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The Impact of Road Development on Livelihood Implication Among Rural Community: Sri Lankan Experiences

A.ArunaShantha
Department of Economics and Statistics, Faculty of Social Sciences, Sabaragamuwa University of Sri Lanka, Sri Lanka
Corresponding Author:A.ArunaShantha

Abstract: Like many other economic and social activities that are intensive in infrastructure, the transport sector is an important component of the economy impacting on development and welfare of the people. Transport plays a major role in the Sri Lankan economy, contribution approximately 11% of GDP and 20% of the service sector. Also, Road transport is the one great part of transport and it for about 92% of both freight and passengers transport. During recent decades, many road development project were implemented in rural areas and IROAD project is big investment in rural area. The IROAD project is connected 1000 GramaNiladari Divisions (GNDs) as rural hubs of the country throughout the better road network condition. The main objectives of this study was to explore the socio economic impact of IROAD project on rural households who are living in the project area. The study concludes that road development influence to change social and economic activities people who are living in the project area. Among these changes, the most positive impacts are made on household income, land value, travel time saving, private vehicle usage, employment opportunities and connectivity of socio-economic centers

Keywords: Rural Poverty, IROAD Project, Livelihood Implication, Infrastructure Development,

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I. INTRODUCTION

Transport plays a major role in the Sri Lankan economy, contribution approximately 11% of GDP and 20% of the service sector. Also Road transport is the one great part of transport and it for about 92% of both freight and passengers transport. Roads are primary and necessary mode of transport in Sri Lanka. The whole road network system of Sri Lanka exists of national highways (11600 km 12.5%), provincial roads (16500 km 17.8%)and rural roads (64600 km 69.8%).Since the independence ,the successive states have paid more attention on constructing, developing , rehabilitating ,widening and maintaining road transport infrastructure than other transport sectors..

Roads are provided socio economic impact for the beneficiaries. because of they connect with places, people, social and economic activities. The development and expansion of the road network, it leads to increase easy access and quick mobility while reducing road user costs and travel time.(ADB, 2012) point out that the building of new roads rehabilitating of existing roads and upgrading of road infrastructure all involve the use of economic resources which has to be taken in consideration when planning and making decisions on development of roads. Road infrastructure can play a significant role in changing the socio economic conditions of the people of a region through dynamic externalities that such development often generates (Atsushi, Eric, Isabela, & Satoshi, 2015)

As well as Sri Lankan economy gives high priority for the rural economy it consists with major economic activities, those are based on agriculture, tourism and service industry. Although nearly 65% of the population lives in the rural area and national economy is indeed their high contribution. According to that development of road infrastructure is essential requirements in the rural area. The importance of the rural road network should be widely identified as fundamental development to the country thus it helps to reduce vulnerability of the rural people. It also supports to deliver their products to the economic centers and it effects to increase agricultural productivity through lower user cost. In case of the agriculture sector ,better roads can significantly reduce the cost of inputs such fertilizers , seeds, and extension services (Fan & Chan, 2005) .On the outside ,better roads increase the scope of profitable trade , which in turn encourages on- farm investments to raising agricultural production (Cook, Duncan, Jitsuchon, Sharma, & Guobco, 2005). Rural communities have less connection with socioeconomic centers due to the poor road infrastructure .It is strongly effect to their lifestyle lead to minimize their satisfaction. Better road condition facilitates to improve connectivity between

rural communities and socio-economic centers. According to that, rural road development is very important to achieving the high economic growth. Better road infrastructure and higher rural population which makes a great effort to accomplish successive survival of the country. So that, Sri Lanka concerns as developing country which realize development of the country each and every development is very significant. Especially Road development project. Among those investments, rural road investment is one of the main considerations of Government of Sri Lanka (GoSL) as strategies towards fulfilling the sustainable development goals. The Government of Sri Lanka is committing this concern through execution of country broad rural road investment program- intent at providing all weather road connectivity to applicable habitations in Sri Lanka's rural areas.

Most of the Sri Lankan population lives in rural and semi urban areas. Over the Past few years, poor attention is given for the obligatory infrastructure facilities in the rural area. Rural population faced so many difficulties due to the bad road condition of the transport infrastructure, when they are engaged with the economic and social activities. Also poor road infrastructure has highly interrupted spread economical background of the rural population and limited their connectivity with socio economic centers as well as it badly effect their productivity. Not only easy accessibility to the vital markets but also selling their products while earning high profit are hindered due to that situation. The Government of Sri Lanka has afforded to solve this serious problem by implementing spread rural road investment program all over the country. Integrated Road Investment Program or iRoad program is the one of the great program which makes classy effort to develop the rural roads network and humans' well-being. The Integrated Investment Program which was implemented by Road Development Authority (RDA) under the guide of Ministry of Higher Education & Highways as the executing agency of this project. Their focus of attention was the improve transport connectivity between rural communities and socio-economic centers.

The IROAD connected 1000 GramaNiladari Divisions (GNDs) as rural hubs of the country throughout the better road network condition. The project mainly focused on the rehabilitation of existing carriageways to correspond all weather conditions. The developments have done within the available corridor of the selected roads. Also this project was avoided the land acquisition and Involuntary Resettlement (IR).The Asian Development Bank's (ADB's) Multi Tranche Financing Facility (MFF) has provided loans to Sri Lanka for the Integrated Investment Program . The ADB financed up to $ 800 million equivalents. The Government of Sri Lanka has involved this financing procedure by providing $106 million for feasibility study, engineering, tax and duties as well as part of the contingency. This project's construction and maintain handle contract packages per district. The relevant contractor has great responsible for construction the selected road over 2 years and maintenance for another 3 years. The developments have undertaken totally within existing Right Of Way (ROW) which is between 2.5m to 5.5m . The contractor should be rehabilitated pavements, road surface, construction of side drains and embankments, develop of culverts and bridge. This project mainly attention of the community participation for the project works. Rehabilitation of the selected rural roads were based on some criteria.

Under this rural investment program was ,paid many more caution for the road safety measures including signboards, speed breakers, guard stones and road edge demarcation and demarcation of pedestrian crossing.. etc. Southern, Sabaragamuwa , North Central , North Western provinces and

Kaluthara District in Western province are the selected provinces which implementation the theiroad program. This rural investment program is now implementation stage on some provinces. This project contributed to achieve Government of Sri Lanka's key development goals by reducing the rural poverty and come up the with considerable economic growth. It gives great support to improve access to economic opportunities and cover up the vital socio economic facilities such as social, health education and so on.

Objectives of the Project

Specific objectives of this project are:

•To improve the road condition between rural communities and socioeconomic centers of the selected provinces.

•To upgrade and maintain the maintain the 1,344km of rural roads connecting rural communities to all weather standard.

•To improve connectivity between production centers and market places and improve linkage with the other districts and provinces.

•To open up rural areas for development

•To reduce rural poverty through improved access to markets and economic centers social, health, and education infrastructure and new employment opportunities.

Statement of the problem

Still Sri Lanka is the third world developing country with GDP growth rate averaged 6.07% from 2003 until 2016 and GDP per capita can be mentioned as $ 3759.20. According to that, country development is the essential requirements for human well-being. Many more development programs are implementing to achieve

the development goals in Sri Lanka. Among those development programs, road infrastructure development takes important places, because its impacts spread all over the country and obtain more facilities to the people.

In recent years, more investors' interest to invest the road development projects specially attention of the rural area. In Sri Lanka 65% of the people are living in rural areas. Also, their contribution is very much important in economic growth. The Government of Sri Lanka's main aim is to poverty alleviation by improving infrastructure facilities. In that case one of the steps is implementing road development project by the government. Road infrastructure is the key component to achieving the sustainable development to the country. Through the road investment program, people who are living in the project area can be gained access to better markets, better services, better economic opportunities, better access to education and health facilities as well as better living standards. Gannon and Liu ,1997 argue that rural roads are key to raising living standards in poor rural areas Considering those impacts and outcomes country can realize their expected goals.

It is essential to expedite how much effective Road development projects to people in Sri Lanka. Also it is much important to find out that how those changes will affect their livelihood, social and economic life. Also it is necessary for evaluating the socio economic impact of rural road project and Decision makers can be used those results and analysis to take proper decisions. Hence, the main objectives of this study is to Explore the socio economic impact of people who are living in the project area and to identify whether there is any changes of household income of people who are living in the project area.

II. LITERATURE REVIEW

When consider the transport literature, mode of the transport can be classified in various ways. Also, Most of the transport mode are facilitating services on the land surface, water body and in the air. According to the (Duncan, 2007), they defined as 'mode 'in transport context is classification based on the type of transport used and is named as road, rail, water, air , pipelines..etc. .Among those five modes, road transport plays major role in the country. Their contribution is the vital part for the transport sector. Road transport is highly contributed to socioeconomic development for the people (Fan, Peter, Hazell, & Sukhdeo, 1999). Road infrastructure socio economic impact can be identified as negative and positive impacts. On the other hand, it can mainly discuss with direct and indirect impacts. Usually road transport has been occurred road user costs and road managers costs. Road user cost consists with vehicle operating and maintaining cost. Due to the poor road condition, traveling become uncomfortable manner and rise costs of road users. Therefore, impact evaluation is a systematic identification of whether positive or negative, changes, effects outcomes on individuals, households, institutions and the environmental caused by a given development activity such as a road program (Chongvilaivan, Kiyoshi, & Rommel, 2016)

Nevertheless, socio economic impact related to road development project, can be explained with short term and long term impacts, further more conclude that local, regional and national impacts Moreover quality, technology and expansion include in terms of development. According to the (Jalan & Martin, 1998), noted that development impacts on quality of the social system, and the continuity of economic activity which assist multidirectional growth by reducing transport costs and improve the environment by removing unsuitable roads. Socio economic impact assessment of roads development are dealing with different types of socio-economic models to measure the impacts (Gibson & Scott, 2003).

Empirical Studies on Socioeconomic Impacts of Road Development

(Raychaudhuri, 2004) conducted household survey based on pre-project baseline NH2 road in India. The research design was two stage stratified probability sampling techniques. Two stage units were village and households. According to research findings, it defined 30 impact variables and group them into seven dimensions. said that out of 30 outcome variables only 15 gained the basic hypothesis that vicinity of NH2 gave better socioeconomic well-being. Between 1989 and 2006, (Balisacan & Pernia, 2002) conducted 56 study areas to examine the relationship between road network development and land cover dynamics in Thailand with special reference to Lop Buri province. He also applied network analysis and graph theory to examine road connectivity. He is also employed Kendall's Tau (T) Test and Wilcoxon matched pair test. According to the his findings, total length of roads increase in the study area ,but connectivity was not improved as they wish. Developed or rehabilitated roads may not connect with the existing roads.

(Van & Dominique, 2002)conducted questionnaire survey for study impacts of rural roads. He is analyzed questionnaires from 288 agricultural households and get the basic details through the interviews. (Van & Dominique, 2002) wanted to estimate factors whether influence on output and income among rural households. The Ordinary Least Square technique was constructed to estimate the significant parameters. According to his findings, rural roads have a significant effects on agricultural output, reduce transport cost, and increase rural income. As well as there was a strong positive feedback on output, income due to the better road quality. (Jalan & Martin, 1998) concluded that there was positive direct effect between A7 motorway road and regional GDP growth in 2000.Motorway roads are highly contributed to the overall regional GDP and to

increase citizen's wealth, and property values. Ochieng (2002) reveals that due to the improvement of the road condition, it effect to save travel time for work. place, schools, hospitals, markets and it lead to save fuel and other direct transport cost.

Direct and indirect effects arise due to the road improvements and it can be effect on regionally, nationally or even internationally. Due to the road infrastructure developments, types of beneficiaries are increased. For example local farmers, urban residents, domestic producers or foreign tourists .As well as indirect effects take considerable places of human wellbeing. Better road condition helps to increased income level of households or individuals and other dimensions of well-being. (Health, education, social activities and interaction, new job opportunities).It leads to decrease vulnerability of households. (Jalan & Martin, 1998) explained that rural roads program in Peru brought about change on gender or not. The study found out, their travelling time have reduced due to the improved of rural roads. It has involved in a accessing health services and education services. But, women discouraged using these services due to the unfair medicine prices.

Development is the most significant goals to achieving the economic growth. For that he pointed out the relationship between transportation and development process. So transportation is the great part of the development in any country or society (Balisacan & Pernia , 2002) But it should be efficient and time savings. "*The transport sector can therefore be viewed an important component of the economy impacting on development welfare of population".*(Balisacan& Pernia; , 2002) .It transport well managed it lead to increase economic and social opportunities and also benefits .It helps to achieve economic growth of the country. If transport sector is not efficient people have to bear economic and social cost while gaining missed opportunities.

There are used to evaluate various theory and methodologies for the impact evaluation of the road infrastructure development. Most of the findings are common and take same results of the research problem. According to that road infrastructure development lead to change the socio economic of the human well- being as well as so many affected field of the life style. But the thing is that, less of theoretical background seen in this research area are existing theory not yet improved matching the new changes. Results of road investments program create the specific changes for the people who are living in the investment project area. So their living standard well improved and it effect to change regional development corresponding to national development. Theoretical framework should be change the according to the new results and discussion.

III. METHODS AND PROCEDURE

Description of Study Area

This Integrated Investment program (iRoad) is implemented within six provinces in the country. Among those provinces, this study focused on the Sabaragamuwa province. The project rehabilitated about 265 km length of rural roads located in Rathnapura district and another 264 km length of rural roads in Kegalle district. All these roads belong to either Provincial council, Pradeshiyasaba or Urban council. The selected roads are located within 17 Divisional Secretariat Divisions (DSDs) Rathnapura in district and 11 DSDs in Kegalle district.

Table 01: Affected DSDs in each district of Sabaragamuwa province

District	Affected Divisional Secretariat Divisions
Rathnapura	Ayagma,Balangoda,Ehaliyagoda,Elapatha,Embilipitiya,Godakawela,Imbulpe Kawatta,**Kalawana**,Kiriella,Kolonna,Kuruwita,Niwithigala,Opanayaka, Pelmadulla, Rathnapura, Weligepola
Kegalle	Aranayake,Bulathkohupitiya,Dehiovita,Deraniyagala,Galigamuwa,Kegalle, Mawanella,Rambukkana,Ruwanwella,Warakapola,Yatiyantota

Population

Population includes each and every element from the set of observations that can be made. It includes all beneficiaries who are living in the project area in Kalawana Divisional Secretariat.

Sampling Procedure and Sampling Method

A sample is only a portion of the population. It consists only of observation drawn from the population. This study based on the Integrated rural investment program in Kalawana Divisional Secretariat in Rathnapura District. According to the sampling procedure of this research, multistage sampling method has been employed. Kalawana Divisional Secretariat divided in to GramaNiladhari Divisions by using cluster sampling method. Also this project area includes in to three GramaNiladhari Division. (Weddagala ,KudawaWewagama) as well as got a sample of 100 households which representing each three GN divisions by using simple random sampling method. Under the Weddagala – Kudawa- Wewagama road that did not have many households along the road. Because of that researcher was decided to survey households inside the village that are connected by the selected road.

Research Instrument and Scaling

A research instrument is a survey, questionnaire, test, scale, rating or tool designed to measure the variable, characteristic or information of interest .The structure questionnaire was developed according to the research objectives. The questionnaire format was easy to understand and answer the target respondents and it used to collect more accurate and necessary information related to the subject matter. The questionnaire was categorized as follows.

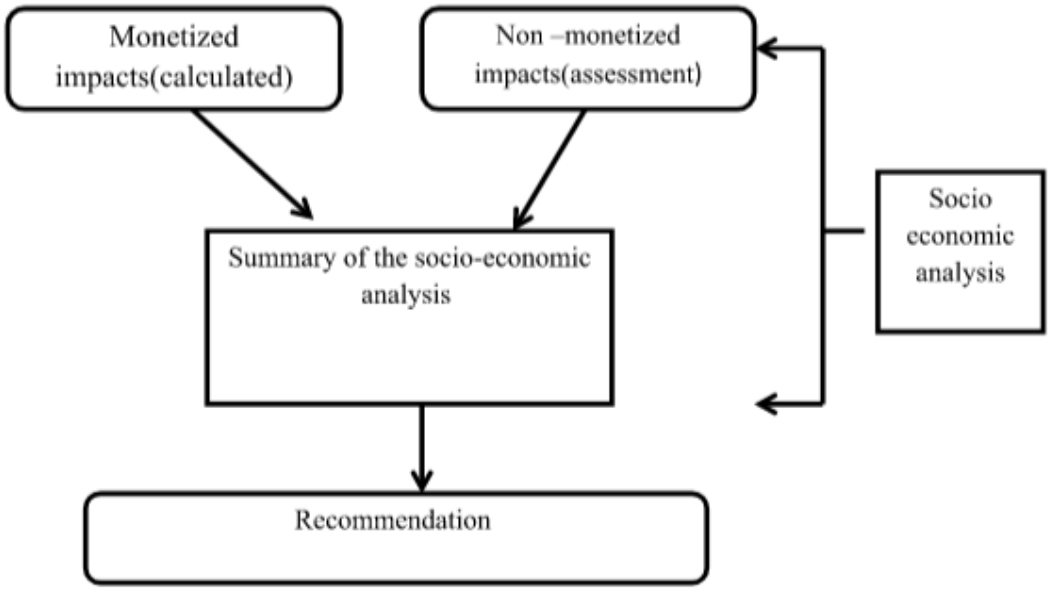
- Key demographic information
- Understanding occupation and household income
- Connectivity of socio economic centers
- Trade and Business changes
- Satisfaction of road construction , maintenance and road quality

The questionnaire included structured questions in to tree main parts, namely part **A ,** part **B** and part **C**. Part A included questions related to general information such as GramaNiladhari Division and code number , Household characteristics etc. Part B refers to general questions related to occupation ,income level of the household etc. As well as part C involves questions about connectivity of socio economic centers , road user cost, labour migration ,perceived social and economic advantages etc. In here Likert scale was employed. Scaling was done based on 5- point Likert Scale which, at present, is the most professional scale and it can be used for multidimensional attitudes.

Data Analysis

The researcher was conducted socio economic impact assessment based on the socio economic analysis who are beneficiaries in the influence zone .The study focused to be analyzed both monetized impacts and non-monetized impacts between current situation an before the intervention.

Figure: 01 Summary of Socio-Economic Analysis



Education Background of Sample Households

According to sample, 12.4 % household members have reported that they have never attained education. However, illiteracy percentage is higher among the old aged members. Up to 1-5,up to 6-G.C.E.(O/L) are 21.9%, and 26.9% respectively. The figures show that majority of the household members completed education up to secondary level. But those who have completed higher education is shown very low level in this study area.

Table 02: Educational Attainment

Education Level	Male		Female		Total	
	No. of persons	%	No. of persons	%	No. of persons	%
Illiterate	23	51.1	22	48.9	45	**12.4**
Can place signature	26	39.4	40	60.6	66	**18.2**
Waiting for Schooling	8	50	8	50	16	**4.4**
Grade 1-5	43	53.6	37	46.25	80	**21.9**
Grade 6 - to G.C.E. (O/L)	51	52.1	47	47.9	98	**26.9**
G.C.E. (O/L) Pass	10	43.5	13	56.5	23	**6.3**
up toG.C.E.(A/L)	10	45.4	12	54.6	22	**6.1**
G.C.E (A/L) pass	3	37.5	5	62.5	8	**2.2**
undergraduate/graduate	4	66.7	2	33.3	6	**1.6**
Total	178	48.9	186	51.1	364	100

Source : Sample survey,2018

Impact Assessment of Road Investment Program

Direct or indirect, negative or positive impacts can be raised due to the Road investment program or Road development. According to the study, various impacts are occurred within the project area. It can be evaluate as follows.

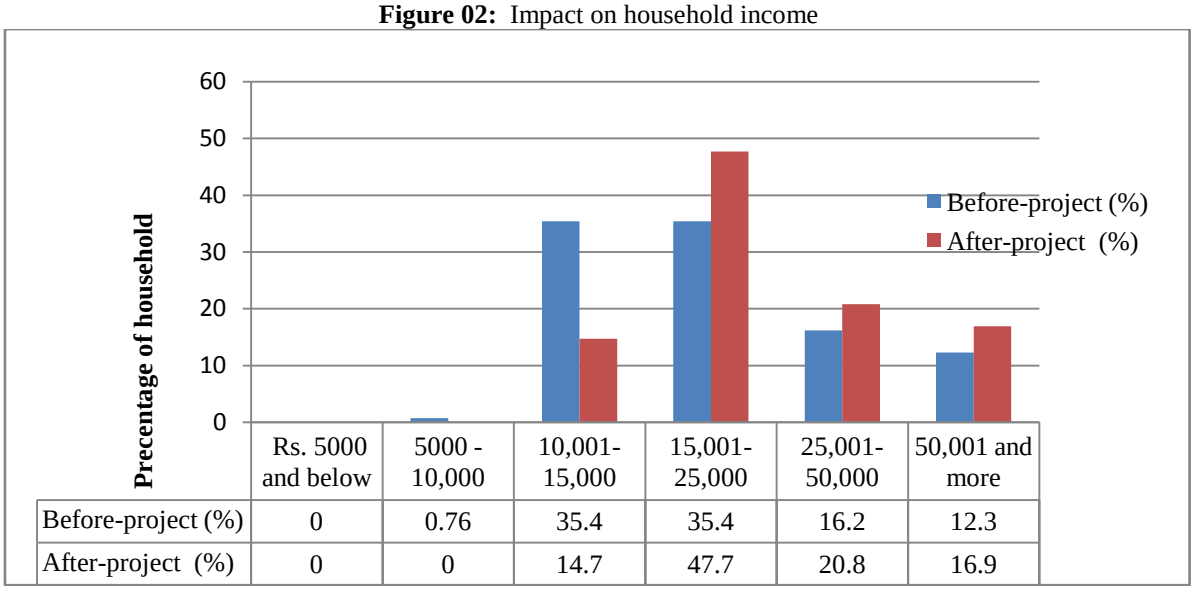
Households Income Sources

Majority of the household members are engaged with Agricultural activities. Some people work as agricultural labour which is represented 35.9%. Due to the impact of the road construction, considerable household members are engaged with the road construction activities as project labour which is reported as 16.2%. The important point is, most of the agricultural labours were shifted to road development activities.

Impacts of Road Development on Household Income

The study has investigated about six income categories considering previous and current situation. Before the road development, income category of 5000- 10000 is shown 0.76% .But after the project that income category is not exhibited any percentage . As well as percentage of income category of 10001 – 15000 is shown decline (35.4% to 14.7%). Because some villagers are earned more income by involving road construction activities. They were shifted to the higher income level and another reason is to reduce their expenditure related to the transportation. After the road construction, rest of income categories' percentage is rapidly increased. It can be clearly understanding through the comparison between previous and current situation.

Figure 02: Impact on household income



	Rs. 5000 and below	5000 - 10,000	10,001- 15,000	15,001- 25,000	25,001- 50,000	50,001 and more
Before-project (%)	0	0.76	35.4	35.4	16.2	12.3
After-project (%)	0	0	14.7	47.7	20.8	16.9

Source: Sample survey,2018

Level of agreement of family income improvement within GNs

Table 03: Agreement of family income improvement

GNs	Level of agreement (%)				
	Strongly disagree	**Disagree**	**Neither agree or disagree**	**Agree**	**Strongly agree**
Weddagala	0	13.33	13.33	56.67	16.67
Kudawa	0	7.69	15.38	38.46	38.46
Wewagama	3.22	9.67	19.35	45.16	22.58

Source: Sample survey,2017

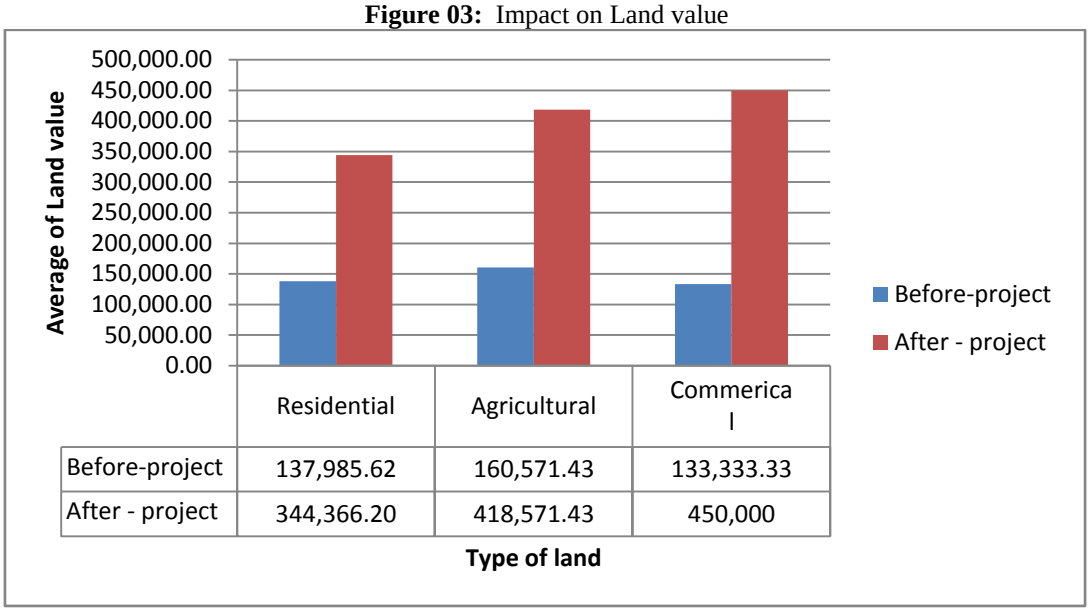
The table shows the result of level of agreement of family income improvement corresponding to 5-point Likert scale. Considering the three GNs, most of the households are agree with this statement and some respondent are strongly agree with this statement. Then number of respondents which have received as answering "strongly disagree" is at the lowest percentage for the statement. (only Wewagama GN as 3.22%) .Just less than one quarter of three GNs have received answer of "Neither agree or disagree" .

Impact of Road Development on Employment Opportunities

According to the sample survey, Out of the 100 households, 27 of household were obtained new employment opportunities due to the road construction. They are engaged with the road construction and maintenance activities.

Impact of Road Development on Land value

Figure 03: Impact on Land value



Source: Sample survey,2018

The study mainly focused about three type of lands. Considering three type of lands have significantly increased after the road construction. It was recorded as 57% improvement .As a result of better road condition, many people were required land near the road side .Due to higher land demand, land value is rapidly increased.

Impact of Road Development on connectivity of Socio-economic Centers.

Road infrastructure is the major link to connect rural community and socio economic centers. Road is the primary mode which makes great connection between community and socio economic centers. Road condition led to change the connection with them.

Table 04: Average distance

GNs	Table 4.3.5 Average Distance (km)				
	School	**To gov institution**	**Fair**	**Working place**	**Hospital**
Weddagala	2.9	12.9	11.4	6.13	13.6
Kudawa	2.65	14.5	13.35	6.41	14.71
Wewagama	4.45	22.45	20.54	7.61	23.12

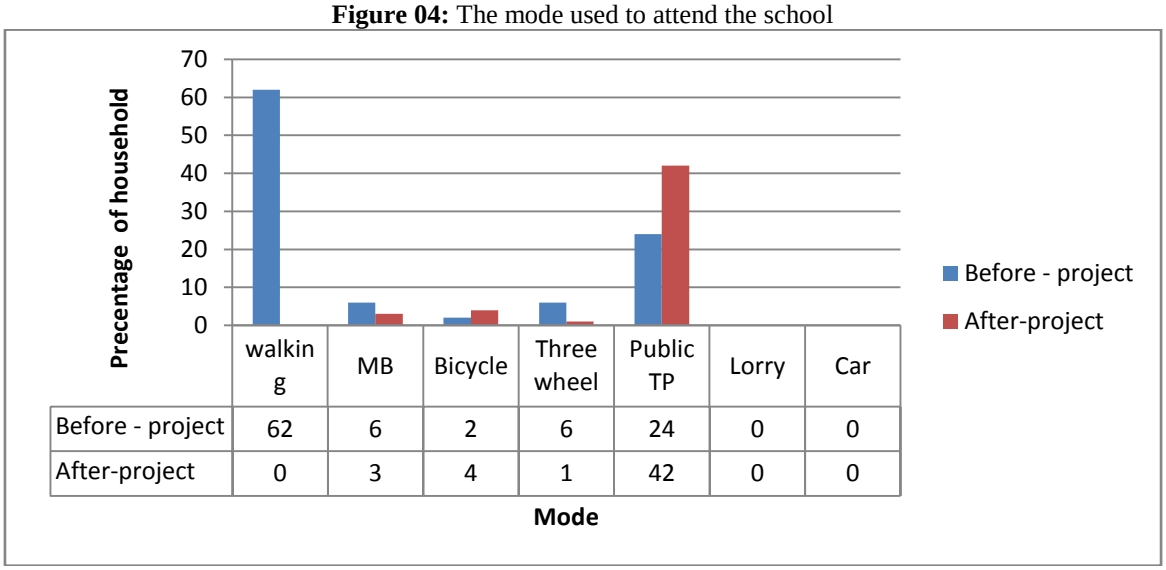
Source: Sample survey ,2017

According to above figures, those who have lived in Weddagala,Kudawa and Wewagama GNs have to travel significant distance to reach their socio economic centers.

With and Without Situation of the Project

Mode of School Attendance

Figure 04: The mode used to attend the school



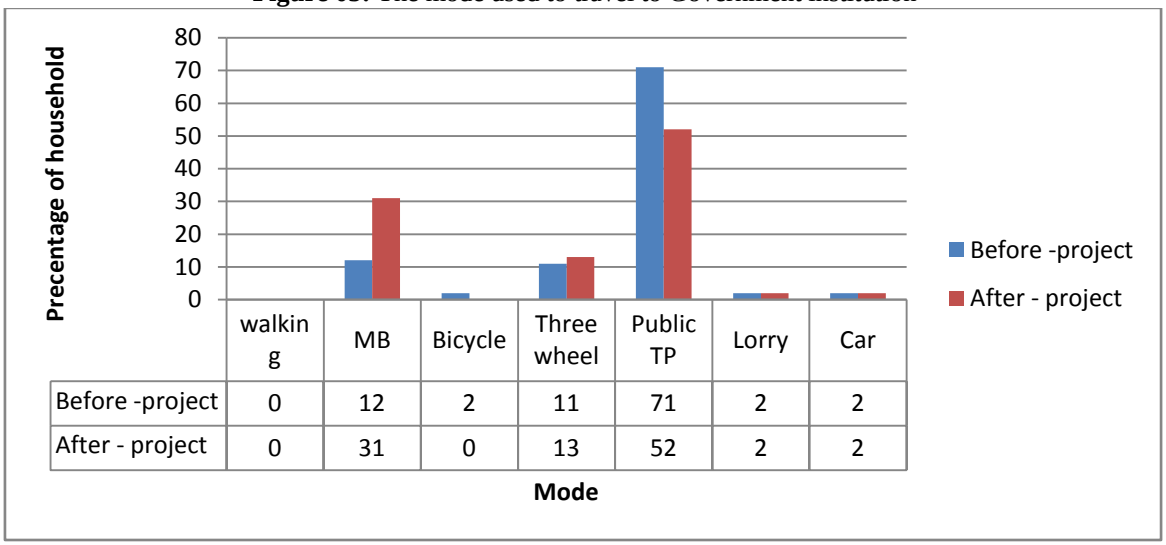
	walking	MB	Bicycle	Three wheel	Public TP	Lorry	Car
Before - project	62	6	2	6	24	0	0
After-project	0	3	4	1	42	0	0

Source: Sample survey,2018

The government institution is the one of the major socio-economic center for everyone. It provides great services to the public. Before the road development, Majority of the children are attended in school by foot It takes 62% of the results. But after the road development, no one attended in a school by walking. Because they have changed their mode of the transport due to better road condition. Now public transportation always works in this study area and usage of public transport is increased up to 24% to 42%.

Mode of Traveling for Government Institution

Figure 05: The mode used to travel to Government institution



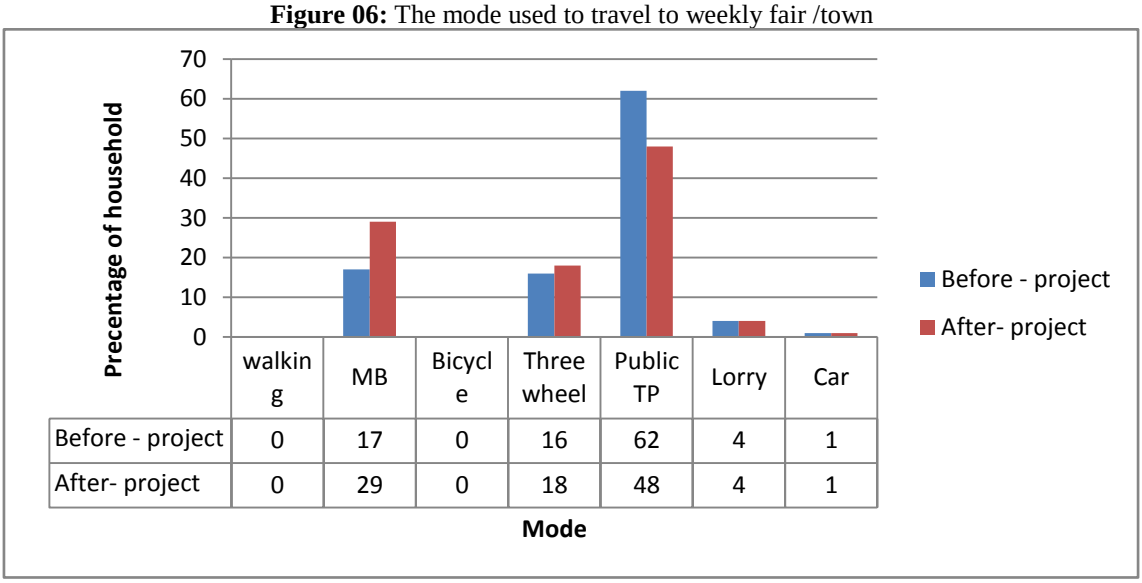
	walking	MB	Bicycle	Three wheel	Public TP	Lorry	Car
Before -project	0	12	2	11	71	2	2
After - project	0	31	0	13	52	2	2

Source: Sample survey,2018

According to the this chart, no one go to the government institution by walking both before and after the road development. Because all government institutions are located in Kalawana town .So villagers have to travel more distance (average distance more than 10 km) to reach their destination. In view that mode of walking is impossible. There is significant improvement of usage of motor bicycle to reach destination (12% - 31 %) while reducing usage of public transportation (71% - 52%) under the current condition. Reason for that, private vehicle usage is cheaper than usage of public transportation due to the high bus fee.

Mode of Traveling to Weekly Fair

Figure 06: The mode used to travel to weekly fair /town



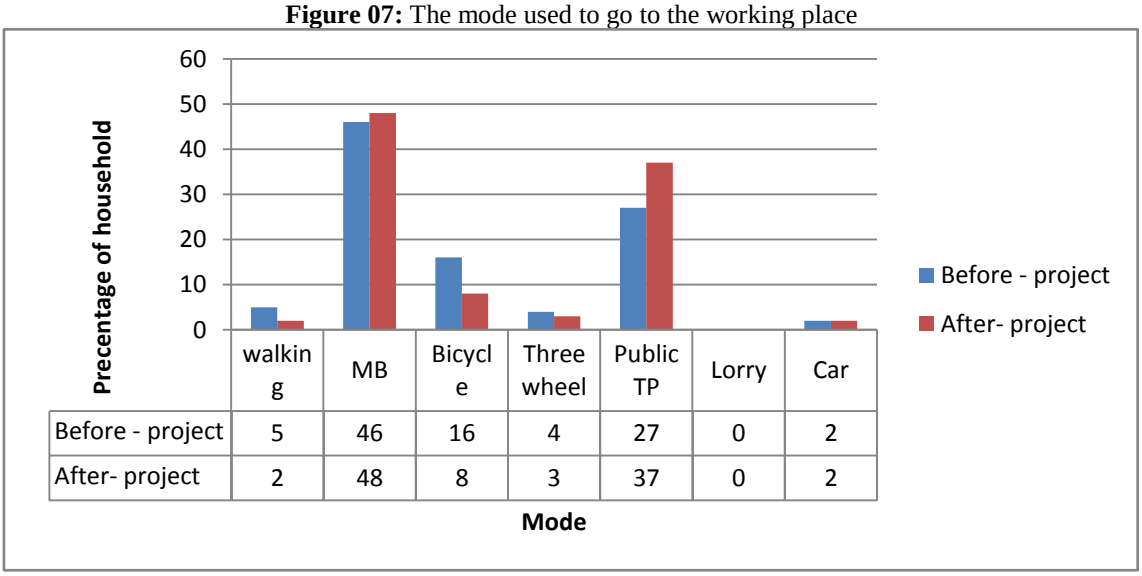
	walking	MB	Bicycle	Three wheel	Public TP	Lorry	Car
Before - project	0	17	0	16	62	4	1
After- project	0	29	0	18	48	4	1

Source: Sample survey,2017

According to this result, when comparing before and after situation of the road, private vehicle usage is increased than usage of public transportation. Who are lived in Weddagala, Kudawa and wewagamaGNs do not have a weekly fair in their village. So they have to travel to Kalawana town for fulfill their needs. Most of the household use private vehicle for that. Before the road construction, 62% of household used public transportation and now 48% used. Public transportation usage was declined.

Mode of Visiting to Working Place

Figure 07: The mode used to go to the working place



	walking	MB	Bicycle	Three wheel	Public TP	Lorry	Car
Before - project	5	46	16	4	27	0	2
After- project	2	48	8	3	37	0	2

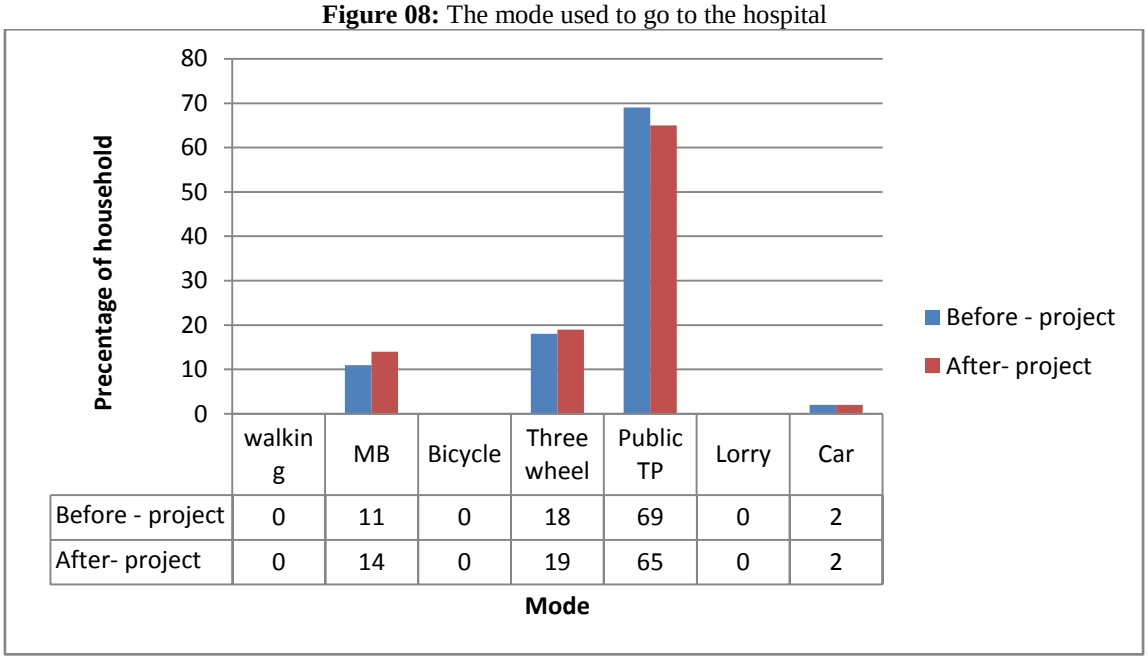
Source: Sample survey, 2017

Majority of the household members travel to their working place daily by using various transportation mode. Among those mode, significant percentage use both motor bicycle and public transport both before and

after condition. Most of the household members are engaged with the agricultural activities within study area .Majority of the workers use public transportation due to the efficient condition of the transport. Public transportation usage was increased up to 37 %. And Motor bicycle usage was increased up to 48%.

Mode of Traveling to Hospital

Figure 08: The mode used to go to the hospital



	walking	MB	Bicycle	Three wheel	Public TP	Lorry	Car
Before - project	0	11	0	18	69	0	2
After- project	0	14	0	19	65	0	2

Source: Sample survey,2017

The hospital is one of the highly effected center by comparing other centers. It directly combined with the human life. So its connectivity always must be strong and efficient. Those villagers have tofacilitae their health services through the kalawana hospital. So they have to travel more distance to reach destination. (between 10km -20km).Most of the respondent used public transportation to cover their services. But after the road construction its percentage decline up to 65 %. due to improvement of private vehicle usage. Mode of motor cycle usage and usage of three wheels were reported as 11%- 14 %, 18% - 19% respectively.

Impact of Road development on Road user cost

According to the study area,main uses of transport can be summarized as day to day work, agricultural purposes, and business purposes .When using the road infrastructure, road users have to bear some cost. It is based on nature of the road condition which it may be high or low cost.

Vehicle operating cost

Table 05: Average maintenance cost

Type of vehicle	**Average maintenance cost – weekly (Rs)**	
	Before - project	**After - project**
MB/ Bicycle	318.59	42.86
Three wheel	410.87	65.22
Car	800.00	200.00
Lorry	566.67	100.00

Source: Sample survey,2018

This table 4.3.6.1 shows the average vehicle maintenance cost of households during the week. The study has considered four type of vehicles. Among those vehicles, Every type of vehicles average maintenance cost was reduced significantly after the road construction .It was reduced by 82 %.

Impact on Fuel cost

Table 06: Average Fuel cost

Type of vehicle	Average Fuel cost - weekly (Rs)	
	Before - project	After - project
Motor Bicycle	340.53	281.25
Three wheel	408.70	323.91
Car	650.00	575.00
Lorry	433.33	360.00

Source: Sample survey, 201

This table no 07 shows average fuel cost of vehicle within a week. Considering the before and after condition, Average fuel cost was reduced for every type of vehicle by 16 %. According to the sample survey, most of the household are owner of the vehicle. So these cost changes are directly effect to family budget .It led to reduce household expenditure.

Impact of Road Development on travel time

Table 07: Impact of Travel Time

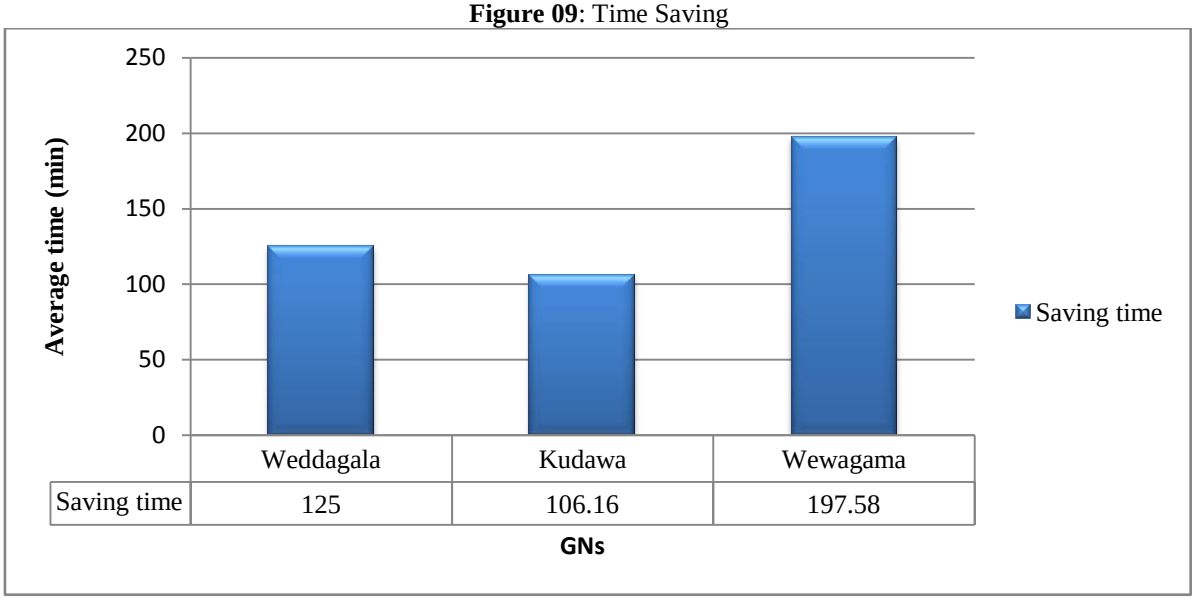
Socio economic centers	Period	Mean value – Travel time (minutes)							Mean (Saving Time)
		Walking	MB	Bicycle	Three wheel	Public TP	Lorry	Car	
(i) WeddagalaGramaNiladhari Division									
School	Before	33.57	-	-	30	67.5	-	-	18.33
	After	-	30	-	20	26.5	-	-	
To gov institution	Before	-	75	-	84	80	60	-	35
	After	-	38.12	-	42	49.06	30	-	
Weekly fair/town	Before	-	90	-	75	77.36	60	120	27.66
	After	-	65	-	46	42.77	30	90	
Working place	Before	60.31	60.31	33.33	90	61.25	-	-	20.83
	After	-	28.46	15	75	48.84	-	-	
Hospital	Before	-	60	-	96	83.47	-	90	35
	After	-	45	-	54	50	-	60	
(ii) KudawaGramaNiladhari Division									
School	Before	29.58	45	45	20	61.66	-	-	15.27
	After	-	-	21.16	-	22.5	-	-	
To gov institution	Before	-	78	65	90	81.6	-	120	32.5
	After	-	45	-	66	53.43	-	60	
Weekly fair/town	Before	-	68.12	-	90	81.25	50	-	28.97
	After	-	42.30	-	60	52.5	30	-	
Working place	Before	45	52.22	37.72	-	55.83	-	30	19.10
	After	20	30.41	19	-	30.62	-	20	
Hospital	Before	-	80	-	112.5	83.63	-	-	30.25
	After	-	51.36	-	69.4	56.31	-	-	
(iii) WewagamaGramaNiladhari Division									
School	Before	45	30	60	-	87	-	-	26.05
	After	-	20	-	30	30.93	-	-	
To gov institution	Before	-	130	-	160	146.08	120	-	50.48
	After	-	75	-	100	102.25	60	-	
Weekly Fair/town	Before	-	127.5	-	122.5	148.42	90	-	47.25
	After	-	77.85	-	78.3	101.87	67.5	-	
Working place	Before	30	74.16	45.3	150	111.42	-	30	32.09
	After	20	44.09	32.5	100	71.66	-	20	
Hospital	Before	-	120	-	156	161.25	-	150	51.77
	After	-	-	-	90	108.2	-	120	

Source : Sample survey,2017

Considering above figures ,household members are able to save their time when connecting with the socio economic centers after the road development. After the road development, they take less time to reach their destination as result of better road condition and change the transport mode .

The Impact of Time Saving

Figure 09: Time Saving



Source: Sample survey , 2018

This figures shows amount of average saving time for three GramaNiladhri Division in the study area. Weddagala villagers could be able to save 125 average minutes, who are live in Kudawa GN could be able to save 106.16 average minutes and Wewagama household could be able to save 197.89 average minutes. Majority of the sample of the study, use saving time for their extra activities .Someone involve with the agricultural activities, household activities or commercial activities..etc by using saving time.

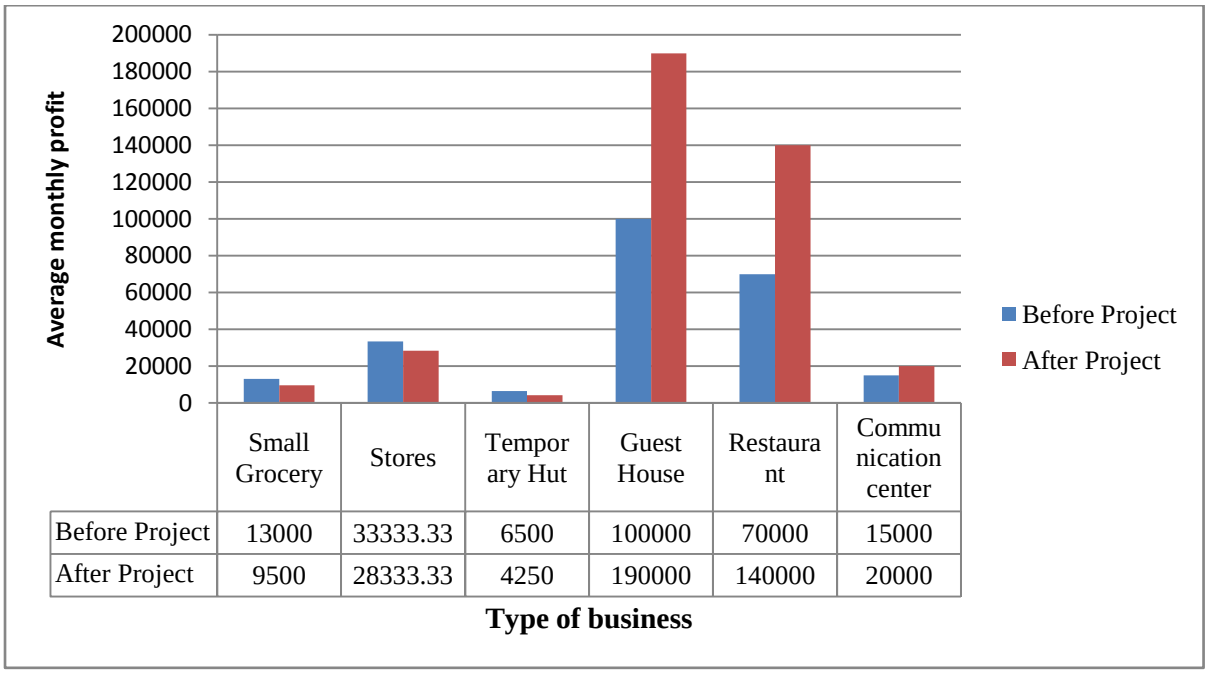
Impacts of Road Development on Labor Migration

Out of the sample ,12 number of household members are involved with the labor migration. Out of 12 households , 9 number of household are employed in the same province and 3 of respondent are employed in another province. As well as 4 number of persons use this selected road in every day , 5 labours use this road in once a week and 3 workers use to travel this road in once a month. According to that ,some households conduct long traveling across this selected road to reach their destination and road situation led to change frequency .

Impact of Road Development on Business Community

Business community play a significant role in the any area and their contribution is much more important to the economy. Road development create negative or positive impacts for them.

Figure 10: Impact on Business Profit



	Small Grocery	Stores	Temporary Hut	Guest House	Restaurant	Communication center
Before Project	13000	33333.33	6500	100000	70000	15000
After Project	9500	28333.33	4250	190000	140000	20000

Source: Sample survey ,2017

This figures exhibit average monthly profit of businesses which are located in the study area. The study has investigated about six type of business. Usually businesses must be improved by cause of road development. After the road development average monthly profit of small grocery, stores and temporary hut or road side boutiques were declined as result of road improvement provided easy and quick access to town. Most of the household are willing to buy goods from the town .Therefore they try to accomplish their willingness by using efficient road transport. That personal attitudes badly effect to the some business profit. After the road improvement, average monthly profit of Guest house, Restaurant and communication centers were improved. Because many travellers travel to visit Sinharaja forest across this road.

Level of satisfaction - Road Construction and Maintenance

Table 09: level of Satisfaction about Road construction and Maintenance

	Very dissatisfied	**Dissatisfied**	**Unsure**	**Satisfied**	**Very satisfied**
*Do you satisfied with Road construction and mainteanice ?	0	1	0	3	96

Source:Sample survey,2017

Out of the 100 sample household, 96 households are very satisfied with road construction and maintenance, 3 households who are satisfied with this statements and only 1 household is dissatisfied about the road construction.

Level of quality – Road Quality and Drainage System

Table 10: Beneficiaries Views on Road Quality and Drainage System

	Poor	**Fair**	**Good**	**Very good**	**Excellent**
*What is your idea about road quality and drainage system ?	1	0	2	14	83

Source:Sample survey,2017

Out of the 100 sample of household, majority of households have excellent idea about road quality and drainage system.it represents through 83 households ideas. As well as 14 number of households,2 number of

households and 1 number of household have very good idea, good idea, and poor idea about road quality and drainage system respectively.

Summary of Perceived Social and Economic Impacts of Households

Table11: Perceived Social and economic impacts

Social impacts	**Percentage (%)**
Improvement of road security and / safety	100
Improve the quality of environmental conditions	33
High demand for lands	50
Increase land values	60
Travel time saving	100
Economic impacts	
Generate additional income	32
Reduce cost of living	100
Develop business premises/ work place	70
Develop social infrastructure	100
Develop transport facilities	100

Source: Sample Survey,2017

Majority of the people have better understanding about socio and economic impacts which related to the road improvement. They almost agree with this impacts changes. Improvement of road security, travel time saving, reduce cost of living, Develop social infrastructure, and Develop transport facilities are the 100% perceived social and economic impacts. According to the people are already know about impacts of improved roads

IV. CONCLUSION AND RECOMMONDATIONS

Conclusion

The study identified that the study area is mainly engaged with agricultural activities as a major income source. Nevertheless, some of them are shifted to employing with the road construction and maintenance due to the road intervention. 16.2% of household members are employed as contract labours in the project site. The study finds that household income has improved with comparing previous and current period of the road development project. As well as majority of the household accepted that their family income is increased after the Road Investment program. The values of lands of residential, commercial, and agricultural around the study area have significantly risen by 57% after road improvement.

Moreover, people who are living in the project area have to travel a considerable distance (2km to 20 km) to reach socio economic centers. The study provides evidence about mode of transportation changes and private vehicle usage improvement. Most of the road users were changed their usual mode of transport and convert for easier transport mode by increasing own vehicles usage. Because private vehicle usage is cheaper than public transportation usage due to higher bus charges. The study finds that road user cost were reduced as a result of improved road condition. With the usage of improved roads maintenance cost and fuel cost were reduced by 82% and 16 % respectively. The study investigated that travel time was reduced beneficiaries who are using improved road when comparing previous and current situation of the road condition. Beneficiaries have saved their travel time by 2.5hours.

As well as improved road networks influenced to reduce the profit of some businesses in the study area. Because well managed road improvement provided quick and easy access to city. Also majority of the households are willing to purchase goods and services from town by using efficient transportation. Only hotels and restaurant profit were improved due to the road impacts. Majority of the people who are living in the study area satisfied about road construction, road quality, and drainage system and road maintenance.

The study revealed that various socio economic impacts are occurred with the road infrastructure development .Also well improved or managed road networks are facilitated to solve transport related problems while enhancing welfare of the citizens. The study concludes that road development influence to change social and economic activities people who are living in the project area. Among these changes ,the most positive impacts are made on household income, land value, travel time saving, private vehicle usage , employment opportunities and connectivity of socio economic centers .However, road improvement is negatively affect on trade which are located along the improved road as result of quick and access to town. Furthermore, majority of beneficiaries are aware of the fact that development of the road is gaining social and economic impacts.

Recommendation

Local and foreign investments need to be increased related to infrastructure development and appropriate strategies should be pursued. Policy makers should be introduced more conducive policies to attracting more investment pertaining to country development. The government should try to function corresponding to purposes of stakeholders or donors The government should be paid more attention to the regional development to achieve sustainable development by supporting rural road network widening and rehabilitating. More road investment programs are mainly considered about engineering aspects by neglecting social ,economic, and environmental impacts. But they must be concerned all around the impacts which are arising due to road investment. When construct the road network, should be focused to establish sign boards, slope sections, sharp bends and steep slopes for convenience of road users. Considering the rural road network, many bridges and some culverts have not guard rails or have damaged guard rails .Because of that should be attention to construct those requirements.

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