

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

**A STUDY ON RURAL ROAD INFRASTRUCTURE
DEVELOPMENT IN MYANMAR
(CASE STUDY IN KYAUKTAN TOWNSHIP)**

CHO KAY KHINE SOE

SEPTEMBER, 2019

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**A STUDY ON RURAL ROAD INFRASTRUCTURE
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A thesis submitted as a partial fulfillment of the requirements for the
degree of Master of Economics, MEcon (Economics)

Supervised by

Daw Kyi Kyi Win
Lecturer
Department of Economics
Yangon University of Economics

Submitted by

Cho Kay Khine Soe
Roll No. 14
MEcon (Economics)

SEPTEMBER, 2019

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MASTER OF ECONOMICS

This is to certify that this thesis entitled “**A STUDY ON RURAL ROAD INFRASTRUCTURE DEVELOPMENT IN MYANMAR (CASE STUDY IN KYAUKTAN TOWNSHIP)**” submitted as a partial fulfillment towards the requirements for the degree of Master of Economics, has been accepted by the Board of Examiners.

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ABSTRACT

Infrastructure plays a very important role in supporting nation's economic development. Improvement in rural road connectivity not only assures the development but also accelerate the process of development of a region. The objective of the study is to identify the current status of rural road infrastructure development in Kyauktan Township and to analyze the effect of rural road development on living standard of households. In this study, descriptive method is used. It is found that a large number of rural road miles have been constructed during the period of 2012-2018 in Kyauktan Township. Rural road construction had significant indirect impacts on general level of economic development in each of the study area. More infrastructure investments are needed in transportation and communication sector in Kyauktan Township. It is suggested that the government should increase the range of the paved rural road surface with concrete by increasing capital investment for the next coming development strategy.

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MEcon(Eco)

Roll no-14

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LIST OF ABBREVIATION

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
MOBA	Ministry of Construction
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

Infrastructure plays a very important role in supporting nation's economic development in a country. Physical infrastructure is indicated as a key input to economic growth both in development and developing countries. Rural infrastructure is a fundamental requirement for the development of agriculture, natural resources, trade and industry. The road infrastructure comprises all types of roads in a given area, including various structures and services to transport passengers and goods.

Better rural road access would contribute to economic growth by reducing travel time and vehicle operating costs. Rural roads can increase rural household access to agricultural inputs and products and product markets. Rural road communication plays a significant role in promoting economic, social, linking rural communities to education, health services and market. Improvement in rural road connectivity not only assures the development but also accelerate the process of development of a region. In developing countries depends on the simultaneous improvement of rural infrastructure, productive sectors, social.

In developing countries, most of the people live in rural areas. Through investments in rural roads and other infrastructure and social programs, the government can make efforts to improve the lot of rural population. The number of vehicles, passenger and freight transportation developed quickly because of improved rural road. With the improvement of rural road infrastructure and growth of farmer's income, more and more rural household purchased motors and vehicles to undertake nonagricultural industries or facilitate travel.

Myanmar's infrastructure lags behind its Association of Southeast Asian Nations neighbors and hinders access to markets and social services. Myanmar transport sectors are accompanied by separate reviews of key subsectors of transport: Railways, River Transport, Rural Roads, Tracks and Urban Transport. Improved rural roads and the better ability to transport goods provide opportunities can afford the

investment to start a small store in the village or to buy village produce or to make villager's own and sell it in the nearby market centers. The impacts are described as follow: on transport, on agriculture, on health and education. Rural road improvements had significant indirect impacts on the general level of economic development. Rural road maintenance works in Myanmar use labor intensive conventional method because it has abundant of cheap labor just like other development countries.

In Myanmar, almost two-third of the total population resides in rural areas. Evidence from Myanmar and from around the world makes it clear that access to markets and services is significant for stimulating rural productivity and development. Kyauktan Township is a township of Yangon Region, located in the southern district of the region. In Kyauktan Township, number of wards 9 and number of village tract 45. In Kyauktan Township, the majority of the households mainly use bicycle as a mean transport. Rural road infrastructure can provide mobility and connectivity people living in rural area. Rural roads become links of network, which facilitates the movements of persons and goods in a rural area. Therefore, are studied how many villages are changed of improving the rural road in Kyauktan Township.

1.2 Objective of the Study

The objective of the study is to identify the current status of rural road infrastructure development in Kyauktan Township and to study effects of rural road development a living standard of households.

1.3 Method of Study

In this study, the method is used mainly based on descriptive method and analytical method. The major sources of secondary data are Ministry of Construction and Department of Rural Road Development (Head Office), Department of Rural Road Development in Kyauktan Township, District General Administration Department of Kyauktan Township, and Internet websites. The primary data based on the survey questionnaires by using simple random sampling method. Due to the limited time and fund, that data from 100 sample households were collected by using face to face interview methods. Simple random sampling method used in this study.

1.4 Scope and Limitation of the Study

The scope of the study is focused on sample households in rural road infrastructure development in Kyauktan Township; for this study has chosen (15 villages-tracts from 45 villages-tracts). The personal interview was conducted between July to August in 2019.

1.5 Organization of the Study

This study is included five chapters. Chapter one is introduction which contains the outline of the rationale, objectives, scope and limitation of the study and organization of the study. Chapter two is Literature Review on concept of infrastructure. Chapter three is overview of rural road infrastructure in Myanmar; Chapter four describes the profile of Kyauktan Township and also accessibility of rural road in Kyauktan Township, survey profile, survey design and effects of rural road development on living standard of Household. Chapter five is concerns with findings and suggestions.

CHAPTER II

LITERATURE REVIEW

2.1 Concept of Infrastructure

The infrastructure is the facilities, activities and services which support operation and development of other sectors of the economy. Infrastructure plays a very important role in supporting nation's economic development. There are two general types of ways to view infrastructure, hard or soft. Hard infrastructure refers to the physical networks necessary for the functioning of a modern industry. The infrastructure is included roads, bridges, railways, etc. Soft infrastructure refers to all the institution that maintains the economic, health, social and cultural standards of a country. In general infrastructure is location specific and cannot be moved from one place to another. However, the term infrastructure has different definitions in different directions and usages (Kuroda, 2006).

World Bank has divided infrastructure into two types. They are Economics Infrastructure and Social Infrastructure. Economics infrastructure includes Public Utilities (Power Telecommunication, Piped water Supply, Sanitation and Sewerage; Solid waste collection and disposal and Piped gas), Public Works (Roads and Major Dam and Canal works, Irrigation and Drainage; Economic zone; Industrial zone, Technology zone, Science Parks), and another transport sectors (Urban and Interurban Railways, Urban Transport, Port and Waterways and Airports). Social infrastructure includes Universities Schools, Hospitals, Ports, Libraries, etc. (World Bank, 2017).

The infrastructure development is mainly related of roads, bridge, building, hydroelectric power generation, telecommunication network, transportation facilities, water supply and so forth. Infrastructure is defined the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance social living conditions. Infrastructure facilities the production of goods and services, and also the distribution of finished products to market as well as basic social services such as schools and hospitals.

Among variety of infrastructure, transport, communication, energy and water have become crucial to any economy. The lack of infrastructure in many developing countries represents one of the most significant limitations to economic growth and development Goals. Infrastructure investments and maintenance can be very expensive, especially such as areas as landlocked, rural and sparsely populated countries in Africa.

2.2 Rural Road infrastructure and Development

Expansion of road is important for economic development. Rural road infrastructure is one of a nation's infrastructure and important in developing and strengthening social, political and commercial ties. Most of social and culture unity is based upon the existence of adequate transportation. The impact of rural road transportation in developed regions is also significant. Transportation development helps to attain an efficient distribution of population, industry and income (Kuroda, 2006).

Rural area with low standards of living are characteristically road with inadequate methods of moving people and goods because of deficient access between villages and markets, schools, medical, economic and social services which affect the day to day lives of rural people. The communication of one region to another region is quick by smooth transport can enable the economic development to prosper and transfer of labor forces (World Bank, 1992).

Rural road play important role in the economics and social development of societies, linking rural people to education, health and markets. In developing countries depends on the improvement of rural infrastructure, productive sectors, social and economics services. A more developed life is bringing into an exchange economy and calling upon transport is much more dependent on the outside world than in the developed countries current consumption products come largely from the outside because there are very few processing industries to manufacture them with the use of local resources (Lebo, 2000).

In Asian and Africa countries, studies have demonstrated a close relationship between the extent of the road and expenditure on roads with income growth. In India, an expenditure on rural roads presented the highest impact in reducing rural poverty and increasing income. In Vietnam, a close relationship between the level of economic activity and the extent of the rural road was observed (Fan, 1999).

Rural road has a primary function of providing access to rural and residential property. Rural road improvement districts a rural road improvement district provides better roads for resident's speeds. Rural road development is associated with an increase in overall income, especially in rural area linked to markets by motorized roads as opposed to low-quality tracks, trails and footpaths that are not suitable for trucks or public transport. Improving rural road access can have development effect. Rural road development can be essential as a means of raising rural incomes in poorly connected areas.

Development of rural road transportation, timely delivery and the quality of services are essential elements in determining the competitiveness of products for trading system. In addition, transport services have become a tradable service and in competition for high-value products, high quality infrastructure is required. Rural road connectivity is a key component of rural development and contributes significantly in the socio-economic development of rural people by providing access to education, health etc. At the household level, rural road development contributes to higher productivity and demand for labor (World Bank, 2000).

2.3 Implementation Methods for Rural Road Infrastructure

Rural road infrastructure provides a basic for economic activities in the rural areas in the long term. Conventional road construction approaches are usually capital and technology-intensive. The method proposes a strategy for labor-intensive construction of environmentally sound rural roads is an alternative for many developing countries. The construction of rural roads can serve a "backbone" of socio-economics rehabilitation and development in areas which lack assets, due to remoteness, adverse environmental conditions or the impacts of on-going or recently ended conflicts. The rural road construction strategy fosters socio-economic development in the project area:

- (1) By providing large-scale employment during road construction and maintenance activities in the short-term, and
- (2) By improving accessibility of target areas and populations in the medium and long-term

The rural road construction measures are generally poor household's suffer from food insecurity and the lack of income opportunities both chronic and in the context of complex emergencies. The road construction process provides with short-

term employment. In long-term improved accessibility promotes the creation of additional social and productive assets as well as access to markets within the target areas. The implementation methods are as follows:

Short-term (Direct Impact)

- (1) Enable large numbers of people in food deficit areas to meet minimum daily needs by providing supplementary income and food during road construction.
- (2) Enable beneficiaries to save and purchase new assets by providing immediate employment opportunities.
- (3) Reduce out-migration of employment, young men and thus decrease the workload of women.

Medium-term (Direct Impact)

- (1) Improve the nutritional status and stabilize the socio-economic conditions of target beneficiaries by improving market access, decreasing transportation time saving
- (2) Improve access to existing public and private services.

Long-term (Indirect impact)

- (1) Promote long-term socio-economics development in target areas through improved access to market centers and services.
- (2) Create new enterprises and small market centers along the road, which offer additional off-farm employment and income opportunities.
- (3) Increase productivity of land through improvements in and diversification of agricultural production, contributing to additional farm employment and income.
- (4) Develop decision-making capacities of marginalized and disadvantaged groups promoted by active participation and social inclusion approaches applies during road construction.
- (5) Extend the geographical outreach of government and private sector services to remote areas.

For the achievement of the medium and long-term objective a timely completion of the construction work is essential. Therefore, a reasonable and not

overly ambitious project time and scope should envisage completion of a road within three years. As beneficiaries must be able to maintain the road with local means for several years (Nikolaus Schall, 2013).

2.4 Accessibility and the Rural Road Network

Accessibility involves two primary components: a transport components and land-use component. The transport component refers to the distance, travel time, and travel costs, the travel effort and travel costs, the travel effort and the perception and valuation of this time and effort on the part of a traveler. There is a generally accepted definition of accessibility, which relates activities or opportunities to the ease of reaching those activities or opportunities.

Improving access to rural areas to stimulate their development is one of the regions. Access to rural infrastructure and services is a serious problem in most developing countries. The road accessibility problem can take different forms. Isolated rural households normally do not have a decent road connection to even the closest village, impeding their access to markets, jobs and services. A rural household may be well linked to main roads connecting to cities or other urban centers. An impact often associated with the development of rural roads is increased land prices, resulting from better accessibility between rural and urban. A rural road may be passable some days, but not others, depending on weather conditions and types of road surface and quality of maintenance. (Asian Development Bank, 2002)

A country's rural road network is normally made up of tracks, trails, footpaths and earth roads that link rural villages and towns among each other and in many cases, connect to secondary roads, which allow residents to access product and factor markets as well as social services. The important of rural road network in the national road system of most developing countries is enormous but typically accounts for more than half of transport network. (Javier Escobal, 2003)

Worldwide, billions of people are unable to access work and educational opportunities because transport service remain either unavailable. In countries with a significant monsoon season, this implies paved roads; but in drier countries, all-season roads can also include gravel roads. Access to an all-season road is believed to significantly increase households' welfare if it can help rural population's access new job markets and social services. However, a road may bring little economics benefit in areas with no market to sustain non-agricultural jobs. (Jerry Olsson, 2008)

For future developments, measures of rural accessibility must be used with caution when it comes to planning investment in rural roads at comes to planning investment in rural roads at the country level. Upgrading rural roads to all weather roads does not guarantee welfare returns if connectivity with the rest of the network and with economic opportunities is not ensured (Asian Development Bank, 2002).

2.5 Benefit of Improved Rural Road

Development depends on these rural roads as does the local economy. Rural road investments had significant indirect impacts on the general level of economic development. Improved roads and the better ability to transport goods provide opportunities can afford the investment to start a small store in the village or to buy village produce or to make their own and sell it in the nearby market centers. The impacts are described as follow: on transport, on agriculture, on health and education.

Rural road improvements had significant indirect impacts on the general level of economic development. Improved roads and the better ability to transport goods provide opportunities can effort the investment to start a small store in the village or to buy villager produce or to make villager own and sell in the nearby market centers (Asian Development Bank, 2006).

The local governments participate effectively in the planning process for rural roads programs even if responsibility for developing and implementing the programs. The improved condition of feeder roads supported rural communities in enhancing their accessibility to healthcare services, education and market. The road users benefited in several other ways are traffic on the project roads increased at higher rates than before the improvement services than in the roads not improved, the supply of interurban passenger services increased and ownership of motorized vehicle increased.

The rural roads offered a special challenge, and it is a complex task. Roads are means for people to reach social services and markets. Road connection is essential to bring food, materials and agricultural inputs or spares for the water and administrative services. The improvement in the roads resulted in a significant reduction in the cost of operating vehicles, often leading to lower transport rates offered by commercial trucking services. Another benefit was an increase in the quality and frequency of commercial transport services. A key element in this effort has been improving the

rural population by gaining access to essential infrastructure and roads (Jill Windle, R.A. Cramb, 2002).

2.6 Rural Road Construction and Maintenance

The general process of new road construction always started with the clearing of grass, vegetation and other unnecessary materials and removal of earth and rock by digging or blasting. The amount and depth of removal are depended on the type of soil that was occurred in the ground and then followed by filling of selected materials such as rock, gravel, sandy gravel or other materials which are approved by the design criteria.

The fill is made by the “Compacted layer method” where a layer of fill is spread then compacted to specifications; the process is repeated until the desired grade is reached. The lower layer of fill layer generally comprises sand or a sand-rich mixture with fine gravel which can acts as an inhibitor to the growth of plants or other vegetable mater. The road bed must be “proof rolled” which mean that it should be compacted well by using the suitable road building machinery or equipment without occurring of visible deformation or shear planes (Htun Nay Aung, 2013).

Geosynthetics such as geotextiles, georgics and geocells are frequently used in the various pavement performances, reduce construction costs and decrease maintenance. The completed road way is finished by using of asphalt pavement or concrete pavement according to the policy guide line, the expected usage and the availability of the budget. Roads are being upgraded in stages from earth roads to mental roads and bitumen roads and these are further upgraded successively from single lane to double lane, four-lane and six-lane roads. For a rapid and smooth flow of goods and commodities through the establishment of a secure and smooth transportation system, existing bitumen roads are being upgraded to double lane, four-lane and six-lane roads.

Road maintenance is essential in order to

- (1) Preserve the road in its originally constructed condition
- (2) Protect adjacent resources and user safety and
- (3) Provide efficient, convenient travel along the route.

Maintenance is often neglected or improperly performed resulting in rapid deterioration of the road and eventual failure from both climate and vehicle use impacts, it follows that it is impossible to build and use a road that requires no

maintenance. In order to plan for maintenance needs, it is important to keep records of all maintenance operations and observations.

Maintenance is essential to ensure the desired level of service of rural roads. Maintenance types can be classified into routine maintenance, rehabilitation and reconstruction or emergency maintenance. Given the accelerated rate of deterioration observed on unpaved roads, routine and periodic maintenance is performed continuously and with a higher frequency than that observed in rural road. Table 2.1 presents a summary of the maintenance activities commonly considered in three general maintenance types.

Table (2.1) Maintenance Categories and Activities

Maintenance	Maintenance Activities
Routine Maintenance	(1) Roadside maintenance (2) Drainage maintenance (3) Surface maintenance
Rehabilitation	(1) Reshaping (2) Reworking (3) Forming or Simple Blading (4) Spot Gravelling (5) Gravelling
Reconstruction, Corrective or Emergency Maintenance	(1) Reconstruction, Corrective or Emergency Maintenance is applied to ensure an acceptable condition for the prevailing traffic.

Source: Marcela Alondra Chamorro Gine, 2012

Without maintenance, roads usually dirt roads deteriorate because of intense rainfall, growth of damaging plants and poor user practices. Rehabilitation can only have a lasting impact on the rural economy if the road network is maintained in the long run.

2.7 Reviews on Previous Studies

Deborah Fahy Bryceson, Annabel Bradbury, Trevor Bradbury (June, 2008) studied on “Roads to poverty reduction? Exploring rural roads impact on mobility in Africa and Asia”. This study found that the road improvements could provide the expansion of social-service provision, as evidenced in Ethiopia. However, given the poor’s relative lack of motor vehicles and ability to pay for public transport, a sufficient condition for enhancing the mobility of the rural poor.

Edward Badu, De-Graft Owusu-Manu, David J Edward, Michael Adesi, Scott Lichtenstein (2013) studied on “Rural infrastructure development in the Volta region of Ghana: barriers and interventions”. This study found that the key challenges confronting rural construction were identified as a lack of financial institutions willing to support projects with funds, lack of potable water, lack of good health care systems and lack of a goods market to supply materials.

Dr. Pradeepta Kumar Samanta (May, 2015) studied on “Development of rural road infrastructure in India”. This study found that the development of rural road infrastructure in general and rural transport infrastructure in particular is very crucial in India. Rural road connectivity ensures access to critical services and opportunities and foster sustainable poverty reduction.

Jill Windle, R.A.Cramb (December, 2002) studied on “Remoteness and rural development: Economics impact of rural roads on Upland farmers in Sarawak, Malaysia”. This study found that the impact of roads varied within an area (a function of remoteness) and between areas (also a function of remoteness). Impacts were considerably greater when roads provided communities with access to a major urban center compared with a small town.

Jerry Olsson (September, 2008) studied on “Improved road accessibility and indirect development effects: evidence from rural Philippines”. This study found that the benefits of the road improvement were considerable and benefited a great majority of the population in the fishing community. In addition to the extensive direct effects of the improved road, a number of complementary factors led to substantial in direct effects.

Marcela Alondra Chamorro Gine (2012) studied on “Development of a sustainable management system for rural road networks in developing countries”. This study found that the development of all components required by the proposed

management system and rural roads networks was developed to assist local road agencies in developing countries.

Javier Escobal, Carmen Ponce San (2003) studied on “The benefits of rural roads enhancing income opportunities for the rural poor”. This study found that the measured the benefits of rehabilitated rural roads by focusing on reduction in monetary or time costs needs to access product and factor markets.

CHAPTER III

OVERVIEW ON RURAL ROAD INFRASTRUCTURE IN MYANMAR

3.1 Rural Road Infrastructure in Myanmar

Myanmar is the largest country in mainland Southeast Asia. It borders Bangladesh and India in the west and northwest, China in the north and northeast, Laos PDR and Thailand in the east and southeast. Myanmar is divided into seven states and seven regions and the Union Territory of the capital Naypyitaw. Myanmar is the historic milestone in its transition into a market economy and democracy. Myanmar's positive economic route will be challenged in a massive infrastructure. Achieving the country's high growth potential will require continued reforms and structural transformation, especially in advancing major investments in infrastructure, developing relevant capacities and skills, and enhancing business environment (Asian Development Bank, 2016).

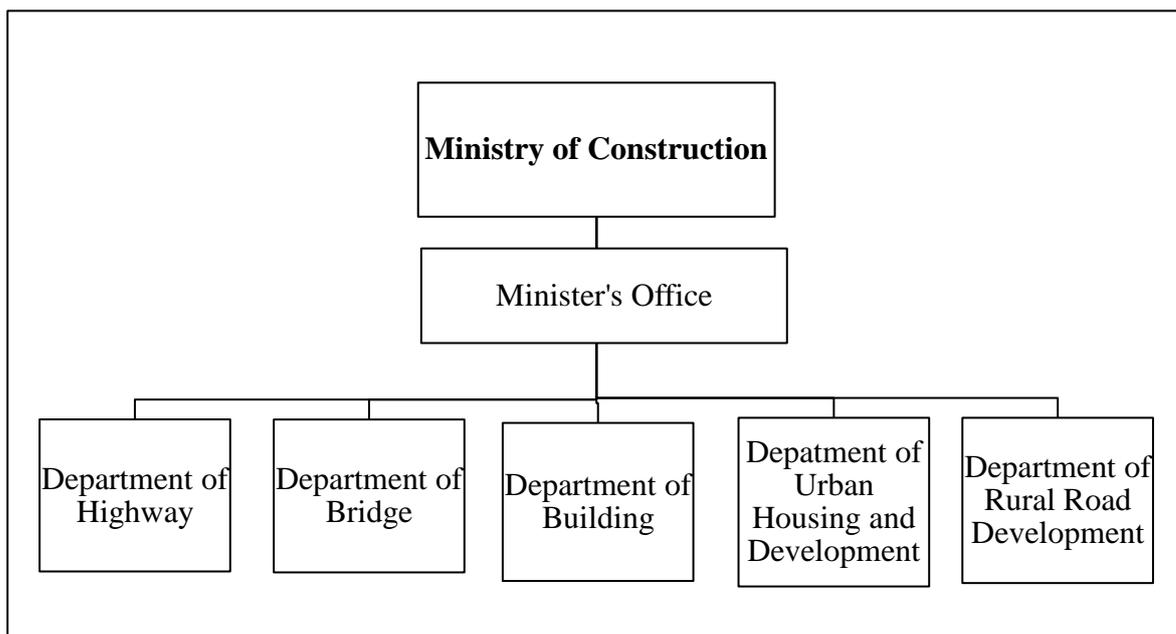
Myanmar's infrastructure lags behind its Association of Southeast Asian Nations neighbors and hinders access to markets and social services. High transport costs and associated limited access to markets and services are among the main causes of poverty and regional inequality. Twenty million people still live in villages without access to all-season roads. The transport sectors are accompanied by separate reviews of key subsectors of transport: Railways, River Transport, Rural Roads, Tracks and Urban Transport.

Myanmar's transport sector is considerably under-developed for a country of its size, population, and potential. Under framework for Economic and Social Reforms, the Myanmar government has indicated that immediate priority will be given to infrastructure projects to improve land connectivity and transportation links with regional economies to boost economic integration and fulfill the country's commitments under the Master Plan on ASEAN Connectivity (Asian Development Bank, 2018).

3.1.1 Legal Framework of Road Infrastructure

Ministry of Construction is a ministry in the Myanmar's Government responsible for the country's construction and maintenance of infrastructure, including roads and bridges. Ministry of Construction is undertaking five departments. The Organization of Ministry of Construction is show in Figure (3.1).

Figure (3.1) Organization of Ministry of Construction



Source: Ministry of Construction

The government will establish a new agency called the Department of Rural Road Development, under the Ministry of Construction (MOC) to implement rural road projects. The perspective on rural road construction might have been changed under the new government's term because only 202.4 miles of rural roads were approved in 2017-2018 fiscal year, which was only 10 percent of 2224.7 miles permitted by the previous government in 2016-2017 budgets.

The estimated that 40% of Myanmar's population and over half of the rural population live in village without access an all-season rural road. A rural road that is not all-season connects most of villages. The villager may be able to use vehicles to reach the nearest township, but the link is likely to become impassable during the rainy season. The Rural Road Access Index (RAI) is an internationally used indicator that shows the portion of the rural population that lives less than 2 km away from an

all-season road. Myanmar's RAI is estimated at 36% implying that 64% of the rural road population has to travel more than 2km to reach an all-season.

Improving rural road access is necessary to reduce Myanmar's rural poverty. A broad set of conditions need to met to foster rural development, as agricultural productivity, health and education outcomes are not dependent on transport. However, minimum rural road access seems to be a requirement for poverty reduction and an enabling factor for the effectiveness of other government programs.

3.1.2 Policies and Strategy for the Department of Rural Road Development

The policy of the Department of Rural Road Development is the improvement of Socio-Economic Life of People through development of rural roads. The objective of the DRRD is the under following:

- (1) To development Rural Roads and Bridge continuously
- (2) To arrive the rural products to the market in the time with the lowest costs
- (3) To quickly access by using Core Rural Road Network (CRRN) for socio economic development of the people in Rural Areas
- (4) To support the National Logistic Hub
- (5) To upgrade all rural roads into year-round access in 2030

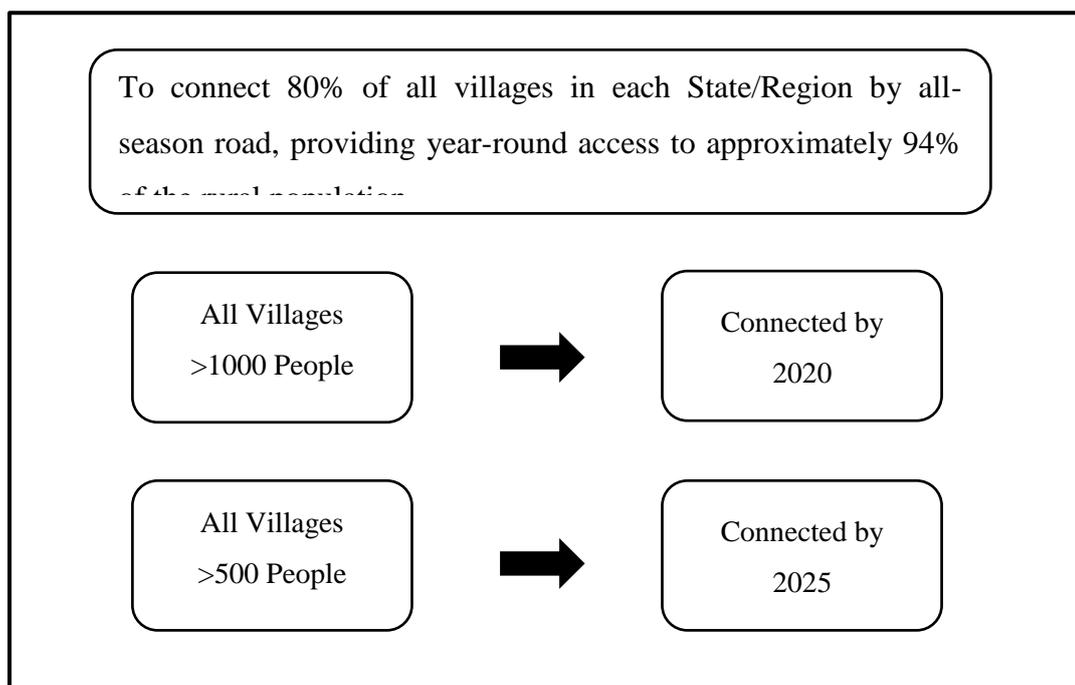
The speedy construction of rural roads is the basic need for rural development. Roads are linking one village with another and roads linking villages will towns and roads linking villages will towns and roads linking villages with highways are being constructed with an aim to emerge township/District roads and State and Division circular roads.

The national Strategy for Rural Roads and Access was jointly prepared by the Department of Rural Development (DRD) under the Ministry of Agriculture, Livestock and Irrigation (MOALI) and by the Ministry of Boarder Affairs (MOBA) with strong involvement of the Ministry of Construction (MOC) and Ministry of Transport and Communications (MOTC). The strategy responds to the lack of all-season rural roads in Myanmar that is affecting rural people's access to health services, education, employment and that of the country as a whole.

This strategy describes how the government of Myanmar aims to improve rural access through the provision of all-season rural road access by 2030, as key approach to developing rural areas and addressing rural poverty and inequalities in the country. It serves to guide investments in the rural road sector over the coming 15

years, ensuring that these investments contribute in an optimal manner to addressing the problems of limited access, providing as many rural people as possible with all-season access by 2030 and supporting the achievement of the 2030 Sustainable Development Goals (SDGs).

Figure (3.2) Strategy Objective for Future



Source: Department of Rural Road Development

The long-term development goal of the Government is to provide all-season rural access to every village in Myanmar. During the 15 years covered by this strategy, the Government of Myanmar will provide 90% of all registered villages in each state and region with road access, including all-season road access for at least 80% of registered villages. The focus of the strategy will be on large villages, providing all-season road access to all registered villages with more than 1,000 people by 2020, and to at least 95% of registered villages with more than 500 people by 2025. By 2030, 90% of all registered villages in each state and region will be connected by roads, benefitting 95% of the rural population, with 80% of the registered villages having all-season road access. Through this strategy, existing rural roads will be upgraded and new rural roads will be conducted, providing an additional 10 million people with all-season road access and a further 3 million people with dry-

season road access. Proper maintenance will be introduces to sustain the improved access levels (DRRD, 2018).

3.2 Future Plans for Rural Road Infrastructure in Myanmar

The Department of Rural Road Development set up 13 years long term plan (starting from 2018 and end at 2031). The stage of 13 years long term plans are as follow;

- (a) 1st Three Years Plan (from 2018-2019 to 2020-2021)
- (b) 2nd Five Years Plan (from 2021-2022 to 2025-2026)
- (c) 3rd Five Years Plan (from 2026-2027 to 2030-2031)

The Department of Rural Road Development (DRRD) is implementing the road upgrading works particularly in rural road within 13 years plan fulfill the objectives in the development of rural roads and transport.

Table (3.1) 1st Three-Year Plan

Types of Road	2018- 2019 to 2020-2021	
	Length (km)	Cost of Project (Billion Kyats)
Concrete/Bituminous Road	8558	1360.456
Macadam Road	7032	641.639
Gravel Road	6489	386.304
Total	22079	2388.399

Source: The Department of Rural Road Development

Table (3.1) shows that although DRRD plan to reach the total length to 22079 km at the end of 1st three-year plan in 2018-2019 to 2020-2021. Estimate budget of rural road projects, which will be implement by the DRRD from 2018 to 2021 will be 2388.399 billion Kyats.

Table (3.2) 2nd Five-Year Plan

Types of Road	2021-2022 to 2025-2026	
	Length (km)	Project of Cost (Billion Kyats)
Concrete/Bituminous Road	14410	2183.355
Macadam Road	9438	855.779
Gravel Road	5782	344.236
Total	29630	3383.370

Source: The Department of Rural Road Development

Estimate budget of rural road projects, which will be implement by the DRRD from 2021-2022 to 2025-2026 will be 3383.370 billion Kyats. Base on the table (3.2), DRRD plan to investment more in rural road construction, extension and upgrading projects.

Table (3.3) 3rd Five-Year Plan

Types of Road	2026-2027 to 2030-2031	
	Length (km)	Project of Cost
Concrete/Bituminous Road	14527	2197.933
Macadam Road	7893	718.715
Gravel Road	4989	296.988
Total	27409	3213.636

Source: The Department of Rural Road Development

Estimate budget of rural road projects, which will be implement by the DRRD from 2026-2027 to 2030-2031 will be 3383.370 billion Kyats. Base on the table (3.3), DRRD plan to investment more in rural road construction, extension and upgrading projects.

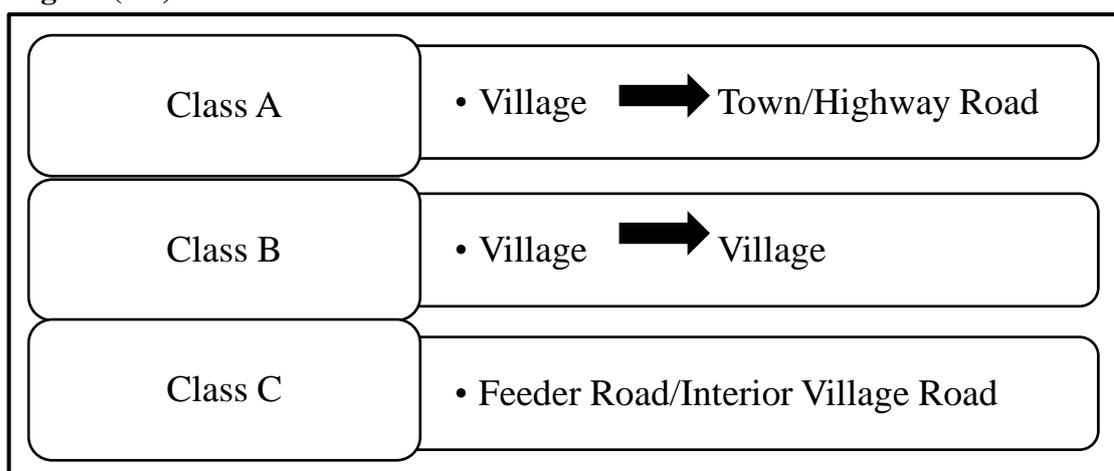
3.3 Classification of Core Rural Road Network (CRRN)

Core Rural Road Network (CRRN) will be identified, comprising the minimum rural road network required to connect all registered villages to each other and to the higher-level road networks. A CRRN road will connect villages that are not connected directly by higher-level roads. Through the CRRN, each village will be able to access services and facilities in nearby village tracts and towns and connect to the higher-level roads that provide access to district and state/regional capitals and the rest of Myanmar.

Rural road have three original classification of core Rural Road are as follow:

- Class A - Connected to MOC
- Class B - Connected to Class A
- Class C - Connected to Class B

Figure (3.3) Rural Road Classes



Source: Department of Rural Road Department

Rural roads will be classified into three administrative classes. Class A rural roads consist of CRRN roads that connect one or more villages with a combined population of 1000 people or more, and which generally connect to higher-level roads or directly to towns. Class B rural roads include the remaining CRRN roads that connect smaller population, and which generally connect to Class A roads. Class C roads include all non-CRRN rural roads that provide access to agricultural areas and remote habitation.

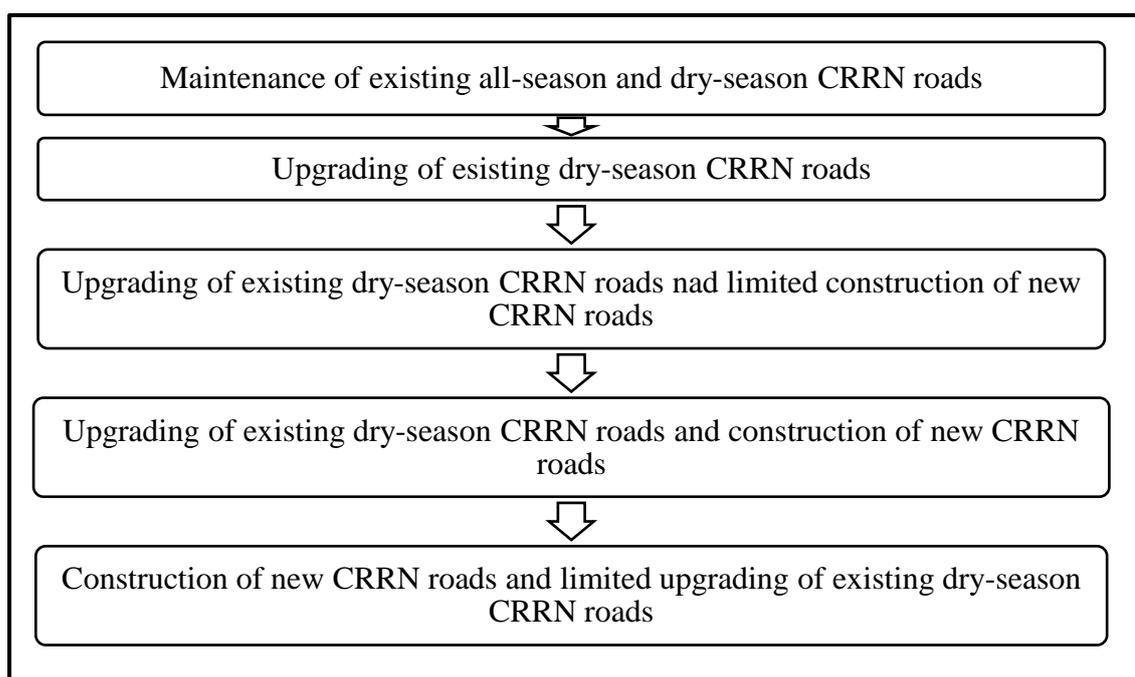
Class A and B rural roads will be constructed to an improved, unsealed standard (e.g. gravel or stone macadam) with a 12 feet carriageway. These roads will be constructed according to climate resilient designs, and proper maintenance will be ensured to improve the condition and increase the lifespan of roads. Where traffic volumes, vehicle types and local conditions warrant it, CNNR roads will be sealed and higher geometric standards will be applied.

All CRRN roads will include proper side drains and across drainage, as well as proper protection measures for slopes and embankments. Water crossing will be constructed using steel and concrete, and timber bridges will be gradually upgraded. Class C roads will not be prioritized for upgrading or new construction. Water village road access is prohibitively expensive or complicated, alternative access solutions may be introduced as motorcycle tracks, footbridges and water transport infrastructure.

3.4 Rural Road Prioritization and Ranking

Rural road financing will be exclusively targeted towards CRRN roads with the aims of achieving the strategy objective of connecting 80% of all registered villages by all-season road, at the least cost and within the shortest timeframe. Available funding will first be allocated to the maintenance of the existing CRRN roads, and remaining funding will be located to upgrading and new construction.

Figure (3.4) Prioritization of CRRN Roads



Source: The Department of Rural Road Development

Priority will be given to CRRN roads connecting larger populations, with the higher priority given to CRRN roads connecting single villages with more than 1000 people or multiple villages with a combined population of more than 2000 people. Second priority will be given to CRRN roads connecting single villages with more than 500 people or multiple villages with a combined population of more than 1000 people. Third priority will be given to CRRN roads connecting single villages with more than 250 people or multiple villages with a combined population of more than 500 people. Fourth priority will be given to the remaining CRRN roads connecting smaller different CRRN roads.

CRRN roads from a lower category will only receive funding once all roads from the higher categories have been upgraded and constructed. Within each priority category, roads will be ranked according to socioeconomic criteria as beneficiary population per mile, traffic volume, poverty levels, environmental impacts, land acquisition and resettlement needs, etc. The road ranking within each priority category will be agreed between DRD/MOBA, the local representatives of the different line ministries, and local members of parliament.

3.5 Construction of Rural Road Condition in Myanmar

The Department of Rural Road Development could have implemented works for the improvement of rural roads and for maintenance, improvements and new constructions of rural roads that link villages with towns and one village with another. New rural road construction and rehabilitation works are in the category of public works. To fulfill the requirements of the nation, the rural road projects are planned by the Department of Rural Road Development. DRRD is construction new rural roads and upgrading the existing ones year by the year with acceleration. The completed works of rural road infrastructure in 2014-2018 are as follows in table (3.4).

Table (3.3) Length of rural road construction in State and Region (2012-2018)

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
Kayah	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
Magwe	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
Rakhing	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: The Department of Rural Road Development

According to the table (3.4), the status of rural road infrastructure in each State and Region of Myanmar are described. In Naypyitaw, the total length of concrete roads is 5 miles 1.176 furlongs; the total length of bituminous roads is 56 miles 4.43 furlongs, the total length of macadam road is 163 miles 6.13 furlongs; the total length of laterite roads is 401 miles 0.61 furlongs and the total length of earth roads is 595 miles 4.99 furlongs; the total length of mule or footpath roads is 403 miles 2.23 furlongs. The total all types of rural road length are 1538 miles 4.14 furlongs in Naypyitaw. In Kachin, the total length of concrete roads is 5 miles 2.27 furlongs; the total length of bituminous roads is 86 miles 0.36 furlong; the total length of macadam roads is miles furlongs; the total length of laterite roads is miles furlongs and the total length of earth roads is 1226 miles 6.99 furlongs. The total all types of rural road length are miles furlongs.

In Kayah, the total length of concrete roads is 6 miles 5.19 furlongs; the total length of bituminous roads is 39 miles 0.42 furlong; the total length of macadam roads is 114 miles 1.78 furlongs; the total length of earth roads is 137 miles 7.26 furlongs and the total length of mule roads is 148 miles 5.18 furlongs. The total all types of rural road length are 446 miles 3.83 furlongs.

In Kayin, the total length of concrete roads is 18 miles 6 furlongs; the total length of bituminous roads is 84 miles 1 furlong; the total length of macadam roads is 155 miles 4 furlongs; the total length of laterite roads is 116 miles and the total length of earth roads is 813 miles 7 furlongs. The total all types of rural road length are 1188 miles 2 furlongs.

In Chin, the total length of concrete roads is 4 furlongs; the total length of bituminous roads is 21 miles 7 furlongs; the total length of macadam roads is 40 miles 7 furlongs; the total length of earth roads is 2160 miles 6 furlongs and the total length of mule roads is 2546 miles 3 furlongs. The total all types of rural road length are 4770 miles 3 furlongs.

In Sagaing, the total length of concrete roads is 36 miles 0.15 furlong; the total length of bituminous roads is 260 miles 1.18 furlongs; the total length of macadam roads is 1005 miles 6.31 furlongs; the total length of laterite roads is 658 miles 4.44 furlongs and the total length of earth roads is 5737 miles 5.52 furlongs. The total all types of rural road length are 7708 miles 1.6 furlongs.

In Tanintharyi, the total length of concrete roads is 26 miles 6.01 furlongs; the total length of bituminous roads is 178 miles 0.54 furlong; the total length of

macadam roads is 495 miles 7.48 furlongs; the total length of laterite roads is 100 miles 0.57 furlong; the total length of earth roads is 1116 miles 4.01 furlongs and the total length of mule roads is 51 miles 4 furlongs. The total all types of length are 1968 miles 6.71 furlongs.

In Bago, the total length of concrete roads is 31 miles 3.59 furlongs; the total length of bituminous roads is 143 miles 4.35 furlongs; the total length of macadam roads is 586 miles 3.37 furlongs; the total length of laterite roads is 1121 miles 1.79 furlongs and the total length of earth roads is 2335 miles 1.69 furlongs. The total all types of length are 4217 miles 6.78 furlongs.

In Magwe, the total length of concrete roads is 4 miles 6.13 furlongs; the total length of bituminous roads is 142 miles 5.06 furlongs; the total length of macadam roads 716 miles 5.8 furlongs; the total length of laterite roads is 678 miles 7.6 furlongs, the total length of earth roads is 3960 miles 3.43 furlongs and the total length of mule roads is 1037 miles 2.73 furlongs. The total all types of length are 6549 miles 6.76 furlongs.

In Mandalay, the total length of concrete roads is 24 miles 6 furlongs; the total length of bituminous roads is 344 miles 4 furlongs; the total length of macadam roads is 1391 miles 4.19 furlongs; the total length of laterite roads is 626 miles 5.91 furlongs and the total length of earth roads is 2937 miles 1.99 furlongs. The total all types of length are 5324 miles 6.09 furlongs.

In Mon, the total length of concrete roads is 77 miles 2.27 furlongs; the total length of bituminous roads is 218 miles 4.73 furlongs; the total length of macadam roads is 221 miles 0.34 furlongs; the total length of earth roads is 302 miles 1.08 furlongs and the total length of mule roads is 59 miles 7.91 furlongs. The total all types of length are 683 miles 6.47 furlongs.

In Rakhine, the total length of concrete roads is 89 miles 6.56 furlongs; the total length of bituminous roads is 53 miles 1.50 furlongs; the total length of macadam roads is 574 miles 5 furlongs; the total length of earth roads is 828 miles 2.35 furlongs and the total length of mule roads is 220 miles 3.95 furlongs. The total all types of length are 1766 miles 3.36 furlongs.

In Yangon, the total length of concrete roads is 348 miles 4.69 furlongs; the total length of bituminous roads is 47 miles 5.53 furlongs; the total length of macadam roads is 226 miles 1.1 furlongs; the total length of laterite roads is 180 miles 2.04 furlongs and the total length of earth is 873 miles 6.81 furlongs and the total

length of mule roads is 272 miles 3.26 furlongs. The total all types of rural road length are 1948 miles 7.43 furlongs.

In Shan (North), the total length of bituminous roads is 201 miles 1 furlong; the total length of macadam roads is 309 miles 1 furlong; the total length of laterite roads is 209 miles 6 furlongs and the total length of earth roads is 4100 miles 6 furlongs. The total all types of rural road length are 4820 miles 6 furlongs.

In Shan (East), the total length of concrete roads is 2 furlongs; the total length of bituminous roads is 55 miles 1.54 furlongs; the total length of macadam roads is 113 miles 3.8 furlongs; the total length of laterite roads is 5 miles 7.3 furlongs the total length of earth roads is 560 miles 0.34 furlongs and the total length of mule roads is 1157 miles 3 furlongs. The total all types of rural road length are 1892 miles 1.98 furlongs.

In Shan (South), the total length of concrete roads is 6.4 furlongs; the total length of bituminous roads is 189 miles 0.42 furlongs; the total length of macadam roads is 548 miles 4.56 furlongs; the total length of earth roads is 3701 miles 0.49 furlongs. The total all types of rural road length are 4439 miles 3.87 furlongs.

In Ayeyarwady, the total length of concrete roads is 209 miles 2.69 furlongs; the total length of bituminous roads is 29 miles 3.73 furlongs; the total length of macadam roads is 758 miles 7.45 furlongs; the total length of laterite roads is 158 miles 7.76 furlongs and the total length of earth roads is 2852 miles 3.75 furlongs. The total all types of rural road length are 4009 miles 1.38 furlongs.

The total length of concrete roads is 886 miles 2.15 furlongs; the total length of bituminous roads is 2153 miles 6.79 furlongs; the total length of macadam roads is 7580 miles 0.01 furlong; the total length of laterite roads is 4605 miles 2.20 furlongs and the total length of earth roads is 34434 miles 1.63 furlongs; the total length of mule roads is 5847 miles 3.35 furlongs. The total all types of rural road length are 55507 miles 0.12 furlongs in Myanmar.

3.6 Maintenance of Rural Road Infrastructure in Myanmar

Rural road deterioration due to lack of maintenance has become a growing issue in a number of developing countries. Rural road maintenance works in Myanmar use labor intensive conventional method because it has abundant of cheap labor just like other development countries. The fixed amount of the routine maintenance funds is allocated depending on the type of roads such as Bituminous,

Metal, Gravel or Earth. Routine maintenance works for the bituminous road includes pot holes patching, one furlong seal coat per mile, shoulder dressing, clearing drains and mile post painting.

Maintenance requirements depend upon a number of external factors such as traffic, terrain, soil types and climate. The need for maintenance is also very much determined by the original technical designs applied during the construction of the road, and the quality of the works carried out during the construction works. Depending on these parameters, it is possible to devise maintenance solutions and corresponding management systems which optimize maintenance costs and efforts.

Timely and regular maintenance requires securing sufficient funding before repairs and maintenance become an urgent issue. The most effective form of maintenance is achieved when an organization is capable and prepared to carry out appropriate interventions at an early stage of deterioration and thus limit the extent of damages. The effective organization of maintenance is based upon the concept of damage control. A central part of road maintenance works is to move the water away from the road structure as quickly and efficiently as possible.

Effective measures need to be installed at an early stage during the original design and construction of the road. With a well-designed road, a major function of the maintenance works is to ensure that the drainage system continues to operate effectively. Maintenance activities are commonly categorized in two distinct groups, depending on the location of the actual works. Off-carriageway works are mostly related to maintaining the drainage system, and halting and damages to the road components outside the road surface. All drains and cross drainage structures are kept in a good condition permitting the free but controlled run-off water away from the road (Ministry of Construction, 2017).

The second group of maintenance activities related to road surface repairs. This work mainly consists of maintaining a good running surface on the road, free from any obstructions and with the necessary cross-fall to secure proper drainage of surface. In terms of securing a long life for rural roads, the most important types of maintenance is related to protecting the drainage system- most of which is found outside the carriageway. On highways, where traffic volumes are more intense, a substantial amount of resources are also used to maintain the roadway surface. Compared to highways, rural roads receive low levels of traffic and road surface works constitute a smaller proportion of the maintenance required. For rural roads, the

maintenance priorities are clearly linked to the provision and upkeep of the drainage system. Roads works need to make provisions for the occurrence of foreseen damage to the road network.

Emergency maintenance involves activities such as:

- (1) Repair or reconstruction of damaged cross-drainage structures due to floods or over-weight vehicles,
- (2) Repair or reconstruction of damaged road sections due to wash-outs, erosion, or floods,
- (3) Repair or reconstruction of damages to erosion protection, resulting from excessive flows of water or landslides,
- (4) Clearing of landslides, tree or rocks from the road carriageway.

Myanmar government has performed rural road infrastructure to improve land connectivity and transportation links with regional development and fulfill the country's requirement. Myanmar government has been implementing policies and strategies. The Department of Rural Road Development is implementing the road upgrading works particularly in rural road within 13 years plan fulfill the objectives in the development of rural roads and transport.

The Department of Rural Road Development works for the improvement of rural roads and for maintenance, improvements and new constructions of rural roads that links villages with towns and village with another. DRRD is construction new rural roads and upgrading the existing one year by the year with acceleration.

CHAPTER IV

ANALYSIS ON RURAL ROAD INFRASTRUCTURE DEVELOPMENT IN KYAUKTAN TOWNSHIP

4.1 Profile of Kyauktan Township

Kyauktan Township is existed at Southern District in Yangon Region. Kyauktan Township is one of the Yangon Division. Yangon Division is composed of 45 Districts. The location of the Kyauktan Township is between North Latitude 26 degree 22 minutes and 26 degree 42 minutes and East Latitude 96 degree 3 minutes. The area is 325.760 square miles, extending for 41 miles from east to west and 36 miles from south to north.

The neighbouring township at the east of Thongwa Township, west of Yangon River and north of Thanlyin Township. Kyauktan Township is as a form of mountain ranges or hilly regions. The rest of all areas are plain regions which can be used for agriculture. In Kyauktan Township, there are plenty of streams and rivers flow from the west to the east. HmawWun is the famous stream also flow the west to east through the river mouth of Yangon.

The Kyaik Khauk Pagoda was built on a hillock names Hlaing Pote Kone on the road from Thanlyin to Kyauktan. Kyauktan Yele Pagoda is located in Kyauktan Township, Yangon Region, on a small island in Hmaw Wun Creek, a tributary of Yangon River. Kyauktan Township is located at elevation 20 feet above sea level. The highest place is fire station and the lowest one is the villages by Hmaw Wun Stream. The major business of town people is agricultural and fishery.

The climate of Kyauktan Township is hot and humid. The highest temperature is 44.1°C and the lowest one is 7.7°C. Kyauktan Township is composed of 13 urban wards and 45 village tracts. In 2018, the total population is 168106. Kyauktan Township have many kind of races such as Kachin, Kayah, Kayin, Chin, Burma, Mon, Rakhine, Shan and among them Burma is the highest in percentage with 99.79 percent, Rakhine is the second highest with 0.054 percent and Kayin is the third with

0.013 percent. The religions are Buddhist, Christian, Islam and Hindu. The number of Buddhist is the largest and Christian is the second largest.

The majority of the households in Kyauktan Township are living in bamboo houses and wooden houses. The households 35.6 percent have bicycle as a means of transport and it is the highest proportion, followed by 29.9 percent of households having motorcycle and moped. The majority of the household's majority use bicycle as a means of transport.

The literacy rate of aged 15 and over in the Kyauktan Township is 95.2 percent. Labor force is 106416. The unemployment rate is 2.62 percent. Agriculture is the main economic activity. Most of the crops grown in Kyauktan Township include rice, sunflower, cow-pea, beans. Under Kyauktan Township, there was one 50 bedded hospitals and four 16 bedded hospitals. The most prevalent diseases are malaria, diarrhea, TB, dysentery and hepatic.

4.2 Accessibility of Rural Road in Kyauktan Township

The smooth transportation is very important for regional development; the government has spent a considerably large amount of expenditure for construction of roads and bridges all over the country. Better accessibility play a significant role in human resource development of a region. The rural road accessibility problem can take different forms.

The related rural households normally do not have an appropriate road connection to even the near village, access to markets, jobs and services. The roads not only linked the districts, cities and township but also linked villages. The Kyauktan Township connected to other township show in table (4.1) and (4.2).

Table (4.1) Connected from Kyauktan to other Township

Name of Road		Length (miles/Furlongs)
From	To	
Kyauktan	Thanlyin	12
Kyauktan	Thongwa	21
Kyauktan	Khayan	30
Tadar	Thongwa	7.5
Tadar	Kyauktan	15
Total		85.5

Source: The Department of Rural Road development

Kyauktan Township linking with Thanlyin Township was 12 miles, Thongwa Township was 21 miles and Khayan was 30 miles, Datar Township linking with Thongwa was 7.5 miles and Kyauktan Township was 15 miles until 2018.

Table (4.2) Bus Station in Kyauktan Township

Name of Road	Name of Bus Station		Category of Bus Line No.	Number of Bus Line
	From	To		
Kyauktan	Kyauktan	Yuzana Plaza	YBS-33	100
Kyauktan	Kyauktan	Tamwe (Hospital Worker)	YBS-95	30
Tadar	Tadar	Botahtaung	YBS-34	3

Source: ygnbusdirectory.com

Yangon Bus Service (YBS) is bus transport network system which started operations on 16 January 2017, serving Myanmar's former capital city of Yangon. It is operated by the Yangon Region Transport Authority (YRTA). In Kyauktan Township, YBS public transport YBS-33 is connected from Kyauktan to Yuzana Plaza and YBS-95 is connected from Kyauktan to Tamwe (Hospital Worker). YBS public transport YBS-34 is connected from Datar to Botahtaung.

4.2.1 Rural Road Construction of Kyauktan Township

The Department of Rural Road Development (DRRD) could have implemented works for the improvement of rural roads and new constructions of rural roads. The DRRD have been constructions the village to village-to-village linking road within the whole country. Rural road constructions were implemented by Kyauktan Township, the situation of roads in rural road area within the year (2012-2013) to (2017-2018) is presented in table (4.3).

Table (4.3) Construction of Rural Road Condition in Kyauktan Township (2012-2018)

Fiscal Year	Complete Works (miles/Furlong)					Total
	Bituminous Road	Macadam Road	Concrete Road	Earth Road	Laterite Road	
2012-2013	175/7	273/6	41/3	577/6	-	1068/6
2013-2014	262/2	744/5	100/2	1569/6	-	2676/7
2014-2015	389/6	1697/4	167/3	2662/6	-	4917/3
2015-2016	225/0	1265/0	120/2	2030/7	164/2	3805/3
2016-2017	117/2.67	633/1.62	133/1.65	993/0.15	348/1.04	2224/7.13
2017-2018	127/1.11	106/7.75	56/5.79	47/6	80/1.59	418/6.24

Source: The Department of Rural Road Development

According to table (4.3), roads implemented within (2012-2018) are started in mile/furlong. The construction roads will be carried out by the Department of Rural Road Development. The progress of road infrastructure construction was increased in Kyauktan Township. In (2012-2013), the construction of road was 1068 miles 6 furlongs. In the year 2018, the total length of road was implemented by DRRD. The total construction of road become 418 miles 6.24 furlongs was implemented in 2018.

The types of the rural roads are Bituminous Road, Macadam Road, Concrete Road, and Earth Road. The total length of complete works of rural road is 15112 miles 0.37 furlongs in Kyauktan Township. Bituminous-road is 1297 mile 2.78 furlongs, macadam-road is 4721 miles 0.37 furlongs, concrete-road is 619 miles 1.44 furlongs, earth-road is 7881 miles 7.15 furlongs, and Laterite road is 592 miles 4.63 furlongs.

The Department of Rural Road Development is undertaking the works as completed 1068 miles 6 furlongs in 2012-2013, 2676 miles 7 furlongs in 2013-2014, 4917 miles 3 furlongs in 2014-2015, and 3805 miles 3 furlongs in 2015-2016, 2224 miles 7.13 furlongs in 2016-2017 and 418 miles 6.24 furlongs in 2017-2018.

4.2.2 Upgrade of Rural Road in Kyauktan Township

Kyauktan Township's Department of Rural Road Development implemented rural road upgrade. Table (4.4) shows that upgrade of rural road conditions in Kyauktan Township.

Table (4.4) Upgrade of Rural Road Conditions in 2012-2018

Village	Organization	Category of Rural Road Construction	
		Before	After
Nyaung Waing	DRRD	Earth	Laterite
Pilakat	DRRD	Earth	Concrete
Taung Gyi	DRRD	Earth	Concrete
Oo Yin	Mother	Earth	Concrete
Mee Pya	Life Door	Earth	Concrete/Laterite
Zwe Par Kone Tan	DRRD	Earth	Concrete
Kyar Kan	Aye Kabar	Earth	Laterite
Kan Pyaung	Kyaung San Win	Earth	Concrete
Kyon Kan	Aye Kabar	Earth	Concrete
Wea Gyi	AMG	Earth	Concrete
Ywar Thit Kalay	DRRD	Earth	Concrete
Chaung Wa	DRRD	Earth	Concrete/Macadam
Min Ga Lun	DRRD	Earth	Concrete
Ywar Thit Gyi	AMG	Earth	Concrete/Macadam
Boe Ba	Life Door	Earth	Concrete

Source: The Department of Rural Road Development

According to table (4.4), rural road is very important for rural development; the government has spent a large amount of expenditure for construction of rural road. Upgrade of rural road conditions responsible organizations are: Department of Rural Road Development, Company (Mother, Life Door, Kyaung San Win, Aye Kabar, AMG). In Nyaung Waing, upgrade rural road from the original earth road to laterite road. In Pilakat, upgrade rural road from the original earth road to laterite road. In Taung Gyi, upgrade rural road from the original earth road to concrete road. In Oo Yin, upgrade rural road from the original earth road to concrete road. In Mee Pya, upgrade rural road from the original earth road to laterite and concrete road. In Zwe Par Kone Tan, upgrade rural road from the original earth road to concrete road. In Kyar Kan, upgrade rural road from the original earth road to laterite.

In Kan Pyaung, upgrade rural road from the original earth road to concrete road. In Kyon Kan, upgrade rural road from the original earth road to concrete road. In Wea Gyi, upgrade rural road from the original earth road to concrete road. In Ywar Thit Kalay, upgrade rural road from the original earth road to concrete road. In Chaung Wa, upgrade rural road from the original earth road to concrete and macadam road. In Min Ga Lun, upgrade rural road from the original earth road to concrete road. In Ywar Thit Gyi, upgrade rural road from the original earth road to concrete and macadam road. In Boe Ba, upgrade rural road from the original earth road to concrete road.

4.3 Survey Profile

Using sampling method uses a survey to study the rural road development in Kyauktan Township. The sample size of household is 100. The sampling unit for this study is the household of Kyauktan Township's village-tracts which are Nyaung Waing village-tract, Pilakat, Taung Gyi, Oo Yin, Mee Pya, Zwe Par Kone Tan., Kyar Kan, Kan Pyaung, Kyone Kan, Wea Gyi, Ywa Thit Kalay, Chaung Wa, Min Ga Lun, Ywar Thit Gyi, Boe Ba village-tract.

The study of rural road infrastructure development in Kyauktan Township in selected 15 village-tracts from 45 village-tracts. The emphasized study unit is that of household members, ages, sex, occupation, income, transportation of each household. There is a total of 15 villages-tracts around the Kyauktan Township that are also beneficial from this rural road infrastructure and a total of 122983 households in this villages. The required households through face-to-face interview using well prepared questionnaire.

4.4 Survey Design

Both quantitative and qualitative methods were used. A questionnaire survey was carried out on selected with quota sampling method. Besides, key informant interviews were conducted using an interview guideline on villagers. The survey questionnaire was designed especially for effects of rural road development on living standard of households and contains six parts. Part I is included about characteristics of sample households, Part II is Occupation of Households, Part III is travel time for Kyauktan Township, Part IV is electricity usage of sample households, Part V is household's assets and Part VI is Household's monthly income.

4.5 Effects of Rural Road Development on Living Standard of Households

Rural road development is very important for rural area. Rural road communication plays an important role in promoting economic, social, linking rural education, health services and market. Therefore, effects of rural road development on living standard of households related situations are occupation of households, electricity usage and travel time, household's assets, income and etc.

(i) Characteristics of Sample Households

Characteristics of 100 sample households were classified according to the age of households by sex, occupation of the household, size of household and sex. The percentage of household head by sex is shown in table (4.5).

Table (4.5) Percentage of Households Heads by Sex

Gender	Number of Households	Percentage (%)
Male	169	46.6
Female	194	53.4
Total	363	100

Source: Survey Data, 2019

The sex of the households is presented in table (4.5). The table shows that the majority of the household are female in all sample villages. The total sample households of the study area are 363 of which 169 were males and 194 were females. The female is 53.3 percent and the male is 46.6 percent.

Table (4.6) Number of Households by Size of Households

Size of Households	Number of Households	Percentage (%)
Less than 3 members	19	19
3 to 5 members	70	70
More than 6 members	11	11
Total	100	100

Source: Survey Data, 2019

Table (4.6) shows the household size in the sample villages. Household size refers to the number of households members that live, work and eat together. The households' members reside under one roof and share households' expenses. Households' members are parents, children and relatives who cooperate in the daily life. Most households have members 3 to 5. The percent of sampled households had members, 11 percent of sample households had more than 6 members and 19 percent of sampled households had less than 3 members.

(ii) Occupation of Households

During the data collection, head of household's occupation status was based on household's answers. The kinds of group are shown in the following table (4.7).

Table (4.7) Classification of occupation for Head of households

Occupation	Number of Head of Households
Farmer	26
Breeder	25
Government Staff	14
Company Staff	10
Factory Worker	13
Jobber	12
Total	100

Source: Survey Data, 2019

The occupation of the head of households categorized into six categories, such as farmer, breeder, government staff, company staff, factory worker and Jobber. In addition, the farmer is 26, breeder is 25, government staff is 14, company staff is 10, factory worker is 13 and jobber is 12. Agriculture is the main economic activity so the most of head of household are farmer. The effect on occupation is negligible to the residing population of the study area, before and after construction of rural road.

Table (4.8) Change of Work Condition of the Household's Member

Occupation	Before Road Construction	After Road Construction
Farmer	28	20
Bender	26	15
Government	8	10
Company	5	17
Factory	3	22
Small Business	6	16
Bike Carrier	0	15

Source: Survey Data, 2019

Table (4.8) shows the change of work condition of the household's member by survey data. Before rural road construction is difficulties to work in Kyauktan urban area and personal mobility. After rural road construction, rural people can go to work in Kyauktan urban areas like a government staff, company staff, and factory worker. Rural people can work in other areas for better rural roads. In addition, increase the number of income because the household's members can work in other areas.

The income increase resulting from rural road construction could be due to a greater accessibility to job opportunity. Improvement roads and the better ability to transport goods provide opportunities can afford the investment to start a small store in the village or to buy village produce or to make their own and sell in the nearby market centers. Therefore it can be said that the effect on occupation before and after construction of rural road.

(iii) Travel Time for Kyauktan Township

The average travel time to Kyauktan Township before and after condition of road construction are shown in table (4.9).

Table (4.9) Average Travel Time to Kyauktan Township before and after Village Transportation Condition

Village	Types of Vehicle	Condition of Road Construction	
		Before(min)	After(min)
Nyaung Waing	Small Vehicle (Motor Cycle/Bicycle)	30	15
Pilakat	Small Vehicle (Motor Cycle/Bicycle)	30	15
Taung Gyi	Small Vehicle (Motor Cycle/Bicycle)	45	25
Oo Yin	Small Vehicle (Motor Cycle/Bicycle)	60	30
Mee Pya	Small Vehicle (Motor Cycle/Bicycle)	60	35
Zwe Par Kone Tan	Small Vehicle (Motor Cycle/Bicycle)	75	40
Kyar Kan	Small Vehicle (Motor Cycle/Bicycle)	80	45
Kan Pyaung	Small Vehicle (Motor Cycle/Bicycle)	85	45
Kyon Kan	Small Vehicle (Motor Cycle/Bicycle)	90	50
Wea Gyi	Small Vehicle (Motor Cycle/Bicycle)	90	50
Ywar Thit Kalay	Small Vehicle (Motor Cycle/Bicycle)	100	60
Chaung Wa	Small Vehicle (Motor Cycle/Bicycle)	130	90
Min Ga Lun	Small Vehicle (Motor Cycle/Bicycle)	130	90
Ywar Thit Gyi	Small Vehicle (Motor Cycle/Bicycle)	145	95
Boe Ba	Small Vehicle (Motor Cycle/Bicycle)	150	100

Source: Survey data, 2019

According to table (4.9), all villages using small vehicle (motor cycle and bicycle) and the average travel time to Kyauktan decrease half an hour in all villages due to the better roads access. In Nyaung Waing and Pilakat village, the average travel time to decrease 15 min and Taung Gyi decrease 20 min before Kyauktan road implemented. In Oo Yin, Mee Pya, Zwe Par Kone Tan, Kyar Kan, Kan Pyaung, Wea Gyi, Ywar Thit Kalay, Chaung Wa, Min Ga Lun, Ywar Thit Gyi, Boe Ba, the average travel time to decrease half an hour after developing Kyauktan road implemented.

Before not finished Kyauktan road the villager facing too many issue like economic, social, health and education and other emergency situation.

Rural accessibility was found to have improved, particularly in terms of travel time to Kyauktan and nearest hospital and transportation cost of each person from village to Kyauktan. In fact, farmer’s access to towns and urban centers could help them to get modern inputs and decrease the cost to use it. Roads are important for households to get to the nearest towns to buy modern inputs and to sell their outputs.

Households are solving the problems with own way like cart transportation, Motor boat and walking. Households are spending a lot of time for the bad transportation but they have a few cost. Now, households can travel too many ways like bus and motorcycle. But the other side households need to spend more transportation costs than not finished Kyauktan road. The price of a motorcycle costs 1,000 kyats from village-tract to Kyauktan urban area and bus cost is 400 kyats. Some villages that travel through waterways cost 1,500 kyats. After finished Kyauktan road households are develop in every sector. Now, households are reducing travel time, emergency health issue and can go safety in every time.

(iv) Electricity Usage of Sample Households

The sample households of rural road infrastructure development in Kyauktan Township’s villages use public electricity, battery and solar power for lighting. According to the finding of sample households in that village are shown in table (4.10).

Table (4.10) Conditions of Electricity Usage of Sample Households

Source of lighting	Quantity	Percentage (%)
Public electricity	77	56.6 %
Candle	19	14 %
Generator	7	5.1 %
Solar power	33	24.3 %
Total	136	100 %

Source: Survey Data, 2019

According to the above table (4.10), 56.6 percent of sample household use electricity from public electricity and 24.3 percent of sample household use solar power because some of the household cannot access the electricity and 14 percent of sample household use candle and 5.1 percent of sample household use generator.

Household with access to electricity performed better than without electricity in terms of income and consumption growth. The government can support about electricity because of better rural road.

(v) Household's Assets

Household's assets include building, furniture, household appliances, electronic equipment; livestock reared on commercial basic are treated as enterprise assets. The household in Kyauktan Township own house assets. Most people of the household have farmed, cattle, chicken, TV, DVD/VCD, telephone, etc. The Assets of sample household before and after construction of villages to village linking road in Kyauktan Township are shown in table (4.11).

Table (4.11) The Assets of Sample Households

No	Type of Assets	Assets	
		Before (Quantity)	After (Quantity)
1	Farm	48	49
2	Cattle/ Buffalo	45	19
3	Pig/ Chicken/Duck	23	28
4	Tractor	3	26
5	Mobile Phone	24	79
6	Bicycle	35	20
7	Motorcycle	21	72
8	Car	-	7
9	TV	32	79
10	VCD/DVD	18	66
11	Refrigerator	4	37

Source: Survey Data, 2019

Table (4.11) shows that after construction of rural road, assets of sample households are increased more than before. All items are increased more than before.

The sample households in study area's economic status have increased according to the household's assets. Therefore, increase the number of assets of households because increase income of households.

Before rural road construction, farm assets of households is 48 percent, cattle and buffalo is 45 percent, pig and chicken is 23 percent, tractor is 3 percent, mobile phone is 24 percent, bicycle is 35 percent, motorcycle is 21 percent, TV is 32 percent, VCD/DVD is 18 percent and refrigerator is 4 percent. After rural road construction, farm assets of households is 49 percent, cattle and buffalo is 19 percent, pig and chicken is 28 percent, tractor is 26 percent, mobile phone is 79 percent, bicycle is 20 percent, motorcycle is 72 percent, TV is 79 percent, VCD/DVD is 66 percent and refrigerator is 37 percent.

(vii) Households' Monthly Income

The income level is of vital importance for the uplift of the socio-economic condition of households. Households' surveys are useful for measuring the economic well-being of household people. Household income is the sum of the income of all members of the family. The distribution of sample households monthly average income is shown in table (4.12).

Table (4.12) Average Monthly Income of Sample Households before and after Construction of Rural Road

No	Name of the Villages	Number of surveyed households	Average Income (Kyat)	
			Before	After
1	Naung Waing	17	100000	350000
2	Pilakat	6	1000000	1500000
3	Taung Gyi	5	200000	500000
4	Oo Yin	10	300000	600000
5	Mee Pya	10	200000	300000
6	Zwe Par Kone Tan	6	200000	500000
7	Kya Kan	7	250000	400000
8	Kan Pyaung	5	300000	700000
9	Kyon Kan	4	300000	400000

10	Wea Gyi	4	200000	400000
11	Ywar Thit Kalay	5	200000	300000
12	Chaung Wa	4	450000	750000
13	Min Ga Lun	6	150000	200000
14	Ywa Thit Gyi	5	250000	400000
15	Boe Ba	6	150000	250000

Source: Survey Data, 2019

Table (4.12) shows average monthly income of sample households before and after construction of rural road. The average monthly income of each household was increased in all average monthly income of all villages after construction of rural road.

The average monthly income of each household was increased in all average monthly income of all villages after construction of rural roads because rural roads construction may affect the income of the beneficiary population rural area. For farmer, may increase the supply of agricultural products that are bought into the market or the effective price paid to the farmer, any of which would result in increase of agricultural income. For non-agricultural employment, may increase the income by non-agricultural labor markets.

In conclusion, the rural road infrastructure is very important in most developing countries. Rural roads are means for people to reach social services and markets. The survey shows that the rural household can directly contacts product to the market and receive more update information about prices and other related market information. Sample survey questionnaires are shown in Appendix. The survey was conducted for 15 villages-tracts in Kyauktan Township. According to survey, more improvement rural road can be enjoyed by the local villagers.

Kyauktan Township is existed at Southern District in Yangon Region. The total rural road promote in Kyauktan Township are 15112 miles 0.37 furlongs. Before not finished Kyauktan rural road the villager facing too many issue like economic, social, health and other emergency situation. Now, upgrade rural road from the original earth road to literate road, concrete road and macadam road. As the rural roads have development, all sides are improving in villagers.

According to the survey, the effects of rural road development on living standard of household's related situations are occupation of households, electricity

usage and travel time, household's assets, income and etc. The effect on occupation is negligible to the residing population of the study area, before and after construction of rural road. Before the construction are difficulties to work in Kyauktan urban area. After the construction, rural people can go to work in Kyauktan Township urban areas like a government staff, company staff, and factory worker.

The government can support about electricity because of better than rural road, so the villager most of use public electricity. After rural road construction, the average travel time decrease half an hour in all villages due to better roads access. Furthermore, increase the number of income because can work in other areas by household's members and increase the number of assets of households.

The more access can be enjoyed by the local people. Improved rural road access can generate more employment and economic activities which can raise the living standard. The survey showed that while the gains in the areas served by the project roads, where enrollment sharply increased between 2012 and 2018, were substantially higher than in the rural roads. Roads are a means for people to reach social services and markets. The survey shows that households can directly contact the product to the market and receive more updated information about prices and other related market information.

Rural road connectivity is essential to bring food, materials and agricultural inputs, or spares for the water well motor, at affordable prices, and to provide access to more social and administrative services. Health care workers are needed to employ more and it has also improved for the period. Regarding to human resource development, infrastructures such as schools and libraries increased. The better road induced more transportation facilities and smoother conditions contributed to higher enrollment ratios. Rural road construction had significant indirect impacts on general level of economic development in each of the study area. Therefore, it can be said that the effects on rural road development on living standard of households.

CHAPTER V

CONCLUSION

5.1 Findings

Myanmar is the largest country in mainland Southeast Asia. Myanmar's positive economic route will be challenged in a massive infrastructure. Myanmar's infrastructure lags behind its Association of Southeast Asian Nations neighbors and hinders access to markets and social services. High transport costs and associated limited access to markets and services are among the main causes of poverty and regional inequality.

Infrastructure plays a very important role in supporting nation's economic development in a country. The infrastructure is the facilities, activities and services which support operation and development of other sectors of the economy. There are two general types of ways to view infrastructure, hard or soft. Hard infrastructure refers to the physical networks necessary for the functioning of a modern industry.

The infrastructure development is mainly related of roads, bridge, building, hydroelectric power generation, telecommunication network, transportation facilities, water supply and so forth. Rural infrastructure is a fundamental requirement for the development of agriculture, natural resources and industry. To promote socio-economic development in rural area, construction of transportation infrastructure should be accelerated to improve the living conditions of the rural people.

Road transport helped reduce income poverty, with road transport improvements having a stronger impact. Access to roads reduced prices under conditions of competitive transport services provision, increased mobility and reduced labor market imperfections enabled too poor to find better paying work, allowed production of higher value cash crops and supply of cheaper agricultural inputs. Investment in transportation sector has provided and transportation, and allowed rural areas to compete both domestically and internationally. Besides contributing to growth, the investment has directly helped reduce poverty by increasing access to services and economic opportunities.

Road connectivity is essential to bring food materials and agricultural inputs, or spares for the water well motor, at affordable prices, and to provide access to more

social and administrative services. Access improved for all villages in the township and rural roads generate traffic, agricultural sales increase and neighboring districts are also enjoy the benefit of improvement in road transport.

Kyauktan Township is existed at Southern District in Yangon Region. Kyauktan Township is one of the Yangon Division is compose of 45 Districts. Kyauktan Township linking with Thanlyin Township was 12 miles, Tongwa Township was 21 miles and Khayan was 30 miles in 2018. The types of rural roads are Bituminous Road, Macadam Road, Concrete Road, and Earth Road. The total promote rural roads in Kyauktan Township are 15112 miles 0.37 furlongs.

The sample size of household is 100. The sampling unit for this study is the household of Kyauktan Township's village-tracts which are Nyaung Waing village-tract, Pilakat village-tract, Taung Gyi village-tract, Oo Yin village-tract, Mee Pya village-tract, Zwe Par Kyone Tan village-tract, Kyar Kan village-tract, Kan Pyaung village-tract, Kyone Kan village-tract, Wea Gyi village-tract, Ywa Thit Kalay village-tract, Chaung Wa village-tract, Min Ga Lun village-tract, Ywar Thit Gyi village-tract, Boe Ba village-tract.

The rural road infrastructure is very important in most developing countries. Rural roads are means for people to reach social services and markets. The survey shows that the rural household can directly contacts product to the market and receive more update information about prices and other related market information. Sample survey questionnaires are shown in Appendix. The survey was conducted for 15 villages-tracts in Kyauktan Township. According to survey, more improvement rural road can be enjoyed by the local villagers.

Kyauktan Township is existed at Southern District in Yangon Region. The total rural road promote in Kyauktan Township are 15112 miles 0.37 furlongs. Before not finished Kyauktan rural road the villager facing too many issue like economic, social, health and other emergency situation. Now, upgrade rural road from the original earth road to literate road, concrete road and macadam road. As the rural roads have development, all sides are improving in villagers.

The effect of rural road development on living standard of households related situations are occupation of households, electricity usage, travel time, household's assets, income and etc. The effect on occupation is negligible to the residing population of the study area, before and after construction of rural road. Before the construction are difficulties to work in Kyauktan urban area. After the construction,

rural people can go to work in Kyauktan Township urban areas like a government staff, company staff, and factory worker.

The total sample households of the study area are 363 of which 169 were males and 194 were females. The female is 53.3 percent and the male is 46.6 percent. Most households have members 3 to 5. The percent of sampled households had members, 11 percent of sample households had more than 6 members and 19 percent of sampled households had less than 3 members.

The occupation of the head of households categorized into six categories, such as farmer, breeder, government staff, company staff, factory worker and laborer. In addition, the effect on occupation is negligible to the residing population of the study area, before and after construction of rural road. Before rural road construction is difficulties to work in Kyauktan urban area and personal mobility. After rural road construction, rural road people can go to work in Kyauktan urban areas like a government staff, company staff, and factory worker. Rural people can work in other areas for better rural roads. In addition, increase the number of income because can work in other areas by Household's member.

The average travel time to Kyauktan Township before and after condition of road construction can be observed that the average travel time to Kyauktan decrease half an hour in all villages due to the better roads access and the average travel time to decrease half an hour after developing Kyauktan road implemented. Before not finished Kyauktan main road the villager facing too many issue like economic, social, health and education and other emergency situation.

Households are solving the problems with own way like cart transportation, Motor boat and walking. Households are spending a lot of time for the bad transportation but they have a few cost. Now, Households can travel too many ways like bus, taxi and Motorcycle. But the other side Households needs to spend more transportation costs than not finished Kyauktan road. The price of a motorcycle costs 1,000 kyats from village-tract to Kyauktan urban area and bus cost is 400 kyats. Some villages that travel through waterways cost 1,500 kyats. After finished Kyauktan road households are develop in every sector. Now, households are reducing travel time, emergency health issue and can go safety in every time.

The government can support about electricity because of better than rural road, so the villager most of use public electricity. The 56.6 percent of sample household use electricity from public electricity. Household with access to electricity performed

better than without electricity performed better than without electricity in terms of income and consumption growth.

The household in Kyauktan Township own house assets. Most people of the household have farmed, cattle, chicken, TV, DVD/VCD, telephone, etc. All items are increased more than before. The sample households in study area's economic status have increased according to the households assets.

The average monthly income of each household was increased in all average monthly income of all villages after construction of rural road. Rural accessibility was found to have improved, particularly in terms of travel time to Kyauktan and nearest hospital and transportation cost of each person from village to Kyauktan. In fact, farmer's access to towns and urban centers could help them to get modern inputs and decrease the cost to use it. Roads are important for households to get to the nearest towns to buy modern inputs and to sell the outputs. Furthermore, increase the number of income because can work in other areas by household's members and increase the number of assets of households.

The more access can be enjoyed by the local people. Improved rural road access can generate more employment and economic activities which can raise the living standard. The survey showed that while the gains in the areas served by the project roads, where enrollment sharply increased between 2012 and 2018, were substantially higher than in the rural roads. Roads are a means for people to reach social services and markets. The survey shows that the villager can directly contact the product to the market and can receive more updated information about prices and other related market information.

Rural road connectivity is essential to bring food, materials and agricultural inputs, or spares for the water well motor, at affordable prices, and to provide access to more social and administrative services. Health care workers are needed to employ more and it has also improved for the period. Regarding to human resource development, infrastructures such as schools and libraries increased. The better road induced more transportation facilities and these smoother conditions contributed to higher enrollment ratios. Rural road construction had significant indirect impacts on general level of economic development in each of the study area. Therefore, it can be said that the effect on rural road development on living standard of households.

5.2 Suggestion

This study found that a large numbers of rural road miles have been constructed within Kyauktan Township period of 2012-2018. With and improvement of rural road construction within the Kyauktan Township. It's observed that the interaction between settlements increases, the effects of arise when government investments in rural road infrastructure, leading to greater employment income earning opportunities for the poor and to cheap foot. The improvement of road are number of benefits such as travel time, cost and distance roads reduced travel time and provided better access to basic education and health services. Rural road construction had significant indirect impacts on general level of economic development in each of the study area.

Rural road access may essential as a means of raising rural income in poorly connected areas. In present, investment on the national roads is higher than the rural roads and the total length of national paved roads is much longer than the rural roads. Rural road improvements had significant indirect impacts on the general level of economic development. Thus, rationalizing the current rural road policy will be essential in order to maximize the development effectiveness of rural road infrastructure and to enhance level of income.

These studies suggest that the government should increase the range of the paved rural road surface with concrete by increasing capital investment for the next coming development strategy. In order to improve rural connectivity, appropriate policies and strategies need to be in place and implemented. Authorities need to prioritize rural connectivity and adopt appropriate policies and innovative technologies for its development. Therefore, more infrastructure investments are needed in transportation and communication sector in Kyauktan Township. Most of the people lived in rural areas and thus, to promote the benefits of rural population are essential.

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APPENDIX

Sample Survey Questionnaire

1. Name of Village-tract -

2. Name -

3. Age of Household

Age of Group	Male	Female
Under 15 years		
Between 15-59		
Above 59 years		
Total		

4. Type of Houses

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

5. Electricity Usage of Households

Public electricity	Candle	Generator	Solar Power	Other

6. Water Usage of Households

Dug well	Tube well	Rain water	Lake	Purified drinking water	Other

7. Assets of Households

No.	Types of Assets	Assets	
		Before (Quantity)	After (Quantity)
1	Farm		
2	Cattle/ Buffalo		
3	Pig/ Chicken/Duck		
4	Tractor		
5	Mobile Phone		
6	Bicycle		
7	Motorcycle		
8	Car		
9	TV		
10	VCD/DVD		
11	Refrigerator		

8. Occupation of Head of Households and Income

Occupation	Before Rural Road Construction	After Rural Road Construction
Farmer		
Breeder		
Government		
Salaried		
Vendor		
Other		
Total Monthly Household Income		

9. Transportation condition on road construction

	Before Road Construction	After Road Construction
Duration to move into Kyauktan		
Duration to move into Kyauktan Hospital		
A person Traveling expenses		

10. The impact of rural road implementation

	Before Road Construction	After Road Construction
Economic		
Social		
Health		
Education		
Other		

11. To describe the opinion for rural road construction

Important	More Important	Not Important

12. 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	

Other	
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13. To describe the opinion for rural road construction

Satisfied	More Satisfied	Dissatisfied

14. How to satisfy the construction of rural road?

.....

15. How to dissatisfy the construction of rural road?

.....

16. Before the construction of rural road condition

Difficult	Medium Difficult	More Difficult	Other

17. Comment on the rural road construction

	Agree	More Agree	Disagree	Neutral
Less duration travel time for village to village				
Less travel cost for village to village				
More flexibility for health case				
More flexibility for road safety				
Products can be easily transported				
Increases the opportunities to work				

Other				
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