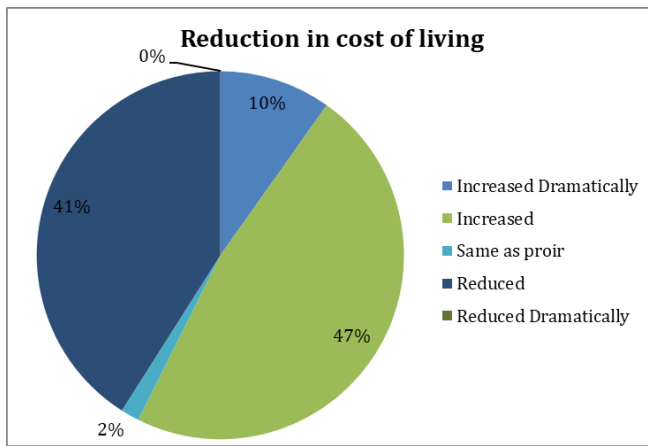
**Figure 14:** Increment in the household income of the village after the road development

As well as expanded road networks, the benefit of certain firms in the study region has been limited. Since the road improvement was well managed, it offered simple and convenient access to the area. Many households are often able to buy goods and services from the region through the use of reliable transport. Most people who live in the research area are happy with the building of roads. The study represents that different socio-economic impacts exist with road infrastructure construction. Well-enhanced or controlled road networks are often encouraged to address transport-related issues while improving citizens' welfare.

The study concludes that the effect of road construction on the social and economic conditions of people living in the project region is changing. Among these improvements, the most positive impacts on household revenue, land valuation, saving

travel time, use of private cars, job opportunities, and socio-economic core connectivity are made. However, road construction harms trade along the enhanced road due to accelerated access to the area. Besides, most beneficiaries are aware of road growth's social and economic effects.

There is a need to increase local and foreign investment relevant to infrastructure growth, and suitable policies should be followed. More conducive policies should be adopted to encourage more investment in the growth of countries by policymakers. The government should aim to act in compliance with the goals of stakeholders or donors. The government should pay more attention to community growth to achieve sustainable development by encouraging the extension and reconstruction of rural road networks. More road investment projects are primarily considered by neglecting social, fiscal, and environmental effects



**Figure 15:** Reduction in the cost of living in the village after the road development

on engineering aspects. They must, though, be cautious about the impacts that occur due to road investment. For the safety of road users, signboards, slope areas, sharp curves, and steep slopes should be concentrated on when building the road network. Given the rural road network, many bridges and certain culverts do not have guard rails or broken guardrails. Thus, priority should be given to designing those specifications.

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