

**YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF ECONOMICS
MASTER OF ECONOMICS**

**A STUDY ON RURAL ROAD INFRASTRUCTURE
DEVELOPMENT IN GYOPINKAUK TOWNSHIP**

SU MON MON PHUU

SEPTEMBER, 2022

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By

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M.Econ (Economics)

Roll No. 5

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ABSTRACT

Rural road connectivity is a crucial element of rural development and plays a significant role in the socioeconomic advancement of rural residents by facilitating access to services like healthcare and education. The objectives of the study are to study the current situation of rural road infrastructure development and to analyze the social and economic conditions of rural road development in Gyopinkauk Township. According to the study's results, the construction of rural roads has a considerable indirect impact on each study area's overall degree of economic development. Since most people live in rural areas, it is crucial to promote the advantages of the rural population. This study suggests that the government should raise capital expenditures for the upcoming development strategy in order to expand the range of the concrete-paved rural road surface. It is necessary to put in place and carry out the proper policies and strategies in order to increase rural connectivity.

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TABLE OF CONTENTS

	Page
ABSTRACT	i
ACKNOWLEDGEMENTS	ii
TABLES OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF ABBREVIATIONS	vii
CHAPTER I INTRODUCTION	
1.1 Rationale of the Study	1
1.2 Objective of the Study	2
1.3 Method of Study	2
1.4 Scope and Limitations of the Study	3
1.5 Organization of the Study	3
CHAPTER II LITERATURE REVIEW	
2.1 Concepts of Infrastructure	4
2.2 Rural Road Infrastructure and Development	6
2.3 Implementation Methods for Rural Road Infrastructure	8
2.4 Benefit of Improved Rural Roads	9
2.5 Rural Road Construction and Maintenance	11
2.6 Reviews on Previous Studies	13
CHAPTER III OVERVIEW ON RURAL ROAD INFRASTRUCTURE DEVELOPMENT IN MYANMAR	
3.1 Rural Road Infrastructure in Myanmar	16
3.2 Legal Framework of Road Infrastructure in Myanmar	18
3.3 Future Plans for Rural Road Infrastructure in Myanmar	24
3.4 Construction of Rural Road Condition in Myanmar	26
3.5 Maintenance of Rural Road Infrastructure in Myanmar	27

CHAPTER IV ANALYSIS ON SURVEY DATA

4.1	Profile of Gyopinkauk Township	29
4.2	Survey Profile	33
4.3	Survey Design	35
4.4	Survey Results	35
4.5	The Situations of the Rural Roads Constructions in Gyopinkauk Township	38
4.6	The Opinions of Sample Households on the Construction of Rural Roads Improvements	45
4.7	Maintenance of the Rural Roads	47

CHAPTER V CONCLUSION

5.1	Findings	50
5.2	Suggestions	53

REFERENCES

APPENDICES

LIST OF TABLES

Table No.	Titles	Page
2.1	Maintenance Categories and Activities for Rural Road Activities	12
3.1	First Three Years Plan	24
3.2	Second Five Years Plan	25
3.3	Third Five Years Plan	25
3.4	Length of Rural Road Construction in State and Region from (2012-2013) to (2017-2018)	26
4.1	Connect Roads from Gyopinkauk to Other Townships	30
4.2	Construction of Rural Road Condition in Gyopinkauk Township (2016-2017) to (2012-2021)	31
4.3	Upgrade of Rural Roads Condition in (2016-2017) to (2020-2021)	32
4.4	Households and Population of Selected Villages in Gyopingauk Township (2020-2021)	34
4.5	Percentage of Households Heads by Age Group	36
4.6	Number of Households by Size of Households Member	36
4.7	Educational Level of the Respondents	37
4.8	Types of Houses	37
4.9	Electricity Usage of Sample Households	38
4.10	Change of Profession for Head of Households	39
4.11	Change in Income of Sample Households before and after Construction and Upgrading of Rural Roads	40
4.12	Households' Assets	42
4.13	Average Travel Time to Gyopinkauk' Urban Area and Gyopinkauk Hospital before and after Rural Road Construction and Upgrading	43
4.14	The Opinions of Sample Households on the Construction of Rural Roads Improvement	45
4.15	Methods of Maintenance of Rural Roads for Long Run by the Villagers	47

LIST OF FIGURES

Figure No.	Titles	Page
3.1	Strategy Objective for 2030	20
3.2	Rural Road Classes	22
3.3	Prioritization of CRRN Roads	23
4.1	Change of Profession for Head of Households	39
4.2	Change in Income of Sample Households before and after Construction and Upgrading of Rural Roads	41
4.3	Average Travel Time to Gyopinkauk' Urban Area and Gyopinkauk Hospital before and after Rural Road Construction and Upgrading	44
4.4	The Opinions of Sample Households on the Construction of Rural Roads Improvement	46

LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AEC	ASEAN Economic Community
BOT	Build-Operate-Transfer
CRRN	Core Rural Road Network
DRD	Department of Rural Development
DRRD	Department of Rural Road Development
JICA	Japan International Cooperation Agency
KOICA	Korea International Cooperation Agency
MDGs	Millennium Development Goals
MOC	Ministry of Construction
MOT	Maintain-Operate-Transfer
MOTC	Ministry of Transport and Communication
NEDA	National Economic and Development Authority
PPP	Private/Public Partnership
SDGs	Sustainable Development Goals

CHAPTER I

INTRODUCTION

1.1 Rationale of the Study

An important factor in a nation's economic prosperity is its infrastructure. Physical infrastructure is a key element of economic development in both industrialized and developing nations. The growth of rural infrastructure is essential for the development of agriculture, natural resources, trade, and industry. The road infrastructure encompasses all sorts of roadways in a given area, as well as different buildings and services for moving people and goods.

The expansion of rural road transportation, quick delivery, and the caliber of services all have a significant role in determining how reasonably priced goods are on the market. Considering that transportation services are increasingly transferrable, a high-quality infrastructure is necessary to compete for high-value items. Rural roads are a vital part of rural development because they make it easier for people to access amenities like healthcare and education, which is important for the socioeconomic development of rural populations. Rural road construction increases labor demand and family production.

In developing countries, the bulk of the population lives in rural areas. The government may improve the lives of those who reside in rural areas by sponsoring social programs, infrastructure upgrades, and rural roadways. As a result of improved rural roads, the number of automobiles, passenger trips, and freight transportation quickly rose. As rural road infrastructure and farmer income improved, more rural households purchased motors and automobiles to participate in non-agricultural activities or to facilitate travel.

It is difficult to access social services and marketplaces in Myanmar due to the country's subpar infrastructure compared to its ASEAN neighbors. Important transportation subsectors in Myanmar, like railways, river transportation, rural roads, rails, and urban transportation, have distinct studies. Better rural roads and the ability to transport goods create opportunities for people with the means to run a small

business in the village, buy local produce, or develop their own goods to sell in close-by market areas. Rural road upgrades have had a considerable indirect impact on overall economic development. Because it needs a lot of labor, Myanmar still maintains rural roads in the old-fashioned manner.

More than two-thirds of Myanmar's population lives in rural areas. Evidence from Myanmar and around the world indicates that increasing rural productivity and development depends on having access to markets and services. Gyopinkauk Township in Tharyarwady District is located in the western part of the Bago Region. Gyopinkauk Township is divided into ten wards, and there are 49 village tracts, including 277 villages. The primary mode of transportation for most homes in Gyopinkauk Township is a motorcycle. People who live in rural areas may benefit from the improved connectivity and mobility that rural road infrastructure provides. Rural roads transform into network nodes, facilitating the movement of people and products there. Gyopinkauk's difficult accessibility and inadequate infrastructure limit livelihood opportunities, access to social services, and overall economic development. The villagers in Gyopinkauk Township faced numerous problems before rural roads were finished, including economic, social, health, and other emergency situations. Therefore, this study focuses on how the socio-economic conditions of the households living in the villages in Gyopinkauk Township have changed due to rural road development.

1.2 Objective of the Study

The objectives of the study are to study the current situation of rural road infrastructure development in Gyopinkauk Township and to analyze the social and economic conditions of rural road development in Gyopinkauk Township.

1.3 Method of Study

The study used a descriptive method based on both primary and secondary data. The primary data collection was conducted by face-to-face interview with an unstructured questionnaire. A sample of 150 households is randomly selected from 19 villages in which rural roads are constructed and upgraded from (2015-2016) to (2020-2021) in Gyopinkauk Township, using the quota sampling method for the questions. Secondary data is available from the Ministry of Construction and

Department of Rural Road Development, Gyopinkauk Township's Department of Rural Road Development, libraries, previous studies, and relevant websites.

1.4 Scope and Limitations of the Study

The scope of the study is only focused on the social and economic situations of households after rural road construction in Gyopinkauk Township, Tharyarwady district, Bago Division during (2015-2016) to (2020-2021). Among 277 villages, 19 villages are selected and 150 sample households are selected by using the quota sampling method from 19 villages in Gyopinkauk Township. The selected 150 sample households do not recover the total population of 3021 in the selected villages. Because there were many difficulties in collecting the data during the survey period due to the spread of Global Pandemic COVID-19. Therefore, the sample of 150 households used in this study may not represent all households in the township.

1.5 Organization of the Study

This research is divided into five chapters. Chapter one includes the rationale of the study, objectives, scope and limitations of the study, as well as the study's organization. Chapter two consists of a review of the literature on the concept of infrastructure and previous studies. Chapter three presents the overview of Myanmar's rural road infrastructure. Chapter four describes the profile of Gyopinkauk Township, as well as survey profile, survey design, and analysis on the situations of the rural road constructions in Gyopinkauk Township. Chapter five consists of conclusions with findings and suggestions.

CHAPTER II

LITERATURE REVIEW

2.1 Concepts of Infrastructure

The basis of modern economic development is infrastructure development, which has come to be synonymous with economic and general development. Infrastructure is vital to society and the economy because it provides services to homes and businesses. The availability of transportation, electricity, clean water, sanitary facilities, as well as other vital infrastructure like schools and hospitals, has a big impact on how well-off a household is, especially if they are poor. The provision of infrastructure services facilitates the production, transportation, and transaction of goods by enterprises. This promotes development, which raises earnings and reduces poverty. Infrastructure development also helps countries address climate change more effectively and become less vulnerable to shocks and natural disasters.

On the other hand, a lack of infrastructure expansion indicates constraints on expansion and global development. Unfortunately, there is still a serious lack of infrastructural services throughout emerging Asia, and this varies greatly between nations. In the region, 0.6 billion people lack access to potable water, 0.8 billion lack power, and 1.8 billion are not connected to basic sanitation services. Therefore, the main task is to create effective infrastructure systems that can support higher and more inclusive economic growth. (Pernia, 2012)

Every building, every development, and really every activity has a base by definition. The main economic foundation, known as infrastructure, is what supports all other economic-related activities, including consumers meeting their requirements through retail, businesses establishing up, moving factory output for export or import, and many other connected activities. Infrastructure development can take many different shapes and behave in various situations in a variety of ways. The two basic types of infrastructure are hard infrastructure and soft infrastructure. A modern industry needs physical networks in order to function, which are referred to as "hard

infrastructure." All the institutions that sustain a country's economic, social, cultural, and physical standards are referred to as its "soft infrastructure." (Samli, 2010)

A nation's goals for social growth to promote entrepreneurship and its ambition to enter, participate in, and excel in international trade are what are most closely tied to infrastructure challenges; a nation also needs to have important plans in place to raise the standard of living for its population. Infrastructure is divided into three categories: basic infrastructure (water supply, energy, well-maintained roads, and communication capabilities); partially tangible or physical infrastructure (roads, airports, seaports, energy, and education for support and special industries or economic projects); and mostly intangible infrastructure (information communication and information technology). (Samli, 2010)

Construction of roads, bridges, buildings, hydroelectric power plants, telecommunications networks, transportation facilities, water supply, and other items are all considered to be part of infrastructure development. "Infrastructure" refers to the tangible elements of interconnected systems that provide the goods and services necessary to enable, preserve, or enhance social living circumstances. Infrastructure is necessary for the provision of fundamental social services like hospitals and schools, as well as for the manufacturing of commodities and services and the transfer of finished items to markets. (Samli, 2010)

The following public utilities were listed as infrastructure in the World Development Report of 1994: power, telecommunications, piped water supply, sanitation and sewage, solid waste collection and disposal, and piped gas. Public works include building highways, significant dams, and drainage and irrigation canals. Other transportation sectors include airports, ports and waterways, intercity and urban railroads, and urban transportation. (World Bank, 1994).

The World Bank divides infrastructure into two groups. They are, respectively, social infrastructure and economic infrastructure. Social infrastructure is that infrastructure that aids in promoting the population's educational, health-related, and cultural standards. Examples of social infrastructure include schools, colleges, universities, hospitals, museums, etc. Economic infrastructure includes facilities like roads, highways, railroads, power, telecommunications, water supply, etc. that support economic activity. (World Bank, 2017).

Infrastructure is the foundation of economic activity, and nations cannot succeed in their trade policies, efforts to establish competitive advantages, or

domestic growth without a supportive infrastructure. The foundation of marketing, global trade, and enhancing the quality of life is infrastructure. Infrastructure will take its proper position in a nation's broader marketing and economic development efforts.

2.2 Rural Road Infrastructure and Development

The quality of life in rural municipal districts is significantly impacted by circumstances and factors that may not at first glance appear to be directly tied to the rural way of life but yet have a significant impact on it. We're talking about how civilization can improve village life and lessen the gap between villagers and city dwellers in terms of standard of living. These benefits are provided through a unique service delivery system and a few things that are commonly referred to as infrastructure. (Press, 2018)

Around a billion people worldwide only occasionally have access to the road network. Those who are already the most disadvantaged are negatively impacted by this since it restricts their mobility and access to development advantages. For rural development, improved roads are very important. It is a crucial step in the fight against poverty since it provides the most vulnerable with access to safe, affordable, accessible, and sustainable transportation options. (Press, 2018)

Rural transportation ensures the availability of agricultural inputs and helps the transfer of farm outputs to markets. One strategy to promote the growth of the agriculture industry in rural areas is to improve rural accessibility through the provision of improved transportation services and rural road infrastructure. The majority of the poorest people in the world reside in rural locations with little in the way of public amenities, particularly when it comes to roadways. (Fungo, 2017)

Poor roads and restricted access are to blame for the exorbitant transportation expenses, which also make it difficult to obtain high-quality inputs and limit the amount of produce, consumer goods, and opportunities for off-farm jobs that may be sold at local markets. Access to other social facilities like schools and hospitals has been hampered for rural poor people due to poor road connectivity. The majority of people in Myanmar still live in rural regions and are mostly employed in agriculture, so this does not apply to them. Therefore, it seems evident that developing rural roads is a way to give many people, especially those who live in rural areas, the ability to participate in the market economy and thereby escape poverty. (Fungo, 2017)

Around a billion people worldwide only occasionally have access to the road network. Those who are already the most disadvantaged are negatively impacted by this since it restricts their mobility and access to development advantages. For rural development, improved roads are very important. It is a crucial step in the fight against poverty since it provides the most vulnerable with access to safe, affordable, accessible, and sustainable transportation options. (Kuroda, 2007)

People, products, and goods are transported by rural transportation between villages and small towns with markets and services. Tiny towns that act as transportation hubs attract small transportation businesses and individual modes of transportation from several villages, especially on special market days. For district, state, regional, and/or national transportation services, the larger towns and cities act as hubs, and the smaller towns can connect to them via more robust transportation services. Although these interurban services may be used by rural inhabitants, the connection between the villages and small towns continues to be the principal form of rural transportation. Due to the generally low demand for passenger and freight transport in small towns, rural transportation services often use modest-capacity trucks, unless some sort of load consolidation is permitted. Villages located on interurban routes benefit from the load increase and consolidation made possible by interurban services. Load consolidation may be a possibility for more remote locations when transportation demand is strong enough to justify employing higher capacity vehicles, such as on market days, holidays, and during harvest. (Fulmer & Jeffrey, 2009)

Rural roads are vital for the economic and social growth of societies because they connect rural residents to marketplaces, healthcare facilities, and educational opportunities. The development of rural infrastructure, productive industries, and social and economic services is crucial in emerging nations. The majority of modern consumer products are imported because more developed nations lack the processing industries necessary to produce them from locally available resources. This is due to the fact that transportation in less developed countries depends on the outside world far more than it does in developed countries. (Lebo, 2000).

The growth of rural road transportation, quick delivery, and service quality are important factors in determining how reasonably priced goods are on the market. Due to the transferability of transportation services, a high-quality infrastructure is necessary to compete for high-value goods. Rural roads are a crucial part of rural

development because they make it easier for people to access amenities like healthcare and education, which helps rural communities thrive socioeconomically. Rural road construction increases family productivity and labor demand.(World Bank, 2000).

2.3 Implementation Methods for Rural Road Infrastructure

The network of rural roads is necessary for the long-term sustainability of rural economic activities. The majority of the time, traditional road construction methods are expensive and require expensive machinery. The concept offers a labor-intensive, ecologically responsible way to build rural roads in many developing countries. Construction of rural roads can act as the "backbone" of socioeconomic development and rehabilitation in places lacking resources owing to isolation, harsh natural conditions, or the effects of current or just ended conflicts. The strategy for building rural roads encourages the socioeconomic development of the project region by:

- (1) by creating a significant number of jobs during current road construction and maintenance projects, and
- (2) by increasing the target locations' and populations' medium- and long-term accessibility.

Food insecurity that doesn't go away and a lack of employment prospects are two traits that are typical of impoverished homes, both of which are exacerbated worse by severe emergencies. Temporary jobs are available during road building. In the long run, better accessibility encourages the development of new social and productive resources as well as market access in the targeted locations. These are the strategies for implementation. Short-term (direct Impact).

1. During road construction, help a large number of people in locations with a food shortage fulfill their bare necessities by giving them extra money and food.
2. Provide beneficiaries with quick employment opportunities to enable them to save and buy new assets.
3. Reduce the number of young males leaving the workforce and the workload placed on women by doing so.

Medium-term (direct Impact)

1. By increasing market access and reducing travel time, you can improve target recipients' socioeconomic situations and their nutritional quality.
2. Access to current public and private services should be improved.

Long-term (Indirect impact)

1. Enhance target communities' access to services and market hubs to foster long-term socioeconomic development.
2. Establish new businesses and small market locations along the road to increase off-farm job and income opportunities.
3. Improve and diversify agricultural production to increase land productivity, which will result in more jobs and revenue for farmers.
4. During road construction, social inclusion strategies and active participation are used to strengthen the decision-making abilities of disadvantaged and excluded groups.
5. Increase the geographic reach of services provided by the public and commercial sectors to outlying places.

The building project's early completion is essential for fulfilling the medium and long-term objectives. An acceptable project time and scope should therefore take a road's completion within three years into account. The road must be able to be maintained by the beneficiaries using local resources for a number of years. (Nikolaus Schall, 2013).

2.4 Benefit of Improved Rural Road

Both local growth and the local economy depend on these rural routes. Rural road upgrades have a substantial indirect impact on the degree of economic development as a whole. The ability to move things more effectively and the improvement of the roads make it possible for people to create a small store in the village, buy local produce, or even build their own produce to sell in the nearby market places. Transportation, agriculture, health, and education are among the effects that are listed.

Roads are used by people to get to marketplaces and social services. Food, supplies, and agricultural inputs, as well as replacement parts for the water system and administrative services, must be transported via a road link. Due to the huge decrease in vehicle operating expenses brought on by the road upgrades, commercial trucking

companies usually offered lower transport rates. Another benefit was an increase in the number and cadence of commercial transportation services. Increasing the rural population's access to essential roads and infrastructure has been a key part of this effort. (Jill Windle and R.A. Cramb, 2002).

Numerous studies have discovered a strong correlation between agricultural productivity and the distance to the nearest all-weather road. In the vicinity of improved roads, agricultural activity overall rose in terms of production volume, land productivity, and monetary value of output. The effects of improved road infrastructure on agricultural output and rural household income are examined in Delta State, Nigeria. The results show that rural roads considerably boost agricultural output. They attributed the result to a decrease in transportation costs, an increase in the demand for rural labor as a result, and an increase in rural revenue brought on by better rural roads. Roads had a large positive impact on output and income since they led to a 12% rise in agricultural output and a 2.2% increase in total family income when road conditions were improved by 10%. According to the report's findings, road infrastructure promotes cross-sectoral ties between agricultural and non-farm businesses, which enhances rural households' income diversification plans. (Ogunleye, 2014)

Despite the fact that access to education is regarded as considerably reducing poverty, getting there can be difficult when there are no roads or when the roads are in poor shape. Accessing education can be quite difficult when there are significant travel distances or poor transit options. Additionally, it is very common for kids from developing countries to have to walk or board in particular cities in order to get to school. These difficulties contribute to the high school dropout rate in rural areas. The workload on the farm and at home, as well as financial limitations, are other factors contributing to the increased dropout rate. (Warr, 2006).

Access to high-quality healthcare, a vital social function, is a crucial aspect of staffing and equipping health institutions. The primary challenges for rural areas trying to receive healthcare services are the distance and time involved. It takes time to go to health facilities. For many rural villages without access to roads or other modes of transportation, the travel times and distances to health centers are too great. Location has a big impact on who uses obstetric care and delivery services in particular. It is obvious that accessing locations for emergency delivery is difficult due to long distances. When rural roads were improved, healthcare services witnessed

a rise in both the number of people using them as well as in the frequency of use. (World Bank, 1996).

2.5 Rural Road Construction and Maintenance

Road deterioration brought on by a lack of maintenance is causing growing worry in a number of developing countries. The problem has undergone a thorough investigation, and an accurate identification and estimation of the effects of subpar maintenance has been made. But both the magnitude of the problem and the solutions' acceptance remain relatively narrow. These considerations include the level of assistance, the requirement for capacity building, and the length of time required to put up an effective road management system. A system like this should prevent the road network from deteriorating by ensuring that financial, material, and human resources are employed in a way that maintains the assets' quality and worthwhile also enhancing the network in proportion to needs and priorities of the user. (Samli, 2010)

The term "road maintenance" alone implies what the primary goal is. This is done in order to retain the road in its original condition after construction or improvement. It is acknowledged that over time, the condition of the road may worsen as a result of issues that maintenance efforts cannot address. However, maintenance should start on the first day following the conclusion of the road enhancement work in order to slow this deterioration.

In actuality, regular upkeep and timely repairs enhance the life of the road by postponing the time when it will need to be rebuilt. This has a variety of benefits, the most significant of which is that it extends the period of time during which the investment's benefits are realized and, as a result, delivers a better rate of return on the initial investment. Maintenance pushes back the deadline for making major investments in road rebuilding. Because the annual cost of maintaining a road represents such a small part of the initial cost, the economic justification for good preventative maintenance is unquestionable. Even if it is expensive to create roads, some would argue that their significance is diminished without a dependable maintenance system. (Samli, 2010)

Unsealed roads, which make up the majority of rural roads in the Asia and Pacific region, provide a particularly poor condition. Even if the cost of maintaining rural roads is relatively low in proportion to the asset's value, timely and regular maintenance must be carried out. As a result, it is a continuing project that needs

funding. The funds given to it should be in accordance with a maintenance schedule that classifies the roads as being in a maintainable state and provides a regular expense for the network. Sadly, road maintenance is typically perceived as a to-do list for roads that need to be rebuilt because of neglect.

The challenges of keeping rural roads in good condition extend beyond only financial ones. There are technical issues as a result of poor planning and knowledge of the state of the road network. The absence of clearly defined accountability for maintenance planning, budgeting, and implementation at multiple scattered levels is another important institutional component at work. The ASIST AP program of the International Labor Organization has been engaged in maintaining rural roads as part of its wider work program on locally resource-based approaches to rural infrastructure development. In addition to implementing sustainable maintenance programs in the Asian region, the task includes assessing and evaluating rural road repair initiatives. (Marcela Alondra Chamorro Gine, 2012)

Table (2.1) Maintenance Categories and Activities for Rural Road Activities

Maintenance	Maintenance Activities
Regular Maintenance	repairing the roads cleaning of the drains upkeep of surfaces
Rehabilitation	Reshaping Reworking Simple Blading or Forming Specified Gravelling Gravelling
Reconstruction, remedial work, or urgent maintenance	To maintain a suitable state for the prevailing traffic, reconstruction, corrective maintenance, or emergency maintenance is used.

Source: Marcela Alondra Chamorro Gine, 2012

2.6 Reviews on Previous Studies

Windle, J., & Cramb, R. A. (1997). "Remoteness and rural development: economic impacts of rural roads on upland farmers in Sarawak, Malaysia". Their study found that the impact of roads varied within an area (a function of remoteness) and between areas (also a function of remoteness). According to their results, impacts were considerably greater when roads provided communities with access to a major urban center compared with a small town.

Bryceson, D. F., Bradbury, A., & Bradbury, T. (2008) studied about how to relate the road development to the poverty reduction. They wanted to find out how rural roads affected movement in Africa and Asia. According to their study, road upgrades may enable the development of social service delivery, as has been seen in Ethiopia. However, a sufficient condition for improving the mobility of the rural poor can be established given their relative lack of motor vehicles and their capacity to pay for public transportation.

Thida Kyu (2008) examined about the role of infrastructure in economic development of Myanmar between 1988 and 2004. This dissertation attempted to study dealing with productivity impact of infrastructure and the linkage of infrastructure to economic growth. Development strategies and infrastructure policies were also mentioned. Her study results confirmed that Myanmar economy depends both more infrastructure investment and economic investment for future economic growth and infrastructure investment has crowd-out effect on economic investment. Moreover, macroeconomic and political instability, and the development of legal and financial infrastructure are imperative to support saving and investment that are essential for economic growth.

Tripathi (2010) studied about the road transport infrastructure and economic growth in India using vector regression (VAR) approach to analyze the impact of road transport infrastructure on macroeconomic variables. He used the vector auto regression (VAR) approach to analyze the impact of road transport infrastructure on macroeconomic variables, and he looked at whether or not there is a long-run equilibrium relationship between road transport infrastructure and the macroeconomic variables such as output, employment, and gross private capital formation. She discovered that the network dynamic externalities from road transport networks and GDP have a long-term link, as do estimates using the VAR technique of the long-run impact of public infrastructure on output and employment. According to her, the idea

that public capital is productive is supported by the long-run elasticity of output with regard to public capital being positive.

John Bryden, (2011) studied that Rural Development Indicators and Diversity in the European Union. This survey's objective was to look at social progress, economic performance and structure, population trends, and migration in EU nations. In view of recent changes to rural policy and new social and economic indicators in EU Member States that could potentially be used at the EU level, this survey's main question focused on these issues. The primary causes of variations in economic performance over the medium term (10–20 years) among rural areas in similar geographic and policy contexts were identified in this study paper by Dynamics of Rural Areas (DORA) in the EU.

Kyaw Thura (2013) investigated the transport infrastructure development in Mon State between 1988 and 2011. His study focused on the transportation infrastructure of Mon State including road transport, waterways, airways and railways. His study found out that the usage of roads and railways transport was increased, the use of inland waterways was decreased. However, the transportation sector has been increasing in the economy of Mon State because its share in GDP grew from 6.7% in 2001/02 to 14% in 2010/11.

Fungo, E., Krygsman, S, & Nel, H. (2017) examined about “the role of road infrastructure in agricultural production” in South Africa. Their study results showed that farmers who have access to the bigger markets, on average, produce high crop yield. According to their results, suggested that for the development of the agricultural sector, the improvement of rural road infrastructure and transport service should be linked to the roads going to the bigger markets, otherwise, the impact on agricultural sector will be low.

Cho Kay Kaine Soe (2019) studied about rural road infrastructure development in Myanmar, on Kyauktan Township in case study. The aim of her study was to assess the impact of rural road development on household living standards and to determine the current state of rural road infrastructure development in Kyauktan Township. Descriptive methodology was employed in that investigation. In Kyauktan Township, it was discovered that a significant number of kilometers of rural roads had been built between 2012 and 2018. The findings of that study revealed that the construction of rural roads significantly impacted the general state of economic

development in each studied area. She opined that Kyauktan Township has to invest more in its transportation and communication infrastructure.

Ye Htet Zaw (2019) studied about the infrastructure development on rural society on Taikkyi Township for the Master of Economics thesis. His thesis title was “A study of infrastructure development on rural society in Taikkyi Township (2009-2018)”. This study examined the impact of infrastructural development in Taikkyi Township on rural society. The survey is carried out as a case study in Taikkyi Township. In Taikkyi Township, it has been discovered that there has been an improvement in rural infrastructure and rural development. Additionally, it has been discovered that the growth of the transportation sector lowers transportation costs and commute times and speeds up the distribution of outputs to markets. Because it may generate employment opportunities and have other good effects, the building industry is a major driver of rural development.

Mie Mie Tun (2019) studied on the impacts of road infrastructure network in rural area of Myanmar, case study in Ywa Ngan Township. Her study mainly focused on the effect of rural road network on socio economic conditions (income, education, health and tourism) in Ywa-Ngan Township. That study was based on a qualitative and quantitative data through input from the household surveys and focus group discussion. The result of her study showed that the construction and upgrading of rural roads have both positive and negative impacts. Increased revenue, a higher percentage of students attending school, easy access to health care services, and more visitors to the area are all positive effects. Increased access to harmful medications, diseases, and the encouragement of environmental destruction are negative effects.

CHAPTER III

OVERVIEW ON RURAL ROAD INFRASTRUCTURE DEVELOPMENT IN MYANMAR

3.1 Rural Road Infrastructure in Myanmar

Nations Online has a profile on Myanmar, a country in Southeast Asia also referred to as Burma or the Golden Land. Myanmar's extensive southern coastline runs along the Andaman Sea, the Gulf of Thailand, and the Bay of Bengal. Laos, Thailand, and Bangladesh are located in the east, north, and northeast, respectively. Bangladesh and India are located in the northwest. According to World Meter's analysis of the most recent United Nations data, Myanmar's population as of today is 55,215,493. Yangon is the largest city, former capital, and economic center of Myanmar (Rangoon). Since 2005, Naypyidaw, a planned city in the center of the country, has functioned as Myanmar's new (administrative) capital.

More than two-thirds of people live in rural areas. Yangon, Myanmar's capital and largest city, is home to around 4.5 million people. Myanmar is home to a variety of ethnic groups, including the Burmans, Shan, Karen, Rakhine, Mon, Chins, and Kachin. Although Buddhism is still widely practiced, Christianity and Islam are also present. The bulk of the population speaks Burmese; however, a small number of places also speak indigenous languages.

Currently, just half of rural inhabitants have access to basic roads. The cost of transportation is ten times higher without a road than it is with one. Village road densities are lowest in ethnic minority areas of Myanmar, particularly in the states of Chin, Kachin, and Kayin. ³ Despite improvements, Myanmar's rural connectivity is still subpar, limiting access to both physical resources and financial resources. There aren't many all-weather roads in the country, which makes travel difficult and usually unfeasible for the majority of the year. In Myanmar, there is a network of 95,000 km of rural roads, 28% of which have an improved (gravel or stone macadam) surface, typically in poor condition, and 6% of which are paved. A nationwide objective of the government is to connect 80% of villages by 2030. According to government

estimates, Myanmar needs to build 10,000 km of new roads and upgrade 42,000 km of current rural roads.

Myanmar's enormous infrastructure will hinder its effective economic development. Myanmar is lowering poverty through boosting economic growth and investing in transportation infrastructure. The reduction of poverty is a significant result of economic progress. Development frequently leads to increases in productivity, employment, and educational standards. Similar to other developing nations, Myanmar saw significant reductions in poverty as a result of a robust economy.

Economic growth is one strategy to fight poverty, but there are other strategies as well. One in four people still live-in poverty in the Southeast Asian nation despite its reduction from 48.2 percent in 2005 to 24.8 percent in 2017. In Myanmar, improvements and expansions are being made to rural roadways. Additionally, to increase transportation with Thailand, a significant commercial partner, Myanmar is developing roads, trains, and bridges.

The government would need to invest \$60 billion in transportation projects between 2016 and 2030 if it intends to completely develop its transportation infrastructure, according to the Asian Development Bank's (ADB) 2016 Myanmar Transport Policy Note. In Myanmar, there are almost 20 million people who lack even the most basic road access. Furthermore, 60% of highways are in poor shape. According to the ADB, Myanmar's GDP could theoretically increase to 13 percent, or nearly \$40 billion, if investments in transportation infrastructure increased to 3 to 4 percent of the GDP. For instance, Myanmar invested between 1 and 1.5 percent of its GDP between 2005 and 2015 in transportation infrastructure. According to Myanmar's Sustainable Development Policy 2018-30, improving transportation infrastructure is a top objective. The improvement of ports, railways, roads, and bridges will make Myanmar more accessible for trade, which may result in an increase in trade between Thailand and other countries. (Asia Development Bank, 2016).

The second Thai-Myanmar Friendship Bridge, which opened for traffic in 2019, spans the Moei River in eastern Myanmar. The \$126 million bridge connects the cities of Mae Sot in Thailand and Myawaddy in Myanmar. The bridge is expected to significantly increase trade between the two trading partners, according to Myanmar. The Yangon-Thanlyin Bridge will connect Thanlyin, an important port city

that controls the majority of commodities entering and departing Myanmar, with the country's capital. The \$278 million Bridge should be done by 2021, according to projections. Dala in the southwest is connected to Yangon by a new bridge that costs \$188 million. The building of this bridge ought to be finished by 2022. Residents of Dala, a rural, underdeveloped suburb, must take a ferry to cross the Yangon River because there are no bridges there. The bridge will shorten commutes for residents and speed up trade in Yangon. (Asian Development Bank, 2016)

Rural transportation services and rural roads are essential for reducing rural poverty and promoting social and economic development. According to research from Myanmar and other nations, access to markets and services is crucial for increasing rural productivity and growth. An estimated 70% of Myanmar's villages lack year-round road access, which has an impact on a population of around 20 million people. To offer year-round access to all villages, it would take around 100,000 km of new roads and 75,000 km of modified existing highways.

The following procedures will be put into place in accordance with the Ministry of Construction's instructions in order to deal with the issue of providing universal access in Myanmar within 15 years.

- More money has to be set aside for modernizing and/or enhancing neighborhood roadways.
- Additional financial resources are required for road maintenance.
- The allocation of resources should be focused on the provision of basic access.
- The execution of roadwork needs to be done with greater professionalism.
- The ownership and maintenance of the village's road infrastructure should be made clear.
- The regulation of rural transportation services should be kept to a minimum. (Myanmar Transport Sector Policy note, 2016).

3.2 Legal Framework of Road Infrastructure in Myanmar

The Ministry of Construction, a government ministry in Burma, is in charge of constructing and maintaining the country's infrastructure, including its roads and bridges. Building and maintaining the country's infrastructure, including its roads and bridges, is the responsibility of the government of Myanmar's Ministry of Construction. In 2019, the Ministry of Construction is in charge of the departments listed below.

- Department of Building
- Department of Highways
- Department of Bridge
- Department of Urban and Housing Development
- Department of Rural Road Development

The Department of Rural Road Development will be a new department inside the Ministry of Construction (MOC) that will be responsible for carrying out rural road projects. 2224.7 miles of rural roads were authorized by the previous administration in the 2016-2017 budgets, but only 202.4 miles were awarded in the 2017-2018 fiscal year, which suggests that the outlook for their construction may have changed under the new administration.

It is estimated that 40% of all people in Myanmar live in villages without access to year-round rural roads, including more than half of the rural population. A rural route that connects the majority of the settlements is not always open. A villager might be able to drive a car to the closest settlement, but the path is likely to become impassable during the rainy season. The percentage of rural residents who live fewer than two kilometers from an all-season road is shown by the widely used Rural Road Access Index (RAI). In rural areas, 64% of people must travel more than two kilometers to get to an all-season, according to the anticipated RAI for Myanmar, which is 36%.

Better access to rural roads is needed in Myanmar in order to reduce rural poverty. Since mobility has no bearing on agricultural output, health, or educational achievements, a number of conditions must be met in order to support rural development. However, it seems that there must be at least some rural road connectivity in order to decrease poverty and improve the effectiveness of other government initiatives.

3.2.1 Policies and Strategy for the Department of Rural Road Development

The Department of Rural Road Development's policy is to construct rural roads in a way that enhances peoples' socioeconomic well-being. The following are the goals of the DRRD:

1. To development Rural Roads and Bridge continuously
2. To bring rural products to market as quickly and affordably as possible

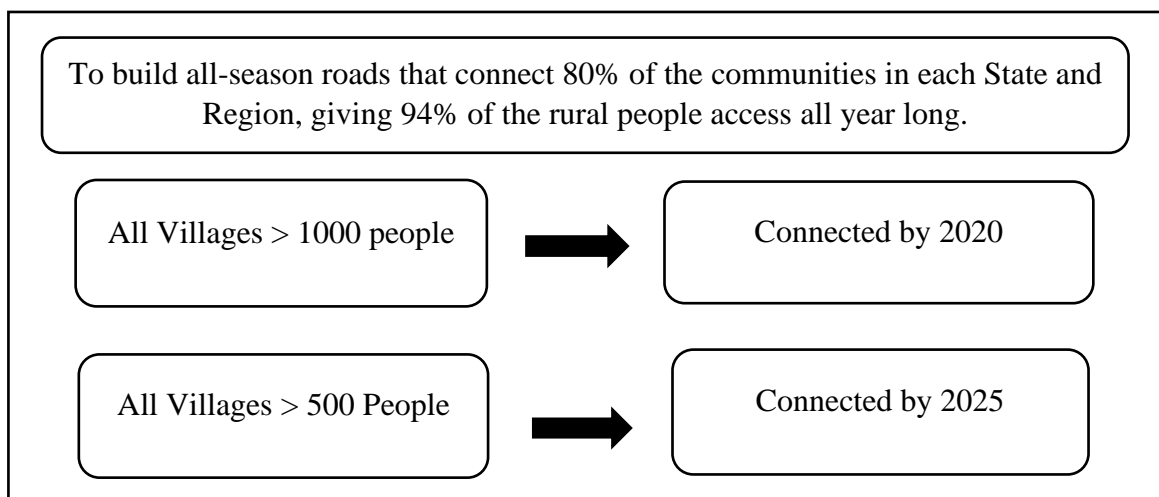
3. To quickly facilitate by using Core Rural Road Network (CRRN) for socio economic development of residents in Rural Areas
4. To support the National Logistic Hub
5. To upgrade all rural roads for year-round accessibility in 2030

The rapid building of rural roadways is vitally necessary for rural growth. The establishment of township/district roads as well as state and division circle roads is the goal of the construction of numerous roads that connect villages to one another, towns to villages, villages to highways, and more.

The national strategy for rural roads and access was developed jointly by the Ministries of Agriculture, Livestock and Irrigation (MOALI) and Border Affairs (MOBA), with the Ministry of Construction (MOC) and the Ministry of Transport and Communications (MOTC) contributing significantly to the improvement of Myanmar's rural road infrastructure development. The initiative is an effort to address Myanmar's lack of year-round rural roads, which affects the ability of rural populations to access healthcare, education, and employment opportunities.

The Myanmar government plans to expand rural access by constructing all-season rural roads by 2030 as a core approach for developing rural areas and tackling rural poverty and inequality in the country. In order to address access difficulties, provide as many rural households with year-round access by 2030, and promote the achievement of the 2030 Sustainable Development Goals, it serves to direct investments in the rural road sector over the next 15 years (SDGs).

Figure (3.1) Strategy Objective for 2030



Source: The Department of Rural Road Development

The government's long-term development goal is to give every community in Myanmar year-round access to the countryside. Over the course of the 15 years covered by this strategy, the government of Myanmar will provide 90% of all registered villages in every state and region with access to roads, with at least 80% of registered villages receiving year-round access.

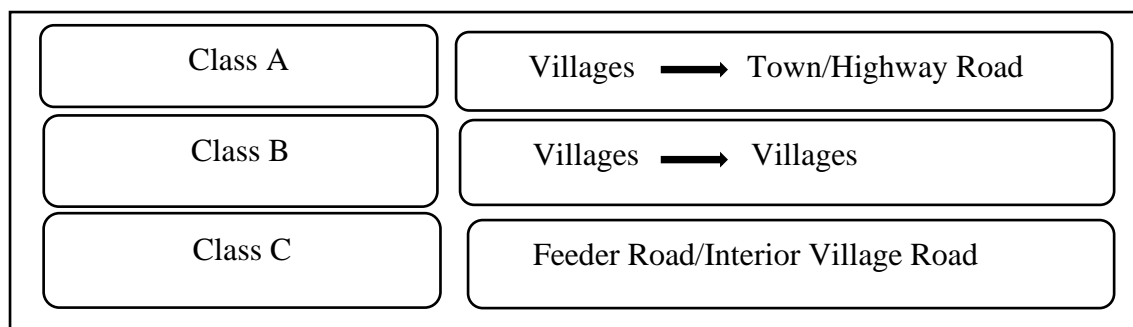
By establishing year-round road connectivity to every registered village with more than 1,000 people by 2020 and to at least 95% of registered villages with more than 500 residents by 2025, the policy will focus on large communities. By 2030, 90% of all registered villages in each state and region will be connected by roads, benefiting 95% of the rural population, and 80% of registered villages will have year-round road access. By implementing this program, 10 million more people will have access to all-season roadways, and 3 million more people will have access to roads during the dry season. New rural roads will also be created, and existing country roads will be renovated. Proper maintenance will be carried out in order to sustain the greater access levels. (Department of Rural Road Development, 2018).

3.2.2 Classification of Core Rural Road Network (CRRN)

The bare minimum rural road system required to connect all registered communities to higher-level road networks, known as the Core Rural Road Network (CRRN), will be defined. A CRRN route will connect any villages that aren't already united by higher-level roadways. Through the CRRN, each village will have access to infrastructure and services in nearby townships and village tracts, as well as connections to higher-level roadways that provide access to district, state, and regional capitals as well as the rest of Myanmar. Three groups describe the fundamental rural roads. Below are a few of them:

- Class A - connected to DOH
- Class B - connected to Class A
- Class C - connected to Class B

Figure (3.2) Rural Road Classes



Source: The Department of Rural Road Development

Rural roads will be given one of three administrative ratings. CRRNs that connect two or more villages with a combined population of 1,000 or more are referred to as class A rural roads. These CRRNs often connect to other roads at a higher level or directly to towns. Class B rural roads typically include the remaining CRRN lines with lower populations that connect to Class A highways. Class C roads are any non-CRRN country roads that provide access to remote villages and agricultural areas. Construction of Class A and B country roads will feature 12-foot carriageways of improved, unsealed quality (such as gravel or stone macadam). These roads will be constructed utilizing climate-resilient designs, and necessary care will be performed to enhance their condition and extend their lives. Where traffic volumes, vehicle types, geometric requirements, and geographical conditions warrant it, CRRN roads will be sealed and subject to stricter geometric standards.

Every road in the CRRN will have the proper side drains, crosswise drainage, slope and embankment protection, etc. For the construction of water crossings, steel and concrete will be employed, and wooden bridges will progressively be modernized. Redevelopment or new construction will not be prioritized for Class C highways. When water village road access is either prohibitively expensive or problematic, alternate access alternatives, such as motorbike tracks, footbridges, and infrastructure for water transport, may be built.

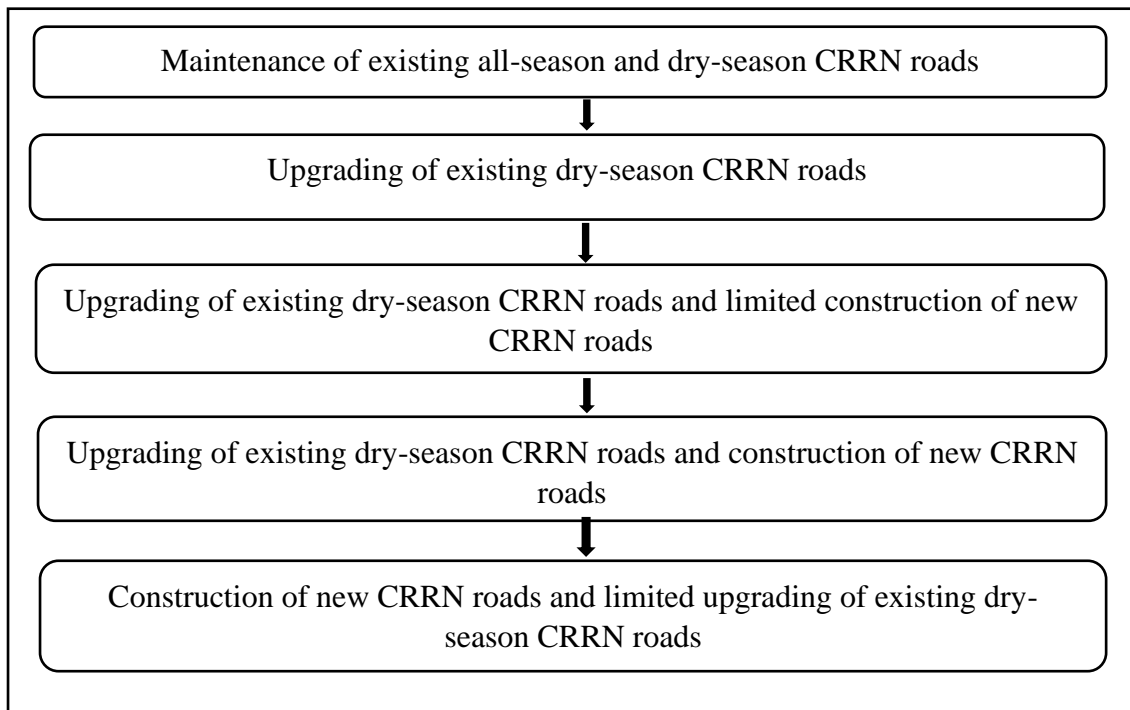
3.2.3 Rural Road Targeting, Ranking and Financing

Historically, funding for rural roads has come from the union budget. Recent years have shown how political objectives and the flexibility of funding for the rural road sector make it difficult to plan and carry out rural road construction and

maintenance. The government plans to create a road fund that will primarily be financed by an increase in the price of gasoline, but will also include toll revenue, loan financing, transfers from the union, state, or local budgets, and loan financing. The road fund was established to ensure more stable and ongoing support for the road industry. According to the National Strategy for Rural Roads and Access, \$1 billion would be set aside annually from the fuel tax for rural roads, or about 25% of the necessary financing. Each of the other sources of funding the Union budget, state or local budgets, and development partners would provide 50% of the necessary funds. (Asian Development Bank, 2018)

Rural road financing will exclusively be focused on CRRN routes in order to meet the strategic goal of connecting 80% of all registered villages by all-season road, at the lowest cost and in the shortest amount of time. The existing CRRN roads will be prioritized for maintenance, with the remaining money going toward modernization and new construction.

Figure (3.3) Prioritization of CRRN Roads



Source: The Department of Rural Road Development

On CRRN routes, settlements with larger populations will be given priority; these settlements may be a single village with more than 1000 residents or a collection of villages with a total population of more than 2000 inhabitants. Second priority will

be given to CRRN-connected roads that serve a single village with a population of more than 500 or a group of villages with a combined population of more than 1000. Third priority will be given to CRRN-connected roads that serve a single village with a population of more than 250 or a group of villages with a combined population of more than 500. The fourth priority will be given to the remaining CRRN routes that link other, smaller, separate CRRN roads.

Funding will only be given to CRRN routes in lower categories when all of the roads in the upper categories have been upgraded and constructed. Roads will be given the highest priority within each priority category based on socioeconomic variables such as benefit population per mile, traffic volume, poverty levels, environmental effects, the need for land acquisition and resettlement, etc. The regional representatives of the several line ministries, and the regional members of parliament will all concur on the road ranking within each priority category.

3.3 Future Plans for Rural Road Infrastructure in Myanmar

The Department of Rural Road Development created a 13-year long-term plan (starting from 2018 and end at 2031). The Department of Rural Road Development (DRRD) is carrying out road upgrading works, primarily in rural roads, throughout a 13-year plan in order to meet the objectives for the development of rural roads and transportation. Following are the stages of the 13-year long-term plans:

- (1) First Three Years Plan (from 2018-2019 to 2020-2021)
- (2) Second Five Years Plan (from 2021-2022 to 2025-2026)
- (3) Third Five Years Plan (from 2026-2027 to 2030-2031)

These 13-year long-term plans are detailed in the tables.

Table (3.1) First Three Years Plan

Types of Roads	2018-2019 to 2020-2021	
	Length (km)	Cost of Project (Billion Kyats)
Concrete/Bituminous	8,558	1,360.456
Macadam Road	7,032	641.639
Gravel Road	6,489	386.304
Total	22,079	2,388.399

Source: The Department of Rural Road Development

Table (3.1) shows that, despite the DRRD's goal of completing the first three-year plan from 2018–2019 to 2020–21 with a total length of 22,079 km, between 2018 and 2021, the DRRD will invest an estimated 2388.399 billion kyats in the rehabilitation of rural roads.

Table (3.2) Second Five Years Plan

Types of Roads	2021-2022 to 2025-2026	
	Length (km)	Cost of Project (Billion Kyats)
Concrete/Bituminous Roads	14,410	2,183.355
Macadam Roads	9,438	855.779
Gravel Roads	5,782	344.236
Total	29,630	3,383.370

Source: The Department of Rural Road Development

Table (3.2) show that the estimated cost of the rural road projects that the DRRD would construct between 2021 and 2025 is 3383.370 billion Kyats. DRRD intends to increase investment in projects for building, extending, and improving rural roads.

Table (3.3) Third Five Years Plan

Types of Roads	2026-2027 to 2030-2031	
	Length (km)	Cost of Project (Billion Kyats)
Concrete/Bituminous Roads	14,527	2,197.933
Macadam Roads	7,893	718.715
Gravel Roads	4,989	296.988
Total	27,409	3,213.636

Source: The Department of Rural Road Development

Table (3.3) show that the DRRD will spend 3,383.370 billion Kyats on rural road projects that are expected to be implemented between 2026 and 2030. DRRD intends to increase funding for initiatives involving the building, extending, and improving of rural roads.

3.4 Construction of Rural Road Condition in Myanmar

Projects for the maintenance, improvement, and building of rural roads that link towns with villages and villages with one another may have been carried out by the Department of Rural Road Development. Public works initiatives include initiatives to upgrade and construct new rural roads. The Department of Rural Road Development plans rural road projects to satisfy national needs. The DRRD is speeding up the restoration of existing rural roads while also constructing new ones.

Table (3.4) Length of Rural Road Construction in State and Region from (2012-2013) to (2017-2018)

State/Region	Category of Rural Road (mile/furlong)						Total
	Concrete Road	Bituminous Road	Macadam Road	Laterite Road	Earth Road	Mule/Foot path Road	
Naypyitaw	5/1.76	59/4.42	163/6.13	401/0.63	595/4.99	413/2.23	1638/4.14
Kachin	5/2.27	68/0.36	313/5.83	217/0.6	1226/6.99	-	1849/0.05
Keyah	6/5.19	34/0.42	114/1.78	-	137/7.26	148/5.18	446/3.83
Kayin	18/6	84/1	155/4	116/0	813/7	-	1188/2
Chin	0/4	21/7	40/7	-	2160/6	2546/3	4770/3
Sagaing	36/0.15	260/1.18	1005/6.31	658/4.44	5737/5.52	-	7708/1.6
Tanintharyi	26/6.01	178/0.54	495/7.48	100/0.57	1116/4.00	51/4	1968/6.71
Bago	31/3.59	143/4.35	586/3.37	1121/1.79	2335/1.69	-	4217/6.78
Magway	4/6.13	142/5.06	716/5.80	678/7.6	3960/3.43	1037/2.73	6549/6.76
Mandalay	26/6	344/4	1391/4.19	626/5.91	2937/1.99	-	5324/6.09
Mon	77/2.72	218/4.73	54/5.2	121/5.58	495/4.92	-	967/7.15
Rakhine	89/6.56	53/1.5	574/5	-	828/2.35	220/3.95	1776/3.36
Yangon	348/4.96	47/5.53	226/1.1	180/2.04	873/6.81	272/3.26	1948/7.43
Shan (North)	-	201/1	309/1	209/6	4100/6	-	4820/6
Shan (East)	0/2	55/1.54	113/3.80	5/7.3	560/0.34	1157/3	1892/1.98
Shan (South)	0/6.4	189/0.42	548/4.56	-	3701/0.49	-	4439/3.87
Ayeyarwady	209/2.69	29/3.37	758/7.45	158/7.76	2852/3.75	-	4009/1.38

Source: Department of Rural Road Development, 2018

3.5 Maintenance of Rural Road Infrastructure in Myanmar

A number of developing nations are increasingly concerned about the deterioration of rural roads brought on by a lack of upkeep. Because, like other developing nations, Myanmar uses a labor-intensive conventional method for maintaining its rural roads because it has an abundance of cheap labor. Depending on the type of road, such as bituminous, metal, gravel, or earth, the predetermined amount of the routine maintenance funding is distributed. The bituminous road routinely requires pothole repair, one furlong of seal coating each mile, shoulder dressing, drain clearance, and milepost painting.

The frequency and severity of maintenance are influenced by a variety of external elements, including weather, topography, traffic, and soil types. The original technical concepts used to build the road and the caliber of the construction job are two other major factors that greatly influence the demand for maintenance. These factors can be used to design maintenance strategies and accompanying management systems that minimize maintenance costs and efforts.

Prior to the need for urgent repairs and maintenance, financing must be in place to ensure timely and regular maintenance. The most efficient form of maintenance is accomplished when a company is able and ready to carry out necessary interventions at an early stage of deterioration and therefore limit the extent of damage. Damage control is the foundation for a successful maintenance plan. The movement of water as fast and effectively away from the road structure as possible is a key component of road repair activities.

Early on, during the planning and building of the road, effective measures must be put in place. One of the key purposes of maintenance work on a well-designed road is to make sure the drainage system continues to function efficiently. Depending on the location of the actual work, maintenance tasks are frequently divided into two distinct divisions. Off-carriageway work is primarily concerned with maintaining the drainage system and repairing damage to the road's external structures. In order to provide for free but controlled run-off water away from the road, all drains and cross drainage systems are maintained in good shape. (Ministry of Construction, 2017).

The second category of maintenance tasks was repairing the road's surface. Mainly, this labor entails keeping the road's running surface in good condition, free of any impediments, and with the requisite cross-fall to provide adequate drainage of the

surface. The majority of the drainage system, which is located outside the carriageway, needs to be protected in order for rural roads to have a long lifespan. The upkeep of the roadway surface also consumes a significant number of resources on highways where traffic volumes are higher. Rural roads get less traffic than motorways, and thus require less maintenance overall because of fewer road surface repairs. The availability and maintenance of the drainage system are directly related to the maintenance priorities for rural roads. Road construction must account for the possibility of anticipated harm to the road network.

Emergency maintenance involves activities such as:

- (1) Repair or reconstruction of cross-drainage infrastructure that have been harmed by flooding or heavy vehicles,
- (2) Road sections that have been destroyed by washouts, erosion, or floods may need to be repaired or rebuilt,
- (3) Repair or restoration of erosion control damages caused by landslides or high-water flows,
- (4) Clear the road's carriageway of landslides, trees, or rocks.

In order to increase transportation and land connectivity, support regional development, and meet national needs, the Myanmar government has built rural roads. The Myanmar administration has been putting policies and plans into action. In order to achieve the goals for the development of rural roads and transportation, the Department of Rural Road Development is putting the road upgrading work, specifically on rural roads, into action. The Department of Rural Road Development is responsible for maintaining, enhancing, and building new rural roads that connect villages with towns and one village with another. New rural roads are being built by DRRD, while existing ones are being upgraded more quickly each year. (Ministry of Construction, 2017)

CHAPTER IV

ANALYSIS ON SURVEY DATA

4.1 Profile of Gyopinkauk Township

Gyopinkauk Township is located in the Western District in the Bago Region. Gyopinkauk Township is under the administration of the Bago Region and is one of the eight townships in Tharyarwadi District. Gyopinkauk Township is located between 10 degrees 65 minutes and 18 degrees 15 minutes north latitude and 95 degrees 27 minutes and 95 degrees 50 minutes east longitude. It extends 33 miles from east to west and 8.3 miles from south to north. The total area is 297.10 square miles.

The east of Gyopinkauk Township is bordered by Kyauk Duttu Township and the south is bordered by Ook Pho Township. The west part of the township is bordered by Moenyo Township, and to the north is Zeekone Township. The entire area east of the quarter of the length of Gyopinkauk is forested and forested by the ridges of Bago Roma Mountain. Beyond the borders of the mountain ridges are the cultivated plains. The township is connected by the Yangon-Pyay highway and railway, and runs from south to north, occupying about one-third of the western part of the city. To the west of these railways and roads are plains and valleys.

Gyopinkauk Township is an area with few rivers, and the rivers flow from northeast to southwest. A prominent downtown stream flows from east to west. Most of the water sources in the region are brackish water, and the main source of water is drilled wells. Gyopinkauk Township is located at an elevation of 87 feet above sea level. The main business of town people is agriculture. The Township's main product is rice, which is mostly exported to the Magway Region.

The climate of Gyopinkauk Township is hot and humid, and the highest temperature is 40°C and the lowest temperature is 11.0°C. In 2021, the total population was 122799. Many kinds of races, such as Kayah, Kayin, Chin, Mon, Burma, Rakhine, and Shan, live in Gyopinkauk Township. Among them, Burma has the largest percentage of 93.53 percent, Kayin is the second largest with 4.983

percent, and Rakhine is the third with 0.033 percent. The religions of people are Buddhist, Christian, Islam, and Hindu. The Buddhists are the largest, and the second largest is Islam. The majority of households live in wooden houses. Two-thirds of the households use motorcycles as transportation tools, and the rest use bicycles and cars. Gyopinkauk Township has a 100% literacy rate among those aged 15 and up. The current unemployment rate is 4.02 percent. Most of the crops grown in Gyopinkauk Township include rice, groundnuts, onions, beans, grape fruit, sesame, wet chili, and mangoes. In Gyopinkauk Township, there were four hospitals, eighteen clinics, and five departments of rural health. The map of the villages in Gyopinkauk Township is shown in Appendix B.

4.1.1 The Current Situation of Rural Roads Use in Gyopinkauk Township

The linked rural families frequently don't have adequate access to even the closest hamlet, let alone markets, jobs, or services. Roads connected villages as well as towns, cities, and districts. Since effective transportation is crucial for regional development, the government has made major investments in the construction of roads and bridges around the country. Better accessibility has a substantial impact on the expansion of a region's human resources. For the accessibility problem on rural roads, various solutions might be discovered.

In table (4.1), the road connecting from Gyopinkauk to other townships are shown.

Table (4.1) Connecting Roads from Gyopinkauk to Other Townships

Name of roads		Length (miles/Furlongs)
From	To	
Gyopingauk	Ook Pho	13.3
Gyopingauk	Zee Kone	5.5
Gyopinkauk	Thar yar wadi	49.1

Source: The Department of Rural Road Development, 2021

According to table (4.1), until 2021, Gyopinkauk Township was connected with Ook Pho Township by 13.3 miles and with Zee-kone Township by 5.5 miles and with Tharyarwady Township by 49.1 miles. At present, when Gyopinkauk-Zeekone Road has been built, makes it easy to travel from the villages to the city and from one

village to another. The length of the road is 7 miles and 6 furlongs. It is an 18-foot-wide bituminous road, and currently 5 furlongs of bituminous have been paved, 9 furlongs will be paved again next year.

4.1.2 Rural Road Construction in Gyopinkauk Township

The Department of Rural Road Development in Gyopinkauk Township was established in 2017. Before 2017, the construction of rural roads in Gyopinkauk Township was taken care of by the Department of Rural Development. The Department of Rural Road Development (DRRD) could have carried out projects for rural road building and improvement. The DRRD constructed the linking roads from village to village across the entire country. The situation in which rural roads were implemented during the years (2016-2017) to (2020-2021) is shown in table (4.2).

Table (4.2) Construction of Rural Road Condition in Gyopinkauk Township (2016-2017) to (2020-2021)

Fiscal Year	Construction of Rural Roads(miles/furlongs)					No. of Concrete Bridge
	Bituminous Road	Macadam Road	Concrete Road	Earth Road	Laterite Road	
2016-2017	-	116/6	-	24	-	8
2017-2018	-	3/4	-	-	3/7.68	2
2018 (Mini)	-	1	-	-	2/6.86	2
2018-2019	1/2	6/0.26				1
2019-2020	-		5/5	1/4	22/0.45	2
2020-2021	-	0/4	3	4/7	14/5.36	4
2021-2022 (Mini)	-	-	1/0	-	1/5	1
Total	1/2	127/7.26	9/5	30/3	45/1.35	20

Source: The Department of Rural Road Development

(mini = six months budget)

According to table (4.2), the types of rural roads are bituminous road, macadam road, concrete road, earth road, and laterite road. There are 157/0.48 miles that were built by the Department of Rural Road Department during the year (2017-2018) to (2021-2022). The bituminous road is one mile two furlongs, the macadam

road is 127 miles 7.26 furlongs, the concrete road is 9 miles 5furlongs, the earth road is 30 miles 3 furlongs, the laterite road is 45 miles 1.35 furlongs.

4.1.3 Upgrade of Rural Road in Gyopinkauk Township

Gyopinkauk Township's Department of Rural Road Development improved rural roads. The improvement in rural road conditions in Gyopinkauk Township is shown in Table (4.3).

Table (4.3) Upgrade of Rural Roads Condition in (2016-2017) to (2020-2021)

Villages	Upgrading of Rural Roads	
	Before	After
Kyunkonegyi	Earth	Laterite
Ywartharkone	Earth	Laterite
Kyunkonelay	Laterite	Concrete/Macadam
Oephokone	Earth	Macadam
Tharhlapinsi	Laterite	Concrete/Macadam
Ohnnekyawtan	Earth	Laterite
Yaytwinpho	Earth	Laterite
Ohnnekone	Earth	Laterite
Zeetaw	Earth	Laterite
Laytae	Earth	Laterite
Hnawkone	Earth	Laterite
Sharrseebo	Earth	Laterite
Phayagyikone	Earth	Laterite
Kawaikone	Earth	Laterite
Taungyoekwin	Earth	Laterite
Ponenayeik	Macadam	Bituminous
BuGyi	Macadam	Bituminous
YinnTikePin	Macadam	Bituminous
Thetkalchinkone	Macadam	Bituminous

Source: The Department of Rural Road Development, 2022

According to the table (4.3), in Ponenayeik, BuGyi, YinnTikePin, Thetkalchinkone villages, rural roads are upgraded from the original macadam road to bituminous roads. In Kyunkonelay, Tharhlapinsi villages, rural roads are being upgraded from the original earth roads to macadam roads and concrete roads. In Kyunkonegyi, Ywartharkone, Ohnnekyawtan, Yaytwinpho, Ohnnekone, Zeetaw, Laytae, Hnawkone, Sharrseebo, Kawaikone, Taungyoekwin upgraded rural roads from the original earth road to a concrete road. In Ywar Thit Kone, rural roads are upgraded from the original earth road to a laterite road.

4.2 Survey Profile

Gyopinkauk Township has 49 village-tracts and 277 villages. A simple random sampling method is used to select 19 villages, which are the most constructed rural roads in Gyopinkauk Township. This study focuses on the social and economic conditions of the villagers after the construction of the rural road in sample villages. The sample size of households is 150. The sampling units are the households of Gyo Pin Kauk Township's villages, which are Kyun Kone Gyi, Ywar Thar Kone, Kyun kone lay, Oe pho Kone, Thar Hla pin si, Ohn Ne Kyaw Tan, Yay Twin Pho, Zee Taw, Lay Tae, Hnaw Kone, Shar See Bo, Phaya Gyi Kone, Kawai Kone, Taung Yoe Kwin, Pone Na Yeik, Bu Gyi, Yinn Tike Pin, and Thet Kal Chin Kone, which are located around the roads are selected randomly. Table (4.4) shows the villages chosen, as well as the number of households and gender population.

Table (4.4) Households and Population of Selected Villages in Gyopingauk Township (2020-2021)

No.	Villages	Households	Population		
			Male	Female	Total
1	Kyunkonegyi	355	603	635	1238
2	Ywartharkone	168	308	333	641
3	Kyunkonelay	145	232	261	493
4	Oephokone	199	332	406	738
5	Tharhlapinsi	56	88	96	184
6	Ohnnekyawtan	127	232	274	506
7	Yaytwinpho	76	126	138	264
8	Ohnnekone	58	110	110	220
9	Zeetaw	108	184	187	371
10	Laytae	66	105	136	241
11	Hnawkone	61	115	109	224
12	Sharrseebo	7	7	11	18
13	Phayagyikone	113	99	99	198
14	Kawaikone	67	101	122	223
15	Taungyoekwin	55	78	84	162
16	Ponenayeik	164	254	303	557
17	BuGyi	183	304	348	652
18	YinnTikePin	64	118	120	238
19	Thetkalchinkone	141	216	249	465
	Total	3,021	3,612	4,021	7,633

Source: General Administration Department, 2021

The sample villages, according to table (4.4), are located around the roads in Gyopinkauk Township and have a total population of 7633, including the male 3612 and the female 4021. Among 277 villages, 19 villages are selected randomly, and 150 sample households are selected by using the quota sampling method from 19 villages in Gyopinkauk Township. The selected 150 sample households do not recover the total population of 3021 in the selected villages. Because there were many difficulties in collecting the data during the survey period due to the spread of Global Pandemic

COVID-19. Therefore, the sample of 150 households used in this study may not represent all households in the township. Therefore, in selected villages in the study area, administer with a total of one hundred and fifty sets of questionnaires.

4.3 Survey Design

In this study, the method of study is descriptive and both quantitative and qualitative methods are used. The primary data is collected from 150 households living in Gyopinkauk Township. The secondary data is obtained from the General Administration Department, Department of Highways, Department of Rural Roads Development, international organizations and internet websites.

The questionnaire was prepared by reviewing the literature review. The survey questionnaire was specifically designed to assess the effects of rural road development on the social and economic situations of households and household attitudes toward rural road infrastructure development. The pilot survey was interviewed on July 23rd, and the questionnaire was revised. And the final survey data collection was conducted from July 30th to August 14th. The primary data collection method was a face-to-face interview using a well-prepared questionnaire.

The questionnaire consists of four parts. Part I is about the demographic characteristics of sample households. The situations of the rural road construction in Gyopinkauk townships, which are (1) occupation of households, (2) monthly income of households, (3) assets of households, and (4) travel time for Gyopinkauk and Gyopinkauk hospital, are included in Part II. Part III consists of the opinions of sample households on the construction of rural road improvements by measuring the five-point Likert Scale for respondents' satisfaction. Part IV is the maintenance of rural roads.

4.4 Survey Results

4.4.1 Demographic Characteristics of sample households

The general socio-economic conditions of 150 sample households are presented in this section. This includes age, education, family size, types of houses, and electricity usage. According to the sample households' age, it is divided into five categories; less than 30 years, 31 to 40 years, 41 to 50 years, 51 to 60 years, and above 60 years. The percentage of household heads by age group is shown in table (4.5).

Table (4.5) Percentage of Households Heads by Age Group

Age Group	Number of Households	Percentage (%)
Less than 30 years	11	7
31-40 years	40	27
41-50 years	38	25
51-60 years	34	23
Above 60 years	27	18
Total	150	100

Source: Survey Data, 2022

According to the survey data, the age of the households is presented in table (4.5). The table shows that among the heads of households interviewed, the maximum age range is 31–40 years old, by 27%. The age range of 41–50 years is 25% and the age range of 51–60 years is 23%. The age groups for those less than 30 and those over 60 are 7% and 27%, respectively. The majority of sample households are between 30 and 40 years old, followed by those between 40 and 50 years old.

Table (4.6) Number of Households by Size of Households Member

Size of Households	Number of Households	Percentage (%)
Less than 3 members	7	5
3 to 5	115	76
6 to 8	27	18
More than 8 members	1	1
Total	150	100

Source: Survey Data, 2022

According to the data, the table (4.6) shows household members in the sample households. It is divided into less than 3 members, 3 to 5 members, 6 to 8 members, and more than 8 members by the size of the household's members. The number of people that live, work, and dine in the same household is referred to as the household size. Members of the households live together under one roof and split household costs. Families consist of parents, kids, and other relatives who work together in daily life. Most households have 3 to 5 members. The number of families with 6 to 8 members has decreased by 18%. The number of families with less than 3 members and more than 8 members is 5% and 1%, respectively.

Table (4.7) Educational Level of the Head of Households

Type of School	Number of respondents	Percentage (%)
Primary school	21	14
Middle school	60	40
High school	45	30
Graduated	24	16
Never	0	0
Total	150	100

Source: Survey Data, 2022

According to the data, the educational level of respondents is divided into five groups: primary school, middle school, high school, graduated, and never. The majority of the respondents, or 60 respondents, attended middle school. This was followed by 45 respondents who attended high school, and 24 respondents who received a diploma. No one respondent stated that they had never attended school, and 21 respondents attended primary school. This means that the level of literacy is not very poor and can have quite a bit of knowledge about deciding their economic, social, and health because most of the respondents possess a middle school level and there is no respondent who has not attended school.

Table (4.8) Types of Houses

Types of Houses	Number of Households	Percentage (%)
Zinc roofs and brick wall	44	29
Zinc roofs and wooden wall	93	62
Thatch roofs and wooden wall	0	0
Thatch roofs and bamboo	0	0
Other	13	9
Total	150	100

Source: Survey Data, 2022

According to the survey data, the table (4.8) shows that most of the households live in zinc-roofed and wooden-walled houses by 62 percent. 29.0% of the households live in zinc roofs and brick wall houses, and the households living in zinc roofs and bamboo wall houses are 9%. It is an area with abundant trees and forests,

and there are many people living in wooden wall houses. It is also assumed that the living standards of most of the respondents are relatively convenient.

Table (4.9) Source of Lighting of Sample Households

Source of lighting	Quantity	Percentage (%)
Public electricity	132	88
Candle	1	1
Generator	0	0
Solar Power	17	11
Other	0	0
Total	150	100

Source: Survey Data, 2022

In the study of rural road infrastructure development in Gyopinkauk Township's villages, the sample households use public electricity, battery power, and solar power for lighting. The findings of sample households in those villages are shown in Table (4.9). The table (4.9) shows that 88 percent of sample households use public electricity. Due to the fact that some villages are located in remote areas from the national grid system, 11.33 percent of households use solar power. The households of 0.67 percent use candles because some of the sample households cannot access public electricity. Regarding the development of income and consumption, those with access to electricity performed better than those without. Because of improved rural roads, the government can subsidize power.

4.5 The Situations of the Rural Roads Construction in Gyopinkauk Townships

The construction of rural roads is crucial for rural areas. Communication along rural roads is crucial for advancing social, economic, and market development in rural areas. As a result, factors influencing how well a household can live include its occupation, the amount of power it uses, the time it takes to get there, as well as its assets and income.

4.5.1 The Occupation of Sample Households

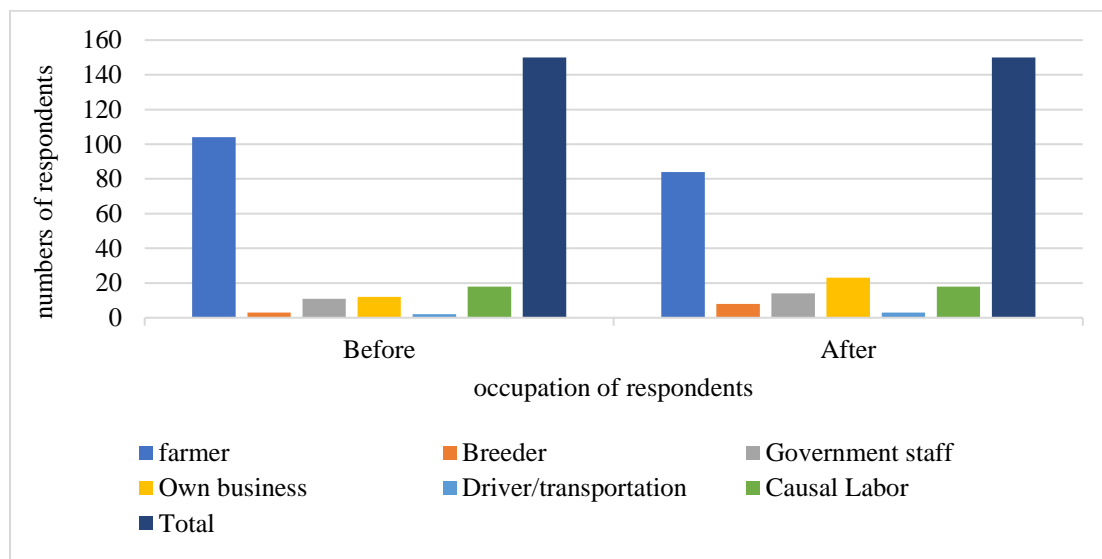
The responses from selected households were used to determine the head of household's occupational status during data collection. The types of groups of occupation are described in the following table (4.10).

Table (4.10) Comparison of Occupation for Head of Households

Occupation	Before rural roads construction	After rural roads construction
farmer	104	84
Breeder	3	8
Government staff	11	14
Own business	12	23
Driver/transportation	2	3
Causal Labor	18	18
Total	150	150

Source: Survey Data, 2022

Figure (4.1) Comparison of Occupation for Head of Households



Source: Survey Data, 2022

According to the survey data, (4.10), the occupation of the head of households is divided into six groups, including farmer, breeder, government staff, own business, driver and transportation, and causal labor. According to the survey data, most of the respondents are farmers (56 percent), and the breeders are 6 percent, the government staff are 9 percent, the own businesses are 15 percent, the driver/transportation is 2

percent, and the casual labor is 12 percent. Since farming is the primary economic activity, most family heads are farmers. Most local residents rely on agriculture, and cattle and buffalo are also raised commercially.

According to survey data, table (4.10) displays the change in each household member's working situation. Prior to the construction of rural roads, it was difficult for people to move around and work in Gyopinkauk. Following the development of rural roads, rural residents can work as government employees or business employees in Gyopinkauk's urban regions. With better rural roads, rural residents can work in distant locations. Additionally, since the household members might work in other fields, they might expand the number of income sources. Construction of rural roads may have increased economic potential as a result of easier access to employment opportunities. Opportunities to start a small store in the village or buy village property can have advantages due to improved roads and an improved ability to move goods.

4.5.2 Monthly income of Sample Households

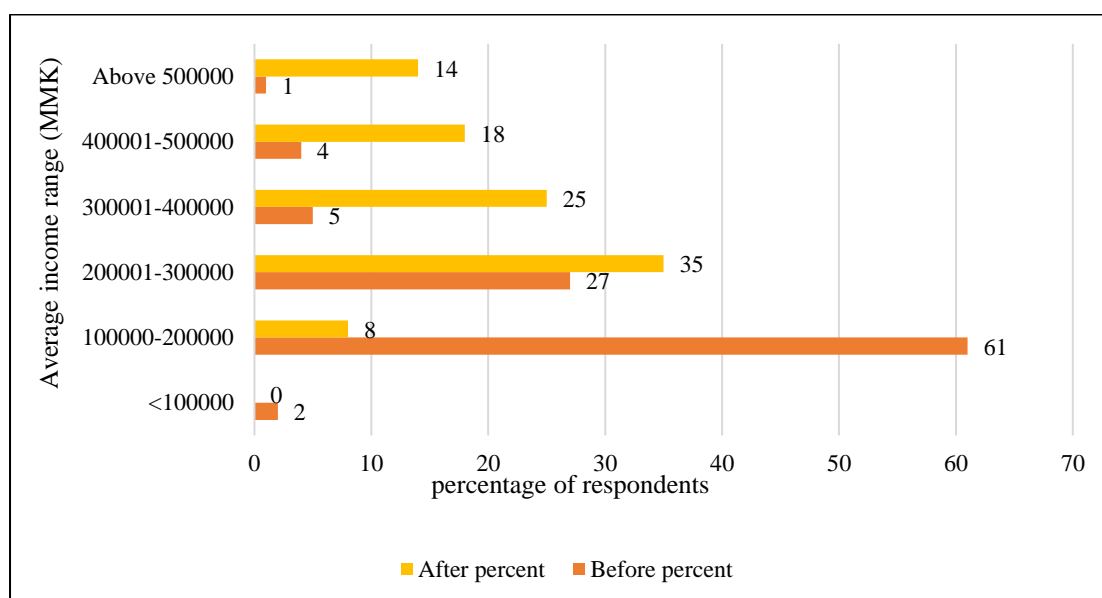
Monthly household income is the total monthly income of all family members. The income level is the most important factor in a household's standard of living. The household income surveys are useful for measuring the well-being of households. According to the data, the sample households' monthly average income is shown in table (4.11).

Table (4.11) Change in Income of Sample Households before and after Construction of Rural Roads

Average income range (MMK)	Before		After	
	Respondent	percent	Respondent	Percent
<100000	3	2	0	0
100000-200000	92	61	12	8
200001-300000	40	27	52	35
300001-400000	7	5	37	25
400001-500000	7	4	27	18
Above 500000	1	1	22	14
Total	150	100	150	100

Source: Survey Data, 2022

Figure (4.2) Change in Income of Sample Households before and after Construction of Rural Roads



Source: Survey Data, 2022

The average income of respondents before and after the construction and upgrading of roads is shown in table (4.11). There was only one respondent who made more than 500,000 kyats prior to the road's improvement. The number of respondents who make more than 400,000 MMK has climbed to 22 since the route was renovated. Between 200,001 and 300,000 MMK, the middle-income range has expanded from 27% to 35%. Between 100,000 and 200,000, the income range has dropped from 61% to 8%, and below 100,000, the MMK has dropped from 2% to 0%.

After the construction and upgrading of rural roads, the average monthly income of sample households in all sample villages has increased because the development of rural roads may have an impact on the beneficiaries' income. Most of the sample households are farmers. For farmers, this could mean increasing the market's supply of agricultural goods or the actual price given to farmers. Therefore, any one of these would not only boost agricultural income but also the income from non-agricultural labor markets, which may increase non-agricultural employment.

4.5.3 Assets of Sample Households

Household assets include the home, furnishings, appliances, and electronics. Cattle and buffalo raised on a business basis are considered an enterprise asset. For extra income, raise pigs and chickens. Farming is among the most common household

possessions. According to the survey data, the table (4.12) shows the assets of sample villages in Gyopinkauk before and after the building of rural roads.

Table (4.12) Households' Assets

Type of Assets	Number of Sample Households (%)	
	Before Rural Roads Construction	After Rural Roads Construction
Farm	78	79
Cattle/ Buffalo	62	64
Pig/ Chicken/Duck	61	69
Tractor	6	35
Mobile Phone	34	95
Car	3	18
Bicycle	72	80
Motorcycle	47	92
Refrigerator	7	54
TV	62	83
VCD/DVD	59	44
Water Pump	56	81

Source: Survey Data, 2022

Before the construction of rural roads, 78 percent of households had farm assets such as cattle, buffalo, pigs, and chickens, according to the table (4.12). Tractor ownership was 6%, mobile phone ownership was 34%, bicycle ownership was 72%, motorcycle ownership was 47%, TV ownership was 62%, VCD/DVD ownership was 59%, and refrigerator ownership was 7%. After the development of rural roads, household farm assets increased by 79 percent, while livestock assets increased by 64 percent, poultry assets increased by 69 percent, and tractor assets increased by 35 percent. Mobile phone assets increased by 95%, television assets increased by 83%, VCD/DVD assets decreased by 44%, and refrigerator assets increased by 54%.

According to the table (4.12), the assets of sample households after rural road construction are greater than before. Except for VCD/DVD, there are more than before the construction of the road in all other categories. When the rural roads

develop in these villages, the incomes of households increase and then their assets increase.

4.5.4 Travel Time from Initial Villages to Gyopinkauk Hospital

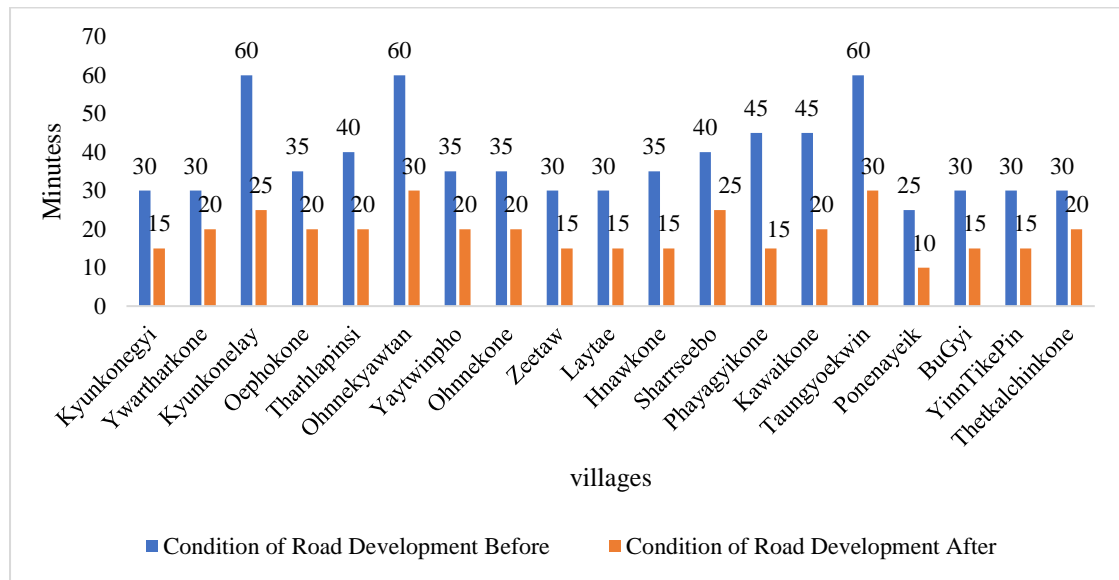
In the table (4.13), shows the average travel time to Gyopinkauk and Gyopinkauk Hospital before and after rural road construction.

Table (4.13) Average Travel Time from Initial Villages to Gyopinkauk Hospital before and after Rural Road Construction

Villages	Types of Vehicles	Before (minutes)	After (minutes)	Time Saving (minutes)
Kyunkonegyi	Motor Cycle/Bicycle	30	15	15
Ywartharkone	Motor Cycle/Bicycle	30	20	10
Kyunkonelay	Motor Cycle/Bicycle	60	25	35
Oephokone	Motor Cycle/Bicycle	35	20	15
Tharhlapinsi	Motor Cycle/Bicycle	40	20	20
Ohnnekyawtan	Motor Cycle/Bicycle	60	30	30
Yaytwinpho	Motor Cycle/Bicycle	35	20	15
Ohnnekone	Motor Cycle/Bicycle	35	20	15
Zeetaw	Motor Cycle/Bicycle	30	15	15
Laytae	Motor Cycle/Bicycle	30	15	15
Hnawkone	Motor Cycle/Bicycle	35	15	20
Sharrseebo	Motor Cycle/Bicycle	40	25	15
Phayagyikone	Motor Cycle/Bicycle	45	15	30
Kawaikone	Motor Cycle/Bicycle	45	20	25
Taungyoekwin	Motor Cycle/Bicycle	60	30	30
Ponenayeik	Motor Cycle/Bicycle	25	10	15
BuGyi	Motor Cycle/Bicycle	30	15	15
YinnTikePin	Motor Cycle/Bicycle	30	15	15
Thetkalchinkone	Motor Cycle/Bicycle	30	20	10

Source: Survey Data, 2022

Figure (4.3) Average Travel Time from Initial Villages to Gyopinkauk Hospital before and after Rural Road Construction



Source: Survey Data, 2022

The greater road access is shown in table (4.13), which indicates that all villages use small vehicles (motorcycles and bicycles), and the average journey time to Gyopinkauk decreases by half an hour in all villages. In Kyunkonegyi, Zeetaw, Laytae, Hnawkone, Phayagyikone, BuGyi, and YinnTikePin, the average travel time to Gyopinkauk decreased from 30 minutes to 15 minutes. In Ywartharkone, Thetkalchinkone decreased 30 to 20 minutes after the implementation of Gyopinkauk-Zeekone Road. In Taungyoekwin, Ohnnekyawtan saves 60 to 20 minutes. In Kawaikone, it decreases to 45 minutes.

The accessibility of rural areas was found to have improved, notably in terms of travel time to Gyopinkauk and the closest hospital, as well as the cost of transportation for each person from the village to Gyopinkauk. In fact, having easy access to towns and cities may enable farmers to acquire contemporary inputs at lower costs. Roads enable households to reach the nearby towns for the purpose of purchasing contemporary inputs and reselling their produced goods.

In the past, households either walked or used bicycles to get to Gyopinkauk. Therefore, they have a few costs although they are spending a lot of time due to the bad roads. After construction of rural roads, now, they are not spending a lot of time but otherwise, the households spend their transportation cost more than before because of travelling by many ways like motorcycle and increasing the inflation rate.

4.6 The Opinions of Sample Households on the Construction of Rural Roads Improvement

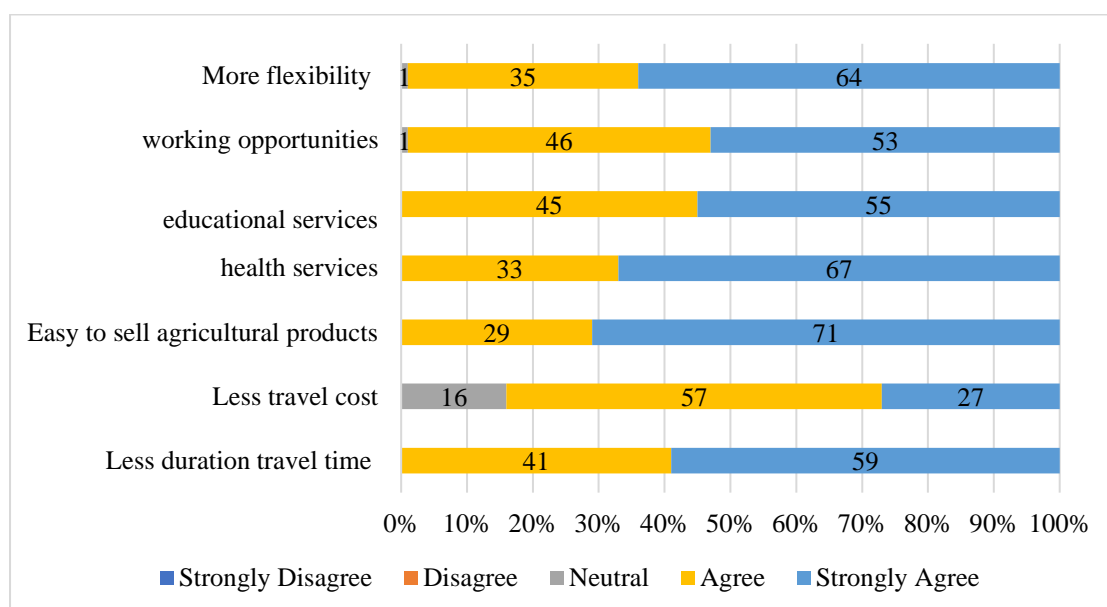
Rural roads development had significant indirect impacts on general level of social and economic improvement in each of the study area. According to the data, table (4.14) shows the opinions of households about the constructions of rural households.

Table (4.14) Opinions of Sample Households on the Construction of Rural Roads Improvement

No.	Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	Less duration travel time for village to village	0	0	0	41%	59%
2	Less travel cost for village to village	0	0	16%	57%	27%
3	Easy to sell agricultural products; farmers are able to sell their products directly to the market	0	0	0	29%	71%
4	Easy access to health services	0	0	0	33%	67%
5	Easy access to educational services	0	0	0	45%	55%
6	Increasing the working opportunities	0	0	1%	46%	53%
7	More flexibility for road safety	0	0	1%	35%	64%
Overall Mean		4.5				

Source: Survey Data, 2022

Figure (4.4) Opinions of Sample Households on the Construction of Rural Roads Improvement



Source: Survey Data, 2022

According to the survey, which is indicated in table (4.14), the overall mean value of 4.5 shows that sample households agree that it takes less time to travel from one village to another after rural road construction. They also agree that the travel costs are low. In the past, because the roads were not good, when they could not use bicycles, they had to travel on foot. Therefore, it causes a time delay in road travel.

The overall mean value of 4.5 shows that rural transport provides assurance for the supply of the agricultural inputs and facilitates the delivery of the farm outputs to the markets. Farmers who have access to the bigger markets, on average, produce a high crop yield. For the development of the agricultural sector, the improvement of rural road infrastructure and transport services should be linked to the roads going to the bigger markets; otherwise, the impact on the agricultural sector will be low.

The overall mean value of 4.5 shows that households' easy access to health care services after the development of rural roads. Health care workers are needed to employ more and it has also improved for the period. The rural health division came again, and getting to and from the hospital and clinics has become easier than before. In the event of an emergency, an ambulance could not be called before. After the construction and upgrading of the rural roads, it is convenient for family members to lose their lives.

The overall mean value of 4.5 shows that in terms of human resources, educational infrastructure and facilities have increased when it comes to sending children to school. It is more convenient than before and can safely send children to school. The sample households agree to increase the work opportunities. After the construction and upgrading, households can go to work in other areas, especially urban areas like company staff, government staff, and casual laborers, etc. More flexibility is needed for road safety, according to the sample households. Higher enrollment rates were influenced by better road conditions, which led to additional transportation options. Construction and upgrading of rural roads have a considerable indirect impact on each study area's overall degree of economic development.

4.7 Maintenance of the Rural Roads

When rural roads are constructed, both the government and the locals participate in the construction process. The majority of them are being built by the government. The community's residents are building with the intention of having efficient transportation and enhancing every aspect of their town. Furthermore, all of the sample homes think that it is crucial to maintain rural roads over the long term after they have been built. The opinions for the maintenance of rural road for long run are stated by the following table (4.15).

Table (4.15) Opinions of Villages on How to Maintain the Rural Roads for the Long Run

No.	Perceptions	Frequency	Percentage (%)
1	Formation of Road Committee	68	46
2	Funds for Road Maintenance	9	6
3	Working Together with the Relevant Organizations	134	89
4	Village People's self help	118	79
5	Waiting for the Relevant Organizations	142	98

Source: Survey Data, 2022

According to the table (4.15), the villages in which the road committee is formed and implemented account for 45.33 percent of the sample units, with road maintenance funds of 6 percent. The households that respond to working together with the relevant organizations represent 89.33 percent of all sample households, and the households that respond to helping themselves represent 78.67 percent of all sample households.

In conclusion, because they link rural populations to markets, healthcare facilities, and educational opportunities, rural roads are essential for the economic and social development of societies. In developing countries, it is essential to create rural infrastructure, productive industries, and social and economic services. Enhancing rural accessibility through the provision of rural road infrastructure and improved transport services is one of the techniques to encourage agriculture sector development in rural areas.

The majority of developing nations place a high value on their rural road infrastructure. People use rural roads to travel to markets and social services. According to the survey, rural households have direct access to the market and can get more up-to-date information on prices and other pertinent market data.

The local economy and growth depend on these rural routes. The improvement of rural roads has a considerable indirect impact on the degree of economic development overall. Improved roads and the ability to move things more effectively make it possible to start a small store in the village, buy local produce, or produce their own and sell it in the nearby market places.

Before the rural road was built, the people in Gyopinkauk Township had to deal with a number of issues, including emergency circumstances in the areas of the economy, society, health, and other areas. Since the original earth road in Gyopinkauk Township, literate, concrete, and macadam roads have been installed. Every aspect of village life is getting better as rural roads expand.

According to the study's results, household living standards, transportation time, possessions, and income are all impacted by rural road building, along with home occupation and electricity use. Those who had access to electricity performed better than those who did not in terms of the growth of income and consumption. Better rural roads make it easier for the government to provide subsidies for power.

Because the development of rural roads may have an effect on the income of the rural population, the average monthly income of every household in every village

increased after the building of rural roads. Farmers' agricultural revenue would rise if either the supply of goods they buy for the market or the price they receive directly were increased. The income from non-agricultural labor markets may rise for non-agricultural employment.

Before the building, it was difficult to find a job in the urban region of Gyopinkauk. After the construction, rural residents can work as government employees, business employees, and casual laborers in the urban parts of Gyopinkauk Township. The poll demonstrates that consumers can speak with a product's manufacturer directly to get more current information on prices and other market-related details.

Raw resources can be processed more simply for local, supra-regional, and regional sales as well as the production of sensitive and local products, and they can be shipped to distant markets more swiftly and economically. Furthermore, it is possible to tap into and diversify markets in nearby areas. Buyers have easier access to producers. Access to social services like health and education is facilitated, and economic opportunities are made more readily available. Equipment for manufacturing, including machinery, seeds, and fertilizer, is now easy to find.

The demand for local recreational facilities by urban population groupings opens up new development opportunities and other sources of income. Reduced transportation costs allow manufacturers, traders, and final consumers to buy goods for less, more quickly and across shorter distances. Transportation-related problems or breakdowns provide lower risks. Transportation resources are preserved, and there is less product damage. Communication between local government employees and the rural population has improved, as has participation in political activities. The overall level of economic development in each study area is significantly indirectly impacted by the construction of rural roads. As a result, one might infer the effects of rural road development on household living standards.

CHAPTER V

CONCLUSION

5.1 Findings

Rural roads are crucial for the economic and social growth of societies because they connect rural residents to marketplaces, healthcare facilities, and educational opportunities. Infrastructure for rural areas, productive industries, and social and economic services must all be developed in developing nations. Because there are so few processing companies to create these products utilizing local resources, the majority of contemporary consumer goods are imported. Society is evolving towards an exchange economy in more developed nations, where transportation is much more dependent on the outside world than it is in industrialized nations.

Gyopinkauk Township is situated in Bago Region's Western District. One of the eight townships of Tharyarwadi District, Gyopinkauk Township is governed by the Bago Region. Until 2021, Gyopinkauk Township was connected with Ook Pho Township by 13.3 miles, with Zeekone Township by 5.5 miles, and with Tharyarwady Township by 49.1 miles. At present, when Gyopinkauk-Zeekone Road has been built, it makes it easy to travel from the villages to the city and from one village to another. There are several different types of country roads, including bituminous, macadam, concrete, earth, and laterite roads. There are 157/0.48 miles that were built by the Department of Rural Road Department during the years (2017-2018) to (2021-2022). The bituminous road is one mile and two furlongs, the macadam road is 127 miles, 7.26 furlongs, the concrete road is 9 miles, 5 furlongs, the earth road is 30 miles, 3 furlongs, and the laterite road is 45 miles, 1.35 furlongs.

In the study of the conditions of rural road infrastructure development in Gyopinkauk Township, 19 villages where rural roads were constructed were selected. In 19 villages around the Gyopinkauk Township that are also benefiting from this rural road infrastructure, there are a total of 3012 households.

The sample size of households is 150. The sampling unit is the households of Gyo Pin Kauk Township's villages, which are Kyun Kone Gyi, Ywar Thar Kone, Kyun kone lay, Oe pho Kone, Thar Hla pin si, Ohn Ne Kyaw Tan, Yay Twin Pho, Zee Taw, Lay Tae, Hnaw Kone, Shar See Bo, Phaya Gyi Kone, Kawai Kone, Taung Yoe Kwin, Pone Na Yeik, Bu Gyi, Yinn Tike Pin, and Thet Kal Chin Kone. Therefore, in selected villages in the study area, administer with a total of one hundred and fifty sets of questionnaires.

A survey was conducted for 19 villages in Gyopinkauk Township. A survey found that upgrading rural roads would be beneficial for the adjacent settlements. Before it was finished, there were many issues that the people in Gyopinkauk had to deal with, including economic, social, health, and other emergency situations. The rural road should be upgraded from its initial macadam condition to a concrete and literate road. As rural routes are improved, villagers are improving all around.

The effects of rural road development on the living standards of households are: occupation of households, electricity usage, travel time, household assets, income, etc. Working in the Gyopinkauk urban area was difficult prior to construction. After the construction, rural people can go to work in Gyopinkauk Township urban areas like government staff, company staff, and factory workers.

The government can support electricity because it's better than rural roads, so most of the villagers use public electricity. Public electricity is used by 88 percent of the sample households. Household with access to electricity performed better than those without electricity. They performed better than those without electricity in terms of income and consumption growth. Regarding the development of income and consumption, those with access to electricity performed better than those without. Because of improved rural roads, the government can subsidize power.

Prior to the construction of rural roads, it was difficult for people to move around and work in Gyopinkauk. Following the development of rural roads, rural residents can work as government employees, business employees in Gyopinkauk's urban regions. With better rural roads, rural residents can work in distant locations. Additionally, since the household members might work in other fields, they might increase the number of income sources. Construction of rural roads may have increased economic potential as a result of easier access to employment opportunities. Opportunities to start a small store in the village or buy village property can have advantages due to improved roads and an improved ability to move goods.

The average monthly income of sample households in all sample villages was calculated because the development of rural roads may have an impact on the beneficiaries' income. Most of the sample households are farmers. For farmers, this could mean increasing the market's supply of agricultural goods or the actual price given to farmers. Therefore, any one of these would not only boost agricultural income but also the income from non-agricultural labor markets, which may increase non-agricultural employment.

There has been an improvement in rural areas' accessibility, particularly in terms of the distance to the nearest hospital and how long it takes to get there, as well as in terms of how much it costs to get from a hamlet to Gyopinkauk per person. In reality, having convenient access to cities and towns may make it possible for farmers to get modern inputs for less money. Roads make it possible for households to go to neighboring towns to buy modern inputs and resell their manufactured commodities.

In the past, households either walked or bicycled to get to Gyopinkauk. Therefore, they have a few costs, although they are spending a lot of time due to the bad roads. Because of the construction of rural roads, now they are not spending a lot of time, but otherwise, households pay more for transportation than before because of travelling by many means, like motorcycle, and this increases the inflation rate.

Health care workers are needed to employ more and it has also improved for the period. The rural health division came again, and getting to and from the hospital and clinics has become easier than before. In the event of an emergency, an ambulance could not be called before. After the construction of the road, it is convenient for family members to lose their lives. In terms of human resources, educational infrastructure and facilities have increased, and when it comes to sending children to school, it is more convenient than before and can safely send them to school. After the construction, households can go to work in other areas, especially urban areas like company staff, government staff, and casual labor, etc. The better roads induced more transportation facilities and smoother conditions contributed to higher enrollment ratios. Rural road construction had significant indirect impacts on the general level of economic development in each of the study areas.

Rural roads need to be connected in order to provide access to additional social and administrative services, affordable food and supplies, and agricultural inputs, as well as spare parts for the water well. Recent improvements have been made. Healthcare employees are more in demand. There are now more facilities for

the development of human resources, like schools and libraries. Because more transit choices could be accommodated on the repaired road, enrollment rates increased. Rural road development significantly influences each study area's overall level of economic growth in an indirect manner. Consequently, it is feasible to state that the standard of life of households is impacted by the construction of rural roads.

When the rural roads are built, they are built by the government and the people of the community help build them. Among them, the government's construction is the biggest. The objective of the construction of the people of the community themselves is that they want to have good transportation and improve everything in their villages. Further, after the construction of rural roads, the importance of the maintenance of rural roads for the long run is agreed upon by all sample households.

Raw resources can be processed more simply for local, supra-regional, and regional sales as well as the production of sensitive and local products, and they can be shipped to distant markets more swiftly and economically. Furthermore, it is possible to tap into and diversify markets in nearby areas. Buyers have easier access to producers. Access to social services like health and education is facilitated, and economic opportunities are made more readily available. Equipment for manufacturing, including machinery, seeds, and fertilizer, is now easy to find.

5.2 Suggestion

This study found that during the 2015–2016 fiscal year to the 2020–2021 fiscal year, the number of kilometers of rural roads created in Gyopinkauk Township increased significantly. Having access to rural roads may be necessary to increase rural revenue in areas with few connections. The advantages of road enhancements include reduced travel times, lower costs, and easier access to basic medical and educational facilities. Rural road construction has a considerable indirect impact on the total rate of economic growth in each studied area. The indirect effects of rural road upgrades on overall economic development are significant. To maximize the development effectiveness of rural road infrastructure and to raise the level of income, the current rural road plan must be streamlined.

This study suggests that the government should raise capital expenditures for the upcoming development strategy in order to expand regional development. It is necessary to put in place and carry out the proper policies and strategies in order to increase rural connectivity. Authorities must prioritize rural connectivity and set up

the necessary rules and modern technologies to support it. Since most people live in rural areas, it is crucial to promote the advantages of the rural population. Therefore, in Gyopinkauk Township, more should be invested in infrastructure related to transportation and communication.

REFERENCES

- Bryceson, D. F., Bradbury, A., & Bradbury, T. (2008). Roads to poverty reduction? Exploring rural roads' impact on mobility in Africa and Asia. *Development Policy Review*, 26(4), 459-482.
- Bryden, J. (2002, November). Rural development indicators and diversity in the European Union. In *conference on "Measuring rural diversity"*. Washington, DC. Available from <http://citeseerx.ist.psu.edu/viewdoc/download>.
- BRYZHKO, V. G., & BRYZHKO, I. V. (2019). Comprehensive assessment of the impact of road infrastructure development in a rural municipal area (Russia).40(37).
- Donnges, C.,Edmonds, G., & Johannessen, B. (2007). *Rural road maintenance: Sustaining the benefits of improved access*. Bangkok: International Labour Office.
- Fulmer, Jeffrey (2009). "What in the world is infrastructure?". PEI Infrastructure Investor (July/August): 30–32.
- Fungo, E., Krygsman, S., & Nel, H. (2017). The role of road infrastructure in agricultural production. Southern African Transport Conference.
- Gyopinkauk General Administration Department (2021) Local Information.
- Kyaw Thura. (2013). Transport Infrastructure Development in Mon State (1988 - 2011), Unpublished thesis for Master of Economics. Yangon University of Economics.
- Inoni, O., & Omotor, E. (2009). Effects of Road Infrastructure on Agricultural Output and Income of Rural Households in Delta state, Nigeria. *Agricultural Tropical and Subtropical*, 42(2), 90-97.
- Intal Jr, P. S., Oum, S., & Simorangkir, M. J. (2011). Agricultural Development, Trade & Regional Cooperation in Developing East Asia. *Economic Research Institute for ASEAN East Asia*.
- Ivanova, E., & Masarova, J. (2013). Importance of road infrastructure in the economic development and competitiveness. *Economics and management*, 18(2), 263-274.
- Kuroda, H., Kawai, M., & Nangia, R. (2007). *Infrastructure and regional cooperation* (No. 76). ADBI Discussion Paper.

- Lebo, J., & Schelling, D. (2000). The design and evaluation of rural transport infrastructure. *Technical Paper, The World Bank, Washington DC, USA*.
- Ng, C. P., Law, T. H., Jakarni, F. M., & Kulanthayan, S. (2019, April). Road infrastructure development and economic growth. In *IOP Conference Series: Materials Science and Engineering* (Vol. 512, No. 1, p. 012045). IOP Publishing.
- Ogunleye, O., Ajibola, A., Enilolobo, O., & Shogunle, O. (2018). Influence of road transport infrastructure on agricultural sector development in Nigeria. *Logistics, Supply Chain, Sustainability and Global Challenges*, 9(1), 39-50.
- O'Connor, J. (2011). *State building, infrastructure development and Chinese energy projects in Myanmar* (pp. 22-pages). IRASEC.
- Oo, N. Z. T. (2019). *A study on the perception of rural people on poverty alleviation programmes* (a case study Hlegu Township, Yangon) (Doctoral dissertation, MERAL Portal).
- Opit, L. (1994). World Development Report 1993: Investing in Health. The World Bank, Oxford University Press, Oxford, 1993. No. of pages: 329. ISBN 0-19-520890-0. *Health Economics*, 3(2), 127-128.
- Oraboune, S. (2008). Infrastructure (rural road) development and poverty alleviation in Lao PDR.
- Pernia, E. (2012). Infrastructure and Inclusive Growth.
- PRESS, U. R. (2018). Oxford University Press is a department of the University of Oxford. It furthers the University's objective of excellence in research, scholarship, and education by publishing worldwide.
- Queiroz, C. A., & Gautam, S. (1992). *Road infrastructure and economic development: some diagnostic indicators* (Vol. 921). World Bank Publications.
- Samli, A. C. (2010). *Infrastructuring: The key to achieving economic growth, productivity, and quality of Life*. Springer Science & Business Media.
- Satish, P. (2007). Rural infrastructure and growth: an overview. *Indian Journal of Agricultural Economics*, 62(902-2016-67382).
- SOE, C. K. K. (2019). A study on rural road infrastructure development in Myanmar (case study in Kyauktan Township) Unpublished Thesis for Master of Economics. Yangon University of Economics.

- Starkey, P., & Cartier van Dissel, S. (2016). Myanmar transport sector policy note: rural roads and access. *Asia Development Bank, Mandaluyong City, Philippines. 61p.*
- Thida Kyu. (2008). The role of infrastructure in economic development of Myanmar (1988-2004), PhD Thesis. Yangon University of Economics.
- TUN, M. M. (2019). Analysis On the Impacts of Road Infrastructure Network In Rural Area Of Myanmar (A Case Study On Ywa-Ngan Township, Southern Shan State) (2012-2013 to 2016-2017) Unpublished Thesis for Master of Development Studies. Yangon University of Economics.
- Tripathi, S., & Gautam, V. (2010). Road transport infrastructure and economic growth in India. *Journal of Infrastructure Development, 2(2)*, 135-151.
- Vo, Q. L. (2021). Climate change adaptation in Southeast Asia: a systematic mapping of the Asian Development Bank's projects in 2016-2020.
- Windle, J., & Cramb, R. A. (1997). Remoteness and rural development: economic impacts of rural roads on upland farmers in Sarawak, Malaysia. *Asia Pacific Viewpoint, 38(1)*, 37-53.
- ZAW, Y. H. (2019). A study of infrastructure development on rural society in Taikkyi Township (2009-2018) Unpublished Thesis for Master of Economics. Yangon University of Economics.

WEBSITES

- https://www.uncrd.or.jp/content/documents/6919Myanmar_Country%20Presentation.pdf
- <https://doi.org/10.1596/978-0-1952-0992-1>
- <https://www.revistaespacios.com/a19v40n37/19403719.html>
- <https://ecomanager.ktu.lt/index.php/Ekv/article/view/4253>
- <https://www.adb.org/sites/default/files/publication/28032/quality-life-rural-asia.pdf>
- <https://methodfinder.net/welcome.html>

APPENDIX - A

Sample Survey Questionnaire

1. Name of village tract-
2. Name of village-
3. Name of Respondents-
4. Age of Respondents –
5. Number of family –
6. Number of children -

7. Educational level of Respondents

Primary school	Middle school	High school	Graduate	Never

8. Education status of children

Primary school	Middle school	High school	Graduate	Never

9. Type of Houses

Zinc roofs and brick wall	Zinc roofs and wooden wall	Thatch roofs and wooden wall	Thatch roofs and bamboo	Other

10. Electricity usage of households

Public electricity	Candle	Generator	Solar Power	Other

11. Water Usage of households

Dug well	Tube well	Rain water	Lake	Purified drinking water	other

12. Are there any construction of rural road around the village during the past five years?

(a) Yes (b) No

13. Occupation of Head of Households

Occupation	Before rural road construction	After rural road construction
farmer		
Breeder		
Government staff		
Own business		
Driver/transportation		
Other		

14. Total monthly income of household

Before rural road construction	After rural road construction

15. Assets of households

Types of asset	Before road construction	After road construction
Farm		
Cattle/Buffalo		
Pig/Chicken/Duck		
Tractor		
Mobile Phone		
Car		
Bicycle		
Motorcycle		
Refrigerator		
TV		
VCD/DVD		
Water pump		

16. Transportation condition on rural road construction to move from initial villages to Gyopinkauk

	Before rural road construction	After rural road construction
Duration to move into Gyopinkauk		
Duration to move into Gyopinkauk Hospital		
A person's travelling expense		

17. If any construction, describe the impact of rural road implementation

	Before rural road construction	After rural road construction
Economic		
Social		
Health		
Education		
Other		

18. To describe the opinion for rural road construction

Important	More important	Not important

19. How is the rural road condition before the new road network?

Difficult	Medium difficult	More difficult	Other

20. Comment on the rural road construction

Statement	Strongly Disagree	Disagree	Normal	Agree	Strongly Agree
Less duration travel time for village to village					
Less travel cost for village to village					
Easy to sell agricultural products; farmers are able to sell their products directly to the market					
Easy access to health services					
Easy access to educational services					
Increasing the working opportunities					
More flexibility for road safety					

21. The opinion about the construction of rural road

Dissatisfied	Satisfied	More Satisfied

22. How to satisfy the construction of rural road?

23. Do you think the improvement of rural road infrastructure development was related to socio economic development?

- (a) Yes (b) No

24. When the rural roads are built, does the government build them? (or)
When rural roads are built, do the people of the community help build themselves?
25. If the rural people of the community help build themselves, what kind of vision did the village have for building the road?
26. Do you think that the maintenance of rural road is important for long-run?
27. If you think, how can use any method for the maintenance of rural road for long run?

Formation of Road Committee	
Funds for Road Maintenance	
Working Together with the Relevant Organizations	
Village People's self help	
Waiting for the Relevant Organizations	

