

**YANGON UNIVERSITY OF ECONOMICS
MASTER OF DEVELOPMENT STUDIES PROGRAMME**

**ANALYSIS ON THE IMPACTS OF ROAD INFRASTRUCTURE
NETWORK IN RURAL AREA OF MYANMAR
(A CASE STUDY ON YWA-NGAN TOWNSHIP,
SOUTHERN SHAN STATE)
(2012-2013 to 2016-2017)**

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EMDevS - 21 (15th Batch)**

NOVEMBER, 2019

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A thesis submitted as a partial fulfillment towards the requirements for the degree of
Master of Development Studies

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YANGON UNIVERSITY OF ECONOMICS
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This is to certify that this thesis entitled “ **ANALYSIS ON THE IMPACTS OF ROAD INFRASTRUCTURE NETWORK IN RURAL AREA OF MYANMAR (A CASE STUDY ON YWA-NGAN TOWNSHIP, SOUTHERN SHAN STATE) (2012-2013 to 2016-2017)**” submitted as a partial fulfillment of the requirements for the degree of Master of Development has been accepted by the Board of Examiners.

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ABSTRACT

Improvements in transport infrastructure and transport services can enable poor people to meet subsistence, economic and social needs more easily. This study mainly focuses on the effect of rural road network on socio economic conditions (income, education, health and tourism) in Ywa-Ngan Township. This study is based on a qualitative and quantitative data through input from the household surveys and focus group discussion. The result shows that the construction and upgrading of rural roads have both positive and negative impacts. Positive impacts are increased income, increased school attendant rate, easy accessible to health care services and increased local tourism. Negative impacts are increased availability of undesired drugs, diseases and the facilitation of environmental damage. This study suggests to keep the increase of government budget for rural road construction and to seek more funding from other donors. Safety driving awareness workshop, environmental maintenance workshop should be given to communities' times to times.

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LIST OF ABBREVIATIONS

| | |
|-------|--|
| ADB | Asian Development Bank |
| CRRN | Core Rural Road Network |
| DRRD | Department of Rural Roads Development |
| EUR | Euro |
| FGD | Focus Group Discussion |
| GAD | General Administration Department |
| GoM | Government of Myanmar |
| INGOs | International Non-governmental organization |
| JICA | Japan International Cooperation Agency |
| KfW | Kreditanstalt für Wiederaufbau |
| MMK | Myanmar Kyat |
| MoBA | Ministry of Border Affairs |
| MoC | Ministry of Construction |
| MS | Middle School |
| NSRA | National Strategy for Rural Roads and Access |
| PS | Primary School |
| RHC | Rural Health Center |
| RHSC | Rural Health Sub Center |
| SDG | Sustainable Development Goals |
| SMS | Sub Middle School |
| UPS | Upper Primary School |
| USD | United States Dollar |
| WB | World Bank |

CHAPTER I

INTRODUCTION

1.1 Rationale of the Study

Transportation plays an important role in the political, economic and social development of any society and whether in rural or urban societies, transportation constitutes the main avenue through which different parts of the society are linked together. As a society grows in terms of population and functions, the need for interaction among its various components also grows there by requiring quality and effective transportation systems (Aderamo & Magaji, 2010).

Improvement of transportation facilities of a country is an important prerequisite for the economic development. It facilitates a geographical extension of internal and external markets by reducing the cost of moving goods. It is also one of the most effective means of maintain internal peace and order and of combating famines by moving from surplus to different areas in time of scarcity. It is also an important component of economy impacting on development and the welfare of populations. When transport sector are efficient, they provide economic and social opportunities and benefit that result in positive multipliers effects such as better accessibility to markets and additional investments (Kyaw Thura, 2013).

In developing countries, most of the people live in rural areas. Generally, rural areas serve as the base for the production of food, the major sources of capital formation for a country, and a principal market for domestic manufactures. The rural areas engage in primary activities which form the foundation for any economic development. Sustainable rural development is a function of a number of factors in which transportation is of importance.

Efficient and effective rural transportation serves as one of the channels for the collection and exchange of goods and services, movement of people, dissemination of information and the promotion of rural economy. Rural transportation provision forms an intrinsic part of rural development strategies, serving as a mechanism and catalyst for rural transformation through the reinforcement of rural development and

contributes to poverty reduction by enhancing both equity and efficiency outcomes (Adedeji, Olafiaji, Omole, Olanibi, & Yusuff, 2014).

Rural transportation is essential not only for connecting people to jobs, health care and family in the ways that enhances their quality of life, but also for contributing to regional economic growth and development by connecting business to customers, goods to markets and tourists to destinations. Commodities including timber, fuel and agriculture product must be moved from rural areas where they are produced to urban areas where they are processed, consumed, or sent out of the state or country. Rural road network has significant effect on the distribution of facilities in rural areas and has the potential of reducing poverty (Aderamo & Magaji, 2010).

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 their residents to access product and factor markets as well as social services their own communities. The importance of the rural road network in the national road system of most developing countries is enormous. The economic benefit from road development accrues from the reduction in costs of both transport and travel. This allows several processes to take place that can have a positive impact on reducing poverty.

Myanmar is the second biggest country in South East Asia after Indonesia with the total land area of 261,228 square-miles (677,000 sq-km). Most of these areas in Myanmar are mountain ranges, hilly tracts and ravines. As a result, it is difficult to travel and they remain behind with poor infrastructure including transportation.

Myanmar has an ethnically diverse population of approximately 54 million and living spreading in 64,000 registered villages. According to census 2014, 70 % of the populations are living in rural areas. The responsibility of the rural road network in Myanmar is mainly under Department of Rural Road Development within Ministry of Construction.

According to the National Strategy for Rural Roads and Access, there are about 64,000 registered villages in Myanmar. Over one-eighth of registered villages are not connected by road. More than 40% are linked by dry-season rural roads that quickly become impassable during the rainy season. Altogether, half the existing registered villages are physically isolated during part or all of the year due to a lack of all-season rural road access, affecting over 14 million rural people. This lack of all-season rural roads is severely affecting rural people's access to health services,

education, employment opportunities, markets, and other services and facilities, limiting their development and that of the country as a whole.

Among 15 Regions in Myanmar, Shan State is the biggest state and in term of areas is 155,801.38 km² with 14,351 villages. The population in the whole Shan State is 5.8 million and the population density is 37.4 km². 76% of the population in Shan State lives in rural areas according to the census 2014. The total rural road network in Shan State is around 14,200 miles. As the Shan State is a big area, it is divided into 3 parts, Southern Shan State, Northern Shan State and Eastern Shan State.

Among many places, Ywa-Ngan township becomes well known place for local tourists visiting Myathabeik blue lagoon, Padalin cave and Mainmaye taung Pagoda and Ywa-Ngan coffee as well. That's why this study focuses how the rural road development affects the socio economic condition in Ywa-Ngan township.

Ywa-Ngan township is included in Southern Shan State and it is bordered to the Mandalay Division. Even though it is located closely to Mandalay city, due to the difficult transportation, difficult accessibility, and the township is underdeveloped. The difficult accessibility, inadequate infrastructure hinders livelihood opportunities, social services access and general economic development communities in that area. In this content, this study focuses on the rural road development in Ywa-Ngan township.

1.2 Objectives of the Study

The objectives of the study are as follow

- (1) to study the development of rural road infrastructure network in Myanmar
- (2) to analyze the effect of rural road network on socio economic conditions in Ywa-Ngan Township, Southern Shan State.

1.3 Method of Study

The method of study is descriptive by using quantitative and qualitative methods. The primary data are collected from 108 households living in Ywa-Ngan Township, Southern Shan State. This study used the unstructured questionnaires for households' survey and through three focus group discussions. The secondary data for this study are obtained from General Administration Department, Department of Rural Roads Development, relevant government departments and international organizations and internet sources.

1.4 Scope and Limitations of the Study

This study focuses only rural road infrastructure development in Ywa-Ngan township, Southern Shan State only within the period from 2012-2013 to 2016-2017. There are 28 village tracks in the study area. Among them, 5 villages out of 28 villages tracts are randomly selected to analysis the effect of rural road network on socio economic conditions (income, education, health and tourism) in Ywa-Ngan Township, Southern Shan State.

1.5 Organization of the Study

This study comprises five chapters. Chapter one presents the introductory part of rationale of the study, objectives of the study, method of study together with scope and limitation. Chapter two presents literature review on how important of the road infrastructure network in rural area. Chapter three discusses the overall rural road development in Myanmar between 2012-2013 and 2016-2017. Chapter four describes analysis the impacts of the rural road development in study area and chapter five presents the key findings and suggestions.

CHAPTER II

LITERATURE REVIEW

2.1 Definition of Infrastructure

Infrastructure is the fundamental facilities and systems serving a country, city, or other area, including the services and facilities necessary for its economy to function. It can be defined as the set of interconnected structural elements that provide framework supporting an entire structure of development. It is composed of public and private physical improvements such as roads, bridges, tunnels, water supply, sewers, electrical grids and telecommunications (including internet connectivity and broadband speeds).

The term infrastructure has been used since 1927 to refer collectively to the roads, bridges, rail lines and similar public works that are required for an industrial economy or a portion of it to function. The term also has had specific applications to the permanent military installations necessary for the defense of a country. Perhaps because of the widespread technical advancement, people now use infrastructure to refer to any substructure or underlying system. Big corporations are said to have their own financial infrastructure of smaller business, for example, the political organization to have their infrastructure of groups, committee and admirers. Nowadays think tanks and research foundation are also regarded as infrastructure as cited in Thida Kyu, 2008.

Infrastructure is the prerequisite for the development of any economy. Transport, telecommunication, energy, water, health, housing and educational facilities have become part and parcel of human existence. Infrastructure plays a crucial role in promoting economic growth and thereby contributes to the reduction of

economic disparity, poverty and deprivations in a country. It is a set of facilities through which goods and services are provided to the public. Its installations do not produce goods and services directly but provide inputs for all other socio-economic activities. Greater access of the poor to education and health services, water and sanitation, road network and electricity is needed to bring equitable development and social empowerment (Srinivasu, Infrastructure Development and Economic growth: Prospects and Perspective, 2013).

In general, it has also been defined as the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance society living conditions. Viewed functionally, infrastructure facilitates the production of goods and services and also the distribution of finished products to markets, as well as basic social services such as school and hospital, for example, roads enable the transport of raw materials to a factory and children can go school easily (Kyaw Thura, 2013).

Access is a precondition for the satisfaction of almost any need, especially physical and therefore provides a central integrating concept with which to grasp the complex interactions between subsistence, economic and social needs. Accessibility is defined in terms of provision of access and the ease with which a need can be satisfied. Improvements in transport infrastructure and transport services can enable poor people to meet subsistence, economic and social needs more easily (Hanmer, Lovell, Chapman, & Slaymaker, 2000).

According to the Infrastructure for Development, World Development Report 1994 from World Bank, the adequacy of infrastructure helps determine one country's success and another's failure in diversifying production, expanding trade, coping with population growth, reducing poverty or improving environmental conditions. Socio economic development can be facilitated and accelerated by the presence of social and economic infrastructure.

According to Nemes, 2005, infrastructure is divided into three categories: physical, economic and policy access. Physical access means physical infrastructure e.g roads, telecommunications, and amenities which makes easy for the movement of people, goods and information. Good physical access can enhance the possibility of commuting from a rural and peripheral area into a nearby industrial centre, the transport of goods produced or the number of tourists attracted and the attractiveness of an area for industrial inward investment. Good Infrastructure encourages the

movement of money and business, financial services, concerns economic access, educational institutions or health services which is called economic access. Policy access means the ability of central organizations to reach the rural and peripheral areas to enforce regulations or to offer resources for development by public administration; organized interest groups; various agencies and umbrella organizations for civil societies; development associations; and often even representation of political parties. Without a functioning local administration it is impossible to maintain even basic services, or to distribute government benefits to those in need. Without working civil society it is difficult to know what people of a certain locality wish for their future.

2.1.1 Type of Infrastructure

According to United Nations Economic and Social Survey for Asia and the Pacific (2004) revealed that infrastructure can also be classified as, “Hard Infrastructure, Soft Infrastructure and Institutional Infrastructure”. Hard infrastructure plays an important role in nation’s development and it includes such as urban and rural roads, telecommunications, electrification, land and irrigation facilities such as dams and reservoirs. Soft infrastructure includes health services, education, finance, distribution factors and marketing, which are necessary for economic development. Institutional infrastructure means such as agencies, which are responsible for collection and analysis of regional data on population, types of land, regional products, and channels of communication. Without sufficient institutional infrastructure, planning for development can be ineffective.

Infrastructural facilities are basic services without which the needed environment as well as primary, secondary and tertiary productive activities will not be able to function. Infrastructural facilities can be physical infrastructure (such as roads, water, rural electrification, storage and processing facilities), social infrastructure (health and educational facilities, community centres, fire and security services) and institutional infrastructure (credit and financial institutions, agricultural research facilities) (Obaleyu, Olarewaju, & Oyelami, 2014).

Infrastructure can be classified according to their usefulness as follows: (Thida Kyu, 2008)

- Physical Infrastructure: e.g: roads, bridges, dams, canals, transportation

- Public Utilities Infrastructure: e.g. power, communication, water supply, sanitation, solid waste collection
- Technology Infrastructure: e.g. technology zones, microwaves centers, internet works, communications
- Industrial Infrastructure: e.g: industrial zones, export promotion zones, special economic zones
- Human Capital Infrastructure: e.g. universities, hospitals, gymnasiums, libraries
- Smart (soft) Infrastructure: e.g. business networks, venture capital pools and training

2.2 Importance of Road Infrastructure in Rural Area

Rural transport plays a major role not only in the distribution of goods and services, but also in improving the rural economy, rural productivity, rural resilience and rural empowerment. It further helps to enhance the livelihood security of the farmers and rural poor, which have a significant impact on socio-economic transformation. The provision of rural transport infrastructure and services bring multiple socio-economic benefits to the communities. The improved rural transport and infrastructure connects the rural community with education, health, markets, access to drinking water, energy, administrative and welfare facilities including provision for employment opportunities. It has significant implications to poverty eradication, hunger elimination, social integration and for achieving the 2030 Agenda for Sustainable Development Goals (SDGs) (Pande, 2017).

An important dimension of transport infrastructure is the network of roads that provide a physical link to various communities in urban and rural areas with outside markets. A good network of roads at the local level is indispensable in the timely movement of people and transport of goods with low transaction costs (Mu & van der Walle, 2007).

The transport system is fundamental to economic and social development in rural areas especially for developing countries and significant investment on infrastructure is required to ensure it is of a suitable level. The road infrastructure comprises all types of roads in a given area, including various structures and serves to transport passengers and goods. It enables to carry people to work, to market, to healthcare centers, to other cities as well as materials, raw materials, semi-finished

and finished products intended for sale. It affects the flexibility and mobility of the workforce, which is reflected in the employment level. Transportation has the potential to grant important consumption benefits by virtue of the increased personal mobility and communication it makes possible. It can also be a means to acquiring other goods and services, by improving access to education and health facilities and to markets (Ivanova & Masarova, 2013).

Transportation improvements affect both economic development and productivity. Pure economic development effects are usually regional in nature and result from improved access to labor pools or to larger markets. While considering the economic development of different regions of a country, transportation infrastructure and the overall system may play a significant role in removing regional economic disparities. Within the same country and under the same development policies, significant role for transportation implies that regions with better transportation infrastructure will have better access to the locations of input materials and markets and thus will be more productive, competitive and hence more successful than regions with inferior transportation accessibility (Myint Maung Kyaw, 2005).

Availability of adequate infrastructure in rural as well as urban areas is essential for economic development of a nation. Access to rural infrastructure has a strong positive association with rural economic development and strong negative association with incidence of poverty. Rural roads link communities and their agricultural fields to the main transport system and markets. Improving rural roads reduce transport cost, travel time and stimulate marketing. This results in increased production and productivity, crop diversification and increased profitability. It is necessary to accelerate investment in rural infrastructure to generate additional employment, create new economic opportunities, ensure delivery of related services and enhance credit absorption. All these ultimately lead to improvement in quality of life and reduce the vulnerability of rural poor (Samanta, Development of Rural Road Infrastructure in India, 2015).

The people in poverty need adequate ways of transport to access clean water, employment, education, health care and the market. Remoteness may matter to poverty not just because remote areas tend to have people with poor endowments of human capital but because rural infrastructure matters directly. The remoteness and inaccessibility to rural people can prevent governments from providing basic social services to the isolated communities (Gibson & Rozelle, 2002).

One solution to solve the isolation problem is to build rural roads that link rural communities to the market and the urban centers. By providing roads to rural communities, major constraints that reinforce poverty can be removed and the rural communities can be set forth on the path of poverty alleviation (Grootaert C. , 2002).

2.3 Investment on Road Infrastructure in Rural Area

Road investment constitutes a major portfolio of public investment in rural areas, reinforcing the notion that rural income and productivity growth depend critically on roads and other public investments. Roads are important public investments that have both short and long-term effects that go beyond transport cost savings. Transport cost savings reflect the short-run and immediate impact of road investment; roads, however, also have short and long-term effects on employment, income, and productivity as well as investment in the human capital (R.Khandker, Bakt, & B.Koolwal, 2006).

Investments in infrastructure contribute to economic growth and to raise the quality of life. They contribute to economic growth by reducing the cost of production, by making possible the diversification of the economy, and by making other factors of production more productive. There is significant empirical evidence at the macroeconomic level of a positive correlation between infrastructure networks, including roads, and GDP per capita or growth rates. Quality of life is improved by creating amenities in the physical environment and by providing outputs, such as transportation and communication, which are valued in their own right. The establishment of roads can reduce this burden and free up time to engage in more productive income-earning activities. To the extent that women are often responsible for these transport duties, rural roads can be expected to free up their time for employment opportunities and improved child care.

Rural roads can contribute to creating opportunity, facilitating empowerment, and enhancing security (World Bank, 2000).

- **Opportunity:** better access to markets creates economic opportunities for poor people to sell their labor and products. Better transport infrastructure and services facilitate access to schools and health clinics.
- **Empowerment:** the presence of roads can empower the poor by facilitating their access to information and their political and social participation, by making it easier to hold public consultations in poor communities and making

it possible for constituents to get to meeting places and town centers. Better access to government officials may serve the same objective. If roads are designed and implemented with local community involvement, the process may strengthen community capacity overall.

- **Security:** a reliable road system can enhance security by making it possible to respond better to economic and natural shocks. At the micro level access to transport facilitates job search and can contribute to easier diversification of income, thus reducing vulnerability of households to external shocks. Roads can also improve access to health care facilities, thus making it easier to respond to medical emergencies.

Investment on road networks can set up a process that will see increased input procurement and will make the marketing of produce easier. As the access between a rural community and the market increases, the price paid for external goods reduces and the transport costs for sending goods to the market decreases. The construction or upgrading of rural roads reduced travel times and vehicle operating costs. As a result of shorter travel times and lower vehicle operating costs, transport fares also decrease. Furthermore, cheaper transport costs mean that farmers can grow alternative exportable crops and save money. Not only do the crops grown in the community diversify but so do the goods coming into the community.

According to World Bank report 2015, evaluating the Social and Economic Impacts of Rural Road Improvements in the State of Tocantins, Brazil, the impacts on the road network construction, rural road construction has short term and long term effects. As a short term, the upgraded roads change physical accessibility in rural areas, especially during the rainy season. Accessibility to certain locations will be improved, particularly in terms of travel time. Thereafter, improved accessibility will likely affect transport demand. People might travel more frequently, and available transport modes and services can also be expected to change as a consequence.

In the long run, an even wider range of economic and social benefits may be measured. The improved accessibility will increase school attendance. Health conditions are also expected to improve thanks to enhanced road accessibility. Similarly such changes might stimulate new local businesses and encourage farmers to sell their agricultural products in the market, eventually resulting in job creation and household income growth which will turn to the growth of a country's economy.

The overall economic returns to road development can be measured by summing over the gains through transportation cost savings, higher output and lower input market prices, and higher productivity. While there is no an easy way we can summarize these benefits in one return estimate, such gains ultimately translate into higher household expenditure (both food and non-food), as well as human capital investment (in children, for example). The results in Bangladesh show that the returns on road investment for household per capita expenditure are about 11 percent in the project villages, a substantial gain in terms of higher consumption and income for rural households. This means that rural households in villages targeted by the road development project have on average an 11 percent higher consumption per capita per year (R.Khandker, Bakt, & B.Koolwal, 2006).

2.4 Positive Impacts of Rural Roads Development

By upgrading or construction of the all year round roads, the communities would receive positive impacts which include impacts on agriculture, impacts on income and poverty, impacts on travel time, impacts on health, impacts on education and impacts on tourism.

2.4.1 Impacts on Agriculture

A strong relationship between distance to the nearest all weather road and agricultural productivity has been reported in many studies. In the area of upgraded roads, overall level of agricultural activity increased in volume of production, productivity of the land and monetary value of output. It is examined the effect of road infrastructural development on agricultural output and income of rural households in Delta State, Nigeria. The results indicated that rural roads have a significant positive effect on agricultural output. They associated the result with the reduction in transportation cost, stimulation of demand for rural labor and improvement of rural income caused by improved rural roads. Road quality instigated a strong positive response to output and income, as a 10% improvement in road quality caused a 12% and 2.2% increase in agricultural output and total household income respectively. The study further explained that road infrastructure promotes inter-sectoral linkages between the agricultural and non-farm sectors thereby enhancing income diversification strategies among rural households (Ogunleye,

Influence of road transport infrastructure on agricultural sector development in Nigeria, 2014).

The correlation between all year round roads and agricultural produce is explained by the fact that the growth of farm productivity is linked closely to the type and quality of rural road infrastructure in place. This means that countries that will provide adequate, affordable and accessible road infrastructure in rural areas will succeed in increasing their agricultural productivity which will follow by increased income (Obaleyu, Olarewaju, & Oyelami, 2014).

2.4.2 Impacts on Transport

The upgrading of the road networks decreases vehicle operating costs and reduces travel time (Warr, *The Impact of Road Development on Poverty in the Lao People's Democratic Republic*, 2006). In the Philippines, (Olsson, 2009) carried out a study that looked at how the upgrading of a road (63km in length) which linked a study village to its major markets and found that the average fuel consumption was reduced by 35% and vehicle maintenance costs reduced by 44%. Before the upgrading of the road, the average travel time for a return trip between the study village and the major markets was 12-16 hours. After the upgrading of the road was finished, the average time for a return trip was reduced to 7-10 hours. In addition to the reduced travel times and vehicle operating costs, the upgrading meant that the road was usable by all motorised vehicles and could be used all year round. The upgraded roads reduced the vehicle operating costs of transport services, the price of inputs become cheaper and the cost of sending outputs to market decreased. As a result of the upgrading, food products would arrive at the markets in a fresher condition and therefore receive higher prices which can raise the farmer's income (Olsson, 2009).

2.4.3 Impacts on Income and Poverty Reduction

The poverty effect of road improvement has been shown significantly in Bangladesh. The report shows the poverty reduction (moderate and extreme) due to road improvements is about 5 percent; with an approximate 6-7 percent poverty reduction villages. Thus, had the duration of road pavement taken about 5 years, it is argued that each year poverty fell by about 1 percent, solely due to rural road improvements (R.Khandker, Bakt, & B.Koolwal, 2006).

It pointed out the existence of strong linkages between rural infrastructure investment, agricultural growth and poverty reduction. These studies draw evidence from South East Asian countries like Indonesia or Malaysia, where a massive increase of rural infrastructure was followed by a long period of economic growth and a dramatic reduction in rural poverty. Although the causal connection is not clearly established, they suggest this would have happened as a result of the impact of infrastructure investment on the rise of agricultural productivity and the creation of new job opportunities (Hanmer, Lovell, Chapman, & Slaymaker, 2000).

Roads also make possible income diversification beyond farming activities, by stimulating the non-farm economy and creating demand for non-farm services. Often this will be manifested through an increase in the number and type of non-farm household enterprises. Better transport may also improve the scope of job opportunities available to rural residents, by allowing them to look for jobs beyond their immediate settlement areas and take advantage, for example, of seasonal work in further away rural areas or cities.

2.4.4 Impacts on Education

Education is believed to be an important tool in alleviating poverty but education can be hard to access when there are no roads or road quality is poor. Accessing to education can be also very difficult when large distances must be travelled or transportation services are inefficient. It is also very common that children from developing countries have to walk to schools or they have to board in selected cities to be able to go to school. Due to those difficulties, the school drop-out rate is high in rural areas. Other reason is that financial limitation, workload of the farm and household are causes for increasing of drop-out rate. For example, villages in Laos without road access have lower rates of attendance and lower per capita expenditure on education than villages with road access (Warr, *The Impact of Road Development on Poverty in the Lao People's Democratic Republic*, 2006).

The increased enrolment was more pronounced in the secondary schools than the primary schools. This was because primary schools were generally closer to rural communities than secondary schools. While travelling to primary schools is often done by walking short distances (often without the use of the road), travelling to secondary schools involved travelling by foot for up to several hours or travelling along the road with the use of intermediate means of transport or motorised vehicles.

Once travelling along the roads became easier, cheaper and more reliable, the prospect of sending children to secondary school became more attractive and worthwhile. Another significant observation in the study is that the increase in girl's enrolment was significantly higher than that of increased boy's enrolment once the road infrastructure is improved (R.Khandker, Bakt, & B.Koolwal, 2006). It is also found that after the road networks were upgraded, the quality of education in the rural primary schools improved as a consequence of increased recruitment of qualified teachers and a decrease in absenteeism of both teachers and students (World Bank, 1996).

2.4.5 Impacts on Health

Health care is an essential basic social service and good quality access and transportation plays a key role in the staffing and equipping of health centres. The largest barrier for rural residents to access health care services is the distance and time. It takes time to reach health clinics. For many rural residents without roads or transportation, the distances to health clinics are too long and time-consuming. Location is a particularly critical factor in the uptake of obstetric, and especially delivery services. Access for emergency deliveries is clearly hampered by long distances. One study, in Zimbabwe, found that up to 50 percent of maternal deaths from hemorrhage could be attributed to the absence of emergency transport (Ensor & Cooper, 2004).

Road access facilitates the provision of health care in rural areas in three ways. Firstly, the local communities have easier access to the health centres. Secondly, mobile health care workers have easier access to the communities. Thirdly, health care services become more sustainable as supplying and staffing rural health care facilities becomes easier with road access (Downing & Sethi, 2001).

Health care services not only witnessed an increase in the number of people using their services but also experienced a higher frequency of use after the upgrading of rural roads. The number of rural residents who used the health care services after the upgrading of the road networks nearly doubled (World Bank, 1996).

2.4.6 Impacts on Tourism

The transportation infrastructure always plays an important role in the development of the local tourism. The transport infrastructure is recognized as a basic

component of successful creation of new attractions as well as for healthy growth of existing ones. Destinations with well-built transport infrastructure attract more tourists and the accessibility of tourism destinations has significant impacts on the tourism development, as the improvement of transport infrastructure can significantly reduce the trip cost. The impact of the transport infrastructure is an interrelated process of multiple tourism destinations, because the construction of the transport infrastructure demonstrates a positive externality and the accessibility enhancement can spread through the transport network (Li, Zhang, Xu, & Jiang, 2015).

Transportation and travel can be discussed without taking tourism into consideration, but tourism cannot thrive without travel. Transportation is an integral part of the tourism industry. Tourism is all about travel; and the role of transportation in its operation is vital. It is attributed to the ease and accessibility of modern transport that has spurred the widespread growth of nature tourism within or outside of the countries. Transportation in tourism is most often seen as just part of the tourism system which is in charge of bringing the tourists to the destinations, a means of getting around the place and leaving it once the duration of the trip is over. The transportation system of a tourist destination has an impact on the tourism experience which explains how people travel and why they choose different forms of holiday, destination, and transport. The improvement in transportation modes plus low fares has increased the accessibility of areas once considered off-the-beaten-path (Sorupia, 2005).

2.5 Negative Impacts of Rural Roads Development

From upgrading or construction of roads, we will receive not only positive impacts but also negative impacts. The literature showed harmful problems that relate to the construction or upgrading of rural roads. The first and second problems are related to environmental damage. Firstly, roads facilitated deforestation, mining and erosion as roads make the prospecting and extraction of natural resources easier. When roads are upgraded, larger vehicles can be brought into mining area, and larger and more efficient transport vehicles can be used to extract the resources. All of this can lead to major environmental damage that can be harmful to the region and its people (Grootaert C. , 2002). Secondly, an increase in traffic density will generally result in an increase in air and noise pollution (Olsson, 2009) .

The third and fourth problems are directly related to health and safety issues. The third problem is that new roads and increased traffic flows can facilitate the spread of diseases such as HIV/AIDs (Grootaert C. , 2002). The fourth problem is that an increase in transport services and private vehicles on the roads can result in the increase of road accidents (Grootaert C. , 2002) (World Bank, 1996). The final problem is an indirect result of the roads. The new or upgraded roads increase the access to urban centres and larger markets. The increased access to urban centres often results in the availability of new goods and services or an increase in previously available goods and services which increase the risk of exposure to negative influences.

Increase of accessibility can lead to negative nutritional and health impacts. Increase of accessibility is also reason for the increase in the consumption of manufactured foods over the traditional foods. It was also pointed out that manufactured products are increasing in popularity with rural households as they can usually be stored for longer and are easier to prepare than traditional foods. They also taste good and they give an impression of being a modern urban consumer good (Molesworth, Mobility and Health, The impact of Transport Provision on Direct and Proximate Determinants of Access to Health Services, 2005). In addition to the unhealthy products that become available with increased access, there are also the illegal goods and services such as drugs and the undesired trade that become more accessible. Further roads enable thieves to depart the scene of a crime easier and faster (Hettige, 2006).

2.6 Reviews on Previous Studies

Kumar, Singh & Vashisht (2006) examined the relationship between rural infrastructure development and level of net state agricultural domestic products. The study used the qualitative data collected from various secondary sources. The study found out that increasing the value of output from agriculture in erstwhile backward states by improving the rural infrastructure. The interdependence and variability in rural infrastructure development is bound to yield divergent economic development.

Kyaw Thura (2013) investigated the transport infrastructure development in Mon State between 1988 and 2011. The study found out that the usage of roads and railways transport was increased, the use of inland waterways was decreased.

However, the transportation sector has been increasing in the economy of Mon State because its share in GDP grew from 6.7% in 2001/02 to 14% in 2010/11.

Escobal & Ponce (2002) studied the impact of rural road rehabilitations on key welfare indicators income or consumption. The study found out that short-term impact from rural road rehabilitation is linked to changes in income-generation sources as road improvement enhances off-farm employment opportunities, especially in non-agricultural waged activities, changes in crops portfolios, technological changes at both agriculture activities level and non-agricultural activities level.

Fan & Chan-Kang (2005) examined the relationship between road development, economic growth and poverty reduction in China. The study found out the benefit-cost ratios for rural are about four times larger than those for high-quality roads when their measured in terms of national GDP. In terms of poverty reduction, for every yuan invested, the rural roads raise far more rural and urban poor people above the poverty line than high quality roads.

Vasconcellos (1995) studied rural transport and access to education in developing countries focusing on policy issues as a guide to the provision of rural pupil transport. The author argued that the transport has to be seen as a right to ensure children's access to schooling. The right to be transported should be clearly stated in the law because a school located very far away in simply not accessible.

Thida Kyu (2008) examined the role of infrastructure in economic development of Myanmar between 1988 and 2004. The study found out that in Myanmar, total economic infrastructure investment is only 2.44% of GDP in 2003-04 even computed using market exchange rate under the assumption of 75% infrastructure investment is imported. Economic infrastructure has both direct and indirect effects on output/productivity and is positively and significantly associated with economic growth. Further, Myanmar economy demands both more infrastructure investment and economic investment for future economic growth an infrastructure investment has crowd-out effect on economic investment.

Tripathi (2010) studied road transport infrastructure and economic growth in India using vector regression (VAR) approach to analyse the impact of road transport infrastructure on macroeconomic variables. She found out that there is a long-term relationship between network dynamic externalities from road transport networks and GDP and the VAR approach estimates of the long-run effect of public infrastructure on output and employment. She suggested that the long-run elasticity of output with

respect to public capital is positive, giving support to the hypothesis that public capital is productive.

CHAPTER III

OVERVIEW OF RURAL ROADS DEVELOPMENT IN MYANMAR

3.1 Background of Rural Roads in Myanmar

Myanmar's long period of isolation, since 1980, and the intense economic sanctions that accompanied it, seriously hampered the country's development. Isolation about three decades is closely associated with poverty in Myanmar. Isolation means limited access to basic services, markets, health centers, to employment opportunities as well as reduced ability to communities to benefit from government programme and private investment. Therefore, Myanmar left behind the neighboring countries.

After long period of isolation, the first elected government took over and started to undergo a series of political reform to become a modern, democratic and developed nation by 2030. Department of Rural Development was founded in 2012 to focus on the rural development activities such as (1) to implement the rural development task in line with the people centred approach (2) to construct the rural infrastructure (3) to uplift the socio-economic life of rural people and (4) to fulfill the necessary actions for poverty reduction.

In 2016, the Government of Myanmar set 12 economic policies for the development of country. Among them "Prioritizing the rapid development of fundamental economic infrastructure, such as electricity generation, roads and ports, and establishing a data ID card system, a digital government strategy, and an e-government system" is also one of the government's policies.

Adequate infrastructure in terms of roads, electricity, clean water, and telecommunications are the major requirements to be a developed country. Development of road and transport facility plays a significant role in changing the socio-economic conditions of the people of a region through dynamic externalities, which it generates. It is an important element of both direct and indirect intervention for socio-economic and regional development.

The rural roads and bridges are a means to an end, the end being to provide rural people with access to services and facilities, allowing them to develop and improve their livelihoods, and to participate in the national economy. A significant portion of the rural population in Myanmar still lacks road access, while an even larger portion of the rural population faces physical isolation during part of the year when dry-season roads become impassable due to rains and flooding

According to 2014 census, the population in Myanmar is about 54 million and 70% of populations live in rural areas spreading into 64,000 villages and connected with 55,000 miles rural road network. In Myanmar, rural roads comprise concrete road, bituminous road, gravel road, laterite road, earth road and road for motorcycle and ox cart roads.

Rural roads do not include the higher-level roads managed by Department of Highway under the Ministry of Construction (MOC) and do not include the urban roads managed by the City Development Councils and Town Development Councils. Rural roads are defined as the lowest level roads managed by the Department of Rural Roads Development (DRRD) under the Ministry of Construction since 2017 and by the Ministry of Border Affairs (MoBA). However, most of rural roads are managed by DRRD with the aims of 1) Development Rural Roads and Bridges continuously 2) arrival of the rural products to the market in time with the lowest costs 3) implementation of quickly access by using Core Rural Road Network (CRRN) for socio-economic development of the people in rural areas and 5) upgrading of all rural roads into year-round access in 2030.

According to Myanmar Transport Sector Note, Rural Roads and Access by ADB, nine million people live in the villages that are not connected by any road. Without a road, people have to walk, bike along narrow paths: they carry goods themselves or on the back of animal. Another estimated eleven million people are connected by not all season-road. It means the people may use vehicle to reach nearest cities, town but the link is impassable during the raining season.

A nationwide village access survey carried out by DRRD together with ADB shows that twenty two percent of all registered villages are connected by higher-level roads, twenty eight percent are connected by all-season rural roads, thirty six percent are connected by dry-season rural roads, and fourteen percent have no road access at all. Half the villages in Myanmar lack road access or have only dry-season road access, and are physically isolated during raining season at least part of the year. This affects 14 million people (40% of the rural population).

Typical relations between access and poverty in Myanmar are (i) in absence of a road, agricultural productivity remains low, agriculture is aimed at subsistence as inputs and products have to be carried out by foot or by animal (ii) people who are require routine or emergency treatment have to travel long way by foot or by poor transport which takes time (iii) children living in unconnected villages have mostly access to primary school, but as many as 90% drop out afterwards because of the time needed to walk or go to the nearest village tract or township, (iv) without access, household members have to spend a large part of their time on travel, a task which falls disproportionately on women. Absence of road access is the main limiting factor to rural transport in Myanmar. Therefore, the Government of Myanmar is setting rural development as one of the priorities of the country and speed up implementing rural development programme.

3.2 Rural Roads Strategy in Myanmar

The Government of Myanmar considers improved rural roads to be a key to developing rural areas and addressing rural poverty and inequalities in the country. Without proper roads, rural people cannot access the services and facilities they need to improve their lives and to participate in the national economy.

The Government of Myanmar aims to improve the access of the rural population to services and facilities by providing rural villages with road access to be in line with SDG and will construct and upgrade the rural roads connection these villages to an all season standard by 2030 to ensure that rural people can make use of the road access throughout the year.

That's why the National Strategy for Rural Roads and Access has been drawn which aims to improve rural access through the provision of all-season rural road access by 2030 and supporting the Sustainable Development Goals (SDGs) by 2030. Rural roads development and the resulting improved access to services and facilities are expected to support the following SDGs.

Rural roads will provide access to employment opportunities outside the villages, while also providing access to markets for selling produce and purchasing inputs, and facilitating access to education to improve future income earning opportunities which are related to the poverty reduction by supporting SDG Goal of end poverty. Rural roads will to lead to higher incomes and related food consumption, while also facilitating access to knowledge and inputs necessary for increasing

agricultural production which are also highlighted in the target for SDG 2, no hunger. Rural roads will facilitate access to health facilities and services and to health education, leading to improved health standards in rural areas which are also one of the targets of SDG 3, ensure healthy lives and promote well-being for all at all ages.

Rural roads will facilitate year-round access to education facilities and to lead to improved education standards, reducing the costs and difficulties of obtaining an education and reducing drop-out rates. Better education makes the facilitation access to employment opportunities outside the village, as well as increasing income earning opportunities within the village which support to SDG 4, ensure inclusive and equitable quality education and promote lifelong learning opportunities for all and SDG 8, promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

Rural roads are increasingly being built to an all-season standard that provides year-round access, while sustainability is ensured both through appropriate designs that are adapted to climate impacts and proper maintenance to prevent road deterioration and damage which is also related to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation of SDG 9.

3.2.1 Classification of Rural Roads Network in Myanmar

The National Strategy for Rural Roads and Access (NSRA) focuses on larger villages, providing all-season road access to all registered villages with more than 1,000 people by 2020 by upgrading of existing dry- season roads, and at least 95% of registered villages with more than 500 people by 2025 by upgrading of existing dry season roads and limited construction of new roads. By 2030, 90% of all registered villages in each state and region will be connected by road, benefitting 95% of the rural population, with 80% of the registered villages having all-season road access. Not only upgrading the existing rural roads but also new roads will be also constructed providing an additional 10 million people with all-season road access, and a further 3 million people with dry-season road access.

According to the strategy, a Core Rural Road Network (CRRN) is identified in each township, comprising the minimum rural road network required to connect all registered villages to each other and to the higher-level road networks. The NSRA estimated that a CRRN of approximately 65,500 miles is required to connect all registered villages in Myanmar by 2030. The existing rural roads in the length of

55,000 miles is formed part of the CRRN. This includes approximately 25,500 miles of existing all-season rural roads as well as 30,000 miles of existing dry-season rural roads. A further 10,500 miles of new CRRN roads is required to link all remaining villages that are currently unconnected by road.

The concept of a CRRN is applied to ensure that available funding for rural roads and access is used efficiently and effectively in achieving the objective of this strategy. In order to speed up the accessibility to the people, rural roads are classified into three administrative classes. Class A rural roads consist of 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 roads that connect smaller populations of 500 and more, and which generally connect to class A roads. Class C roads include all rural roads that provide access to agricultural areas and remote habitations with the population of 250 and more. The classification of roads A, B, C which was done in 2018 is shown in below table (3.1).

Table (3.1) Classified Roads List of Myanmar

(Mile/Furlong)

| State/Region | Class A Road | Class B Road | Class C Road | Total |
|---------------------|---------------------|---------------------|---------------------|----------------|
| Nay Pyi Taw | 633/2 | 566/2 | 439 | 1638/4 |
| Kachin | 959 | 607/2 | 282/6 | 1849 |
| Kayah | 47/2 | 131/4 | 267/6 | 446/4 |
| Kayin | 772 | 228/4 | 187/6 | 1188/2 |
| Chin | 2284/4 | 1466/6 | 1019/1 | 4770/3 |
| Sagaing | 4508/4 | 2499/6 | 700 | 7708/2 |
| Thaninthayi | 623/3 | 1039/1 | 306/3 | 1968/7 |
| Bago | 2444/5 | 803/1 | 970/1 | 4217/7 |
| Magway | 841/3 | 2086/6 | 3621/6 | 6549/7 |
| Mandalay | 3280/7 | 1504/2 | 539/5 | 5324/6 |
| Mon | 467 | 383/5 | 117/2 | 967/7 |
| Rakhine | 829/1 | 656/5 | 280/5 | 1766/3 |
| Yangon | 864/5 | 755/7 | 328/3 | 1948/7 |
| Shan | 5140/6 | 3467/2 | 2543/7 | 11151/7 |
| Ayeyawaddy | 1938/7 | 1124/1 | 946/2 | 4009/2 |
| Total | 25635/1 | 17320/6 | 12550/5 | 55506/4 |

Source: Department of Rural Roads Development (2019)

According to this above table, the class A road network in Myanmar is 25635 miles 1 furlong which is 46% of the total road network, the class B road network is 17320 miles 6 furlong which is 31% of the total road network and the class C road is 12550 miles and 5 furlong which is 23% of the total road network.

3.2.2 Financing Volume and Source of Funding for the National Strategy for Rural Roads and Access

According to the National Strategy for Rural Roads and Access, the total financing requirement for the strategy period up to 2030 is US\$ 3.9 billion is required to be able to connect 80% of villages with the all year round access roads. The total required funding includes US\$ 2.5 billion for upgrading and construction, and US\$ 1.4 billion for maintenance. This will be financed from three sources. A total of US\$ 2.1 billion will be financed from union and state/regional government budgets, in line with the average of US\$ 150 million per year that was allocated the past three years. The second source of financing will be a Road Fund that the Government of Myanmar is planning to introduce by 2021, and which will be financed from existing tolls and vehicle fees, as well as a new fuel tax. A tax of 1.5-2.0 dollar cents per litre (MMK 100 per gallon) would already provide US\$ 1.0 billion in revenue for rural roads during the strategy period (a quarter of the requirement). The total fuel tax would likely be in the order of MMK 400-500 per gallon to also cover the financing needs for MOC roads and urban roads.

As a third source of financing, development partners will be requested to provide financial support to cover the remaining US\$ 0.8 billion required to finance this strategy. This requires an average of US\$ 60 million per year from development partners, growing from US\$ 40 million per year initially to approximately US\$ 80-90 million per year by 2030. The achievement of the strategy objective is highly dependent on these financing levels being achieved. If financing from the fuel tax is not made available, 2.5 million fewer rural people will receive all-season road access by 2030. If government budget allocations are also reduced, as many as 5 million rural people may not receive the planned all-season road access, severely affecting their livelihoods and their participation in the national economy. The following table shows the estimated funding for the strategy.

Table (3.2) Estimated Funding for Levels on Village and Rural Population Access Levels in Myanmar

| Investment Strategy | Investment 2017-2030 | Higher-level road or all-season CRRN | | Dry-season CRRN | | No road | |
|--------------------------------------|----------------------|--------------------------------------|------------|-----------------|-----------|------------|-----------|
| | US\$ billion | % villages | % people | % villages | % people | % villages | % people |
| 2016 Situation | - | 50% | 58% | 36% | 30% | 14% | 12% |
| 2030 Situation (60% villages) | 2.1 | 62% | 72% | 24% | 17% | 14% | 11% |
| 2030 Situation (70% villages) | 2.9 | 70% | 79% | 17% | 10% | 13% | 10% |
| 2030 Situation (80% villages) | 3.9 | 80% | 87% | 12% | 8% | 8% | 5% |
| 2030 Situation (90% villages) | 5.0 | 90% | 94% | 10% | 6% | - | - |
| 2030 Situation (100% villages) | 6.0 | 100% | 100% | - | - | - | - |

Source: National Strategy for Rural Roads and Access (2017)

From the above table, rural road allocations from the union budget, from the states and regions, from the Road Fund or from the development partners may also turn out to be higher than expected which may lead to significantly higher budgets becoming available in the period up to 2030, allowing the impact to be increased. An additional allocation of US\$ 1.0 billion would allow up to 90% of villages to be connected by all-season roads, and 94% of the rural population to be provided with all-season road access (an additional 2.5 million people) and connecting all villages and the entire rural population by all-season road would require a total estimated budget of US\$ 6.0 billion.

3.3 Rural Roads Construction between 2012-2013 and 2016-2017 in Myanmar

Department of Rural Road Development under Ministry of Construction is the main responsible department for rural road construction in Myanmar. DRRD has implemented the construction of new earth roads and upgraded the roads from earth road to gravel road, gravel road to bituminous road that links villages to villages, villages to urban cities in the whole country except in border area. The length of total constructed road in the whole country before 1988, length 2005, length in 2012-2013 and 2016- 2017 is below in table (3.3).

Table (3.3) Rural Roads Construction before (1988 and 2005, 2012-2013) and (2016- 2017) in Myanmar (Miles/furlong)

| Type of Road | Length before 1988 | Length at 2005 | Length at 2012-2013 | Length at 2016-2017 |
|-------------------------|--------------------|----------------|---------------------|---------------------|
| Concrete | - | - | 60/1 | 1,053/4 |
| Bitumen | 295/0 | 1,182/3 | 1,383/4 | 1,963/2 |
| Gravel | 822/7 | 3,957/7 | 5,216/4 | 7,537/4 |
| Laterite | 730/5 | 1,689/1 | 2,340/7 | 4,538/2 |
| Earth | 2,092/2 | 17,070/5 | 21,357/0 | 29,519/4 |
| Oxcart, motorcycle road | - | - | - | 6,262/2 |
| Total | 3,940/6 | 23,239/6 | 30,358/0 | 50,874/2 |

Source: Department of Rural Roads Development (2019)

According to the above table, between 1988 and 2005, total length of rural roads 19,299 miles of roads were constructed. Especially the new earth roads were constructed in the length of 14,978 miles and 3 furlong between 1988 and 2005 and until 2005, the concrete roads in rural area were not taken into consideration. From 2005 to 2012-2013, total length of rural road 7,120 miles and 2 furlong was constructed. But during the study time period between 2012-2013 and 2016-2017, total lengths of rural road 20,516 miles and 3 furlong were constructed. Comparing this figures (2005- 2012) and (2012-2013 and 2016-2017), it shows that the Government of Myanmar has put its strong effort and budget to the rural development to become a developed country and to reduce the inequalities between urban and rural area.

Current Myanmar's rural road network in 206-2017 is 50,874 miles and 3.72 furlong in total and it comprises 1,053 miles 5.34 furlong of concrete road, 1,963 miles and 1.52 furlong of bituminous road, 7,537 miles and 4.38 furlong of gravel road, 4,538 miles and 2.38 furlong of laterite road, 29,519 miles and 3.98 furlong of earth road and 6,262 miles and 3.12 furlong of motor cycle, ox cart, jeep. Before, 2015-2016, the Government didn't officially construct as oxcart and motorcycle road. But after 2015-2016, the GoM has constructed officially as oxcart and motorcycle road. DRRD is also responsible for bridges (concrete bridge, wood bridge, causeways, hanging bridge, Valley Bridge and culvert) along the rural rod network. So far DRRD has constructed 5,527 concrete bridges, 6,749 wood bridges, 1053 causeways, 125

hanging bridges, 18 valley bridges and 10,709 culverts within the study period. The rural road networks which are built between 2012-2013 and 2016- 2017 in different regions and states are shown in table (3.4).

Table (3.4) Rural Roads Network in States and Regions in Myanmar between (2012-2013) and (2016-2017)

(Mile/Furlong)

| State/ Region | 2012-2013 | 2013-2014 | 2014-2015 | 2015-2016 | 2016-2017 |
|----------------------|------------------|------------------|------------------|------------------|------------------|
| Nay Pyi Taw | | | 70/7 | 389 | 1638/4 |
| Kachin | 1,606/6 | 1712/2 | 1882/1 | 1960/1 | 2,045/4 |
| Kayah | 273/4 | 304/3 | 360 | 416 | 452/2 |
| Kayin | 535/4 | 624/5 | 791/3 | 943/7 | 1,087/0 |
| Chin | 1,805/0 | 2290 | 2766/5 | 3464/2 | 4,298/6 |
| Sagaing | 4,764/7 | 5133/5 | 5602/2 | 6222/1 | 6,784/5 |
| Thaninthayi | 656/4 | 785/4 | 1140/3 | 1277/1 | 1,384/3 |
| Bago | 3,167/2 | 3465 | 3890/1 | 4055/2 | 4,217/7 |
| Magway | 4,260/1 | 4753/2 | 5248/2 | 5733/1 | 6,256/1 |
| Mandalay | 3,038/3 | 3274/2 | 3910/7 | 4430/3 | 4,858/1 |
| Mon | 914/0 | 959/4 | 1011 | 1075/1 | 1148/3 |
| Rakhine | 936/6 | 1201/3 | 1418/2 | 1646/1 | 1781/6 |
| Yangon | 1,066/6 | 1213/1 | 1367/1 | 1493/7 | 1546/5 |
| Shan | 4985/6 | 5865/1 | 7153/2 | 8748/6 | 9716/2 |
| Ayeyawaddy | 2346/6 | 2573/6 | 3024/7 | 3384/4 | 3658/1 |
| Total | 30358/0 | 34155/6 | 39637/3 | 45239/5 | 50874/2 |

Source: Department of Rural Road Development

According to the table (3.4), during the study period, the focus on the development of rural road has been significantly increased. But until 2014-2015, the rural road network in Nay Pyi Taw was not been measured. Therefore, there was no figure of rural roads in Nay Pyi Taw on 2012-2013 and 2013-2014. It found that in Myanmar the most developed on rural road construction are in Shan State and Chin State. It can be seen the rehabilitation of rural road per year is around 4000 miles. It also points out that GoM is focusing also in very remote area and rural area.

3.4 Rural Roads Sustainability and Role of Donor Organization

Not only the speedy construction and upgrading of the roads but also maintenance for the constructed roads and upgraded roads are also very important for the sustainability of the roads. DRRD didn't have a proper maintenance plan and budget for maintenance of rural road until 2015-2016. The fund was very limited. Even though, if there was a fund, the fund was used mainly for emergency repairs. Routine maintenance was rarely done and periodic maintenance was done by their department. But starting from 2016-2017, 4,486 million MMK of budget was allocated for the rural road maintenance for 9,932 miles for routine maintenance and 10,039 miles and 6 furlong for periodic maintenance. In fiscal year 2018 and until September 2019, 16,752 million MMK was allocated for the maintenance. MMK 14,800 million has been allocated for 2020 for the rural road maintenance. The Government of Myanmar has shown its commitments not only for the construction of the rural road but also the sustainability of constructed and upgraded roads.

Once the elected new Government took over 2011, the Government of Myanmar has been receiving the support from other countries in terms of loan and grant for the development of the country for the transition to democracy and to become a developed country. Even though DRRD is implementing the development of rural roads with their own fund and standard since 2011, a lot of investment in rural road development is still needed in order to meet the NSRA by 2030.

Therefore, DRRD is seeking for financial and technical supporting from other countries and donor organizations. In terms of financial cooperation, DRRD is receiving grants and ODA loan to implement several rural road projects from Asian Development Bank, World Bank, KfW German Development Bank, Japan International Cooperation Agency and other INGOs. In terms of technical cooperation, the DRRD employee received the capacity building training, on job training, and international experiences working together with international organizations. DRRD is also trying to avoid the duplication of the donor funds at the same state and divisions. Therefore, DRRD places a every donor to specific state and divisions. The list of donor organization in rural road development is as below:

Table (3.5) Donor Participation in Rural Road Development

| Name of donor organization | Amount in origin (Million) | Amount in USD (Million) | Places |
|--|-----------------------------------|--------------------------------|---|
| KfW | EUR 46.9 | 50 | Sagaing (Kalay) and Southern Shan State |
| World Bank | USD 70 | 70 | Yangon, Bago, Ayeyarwaddy, Sagaing, Magwe Region |
| ADB | USD 50 | 50 | Ayeyarwaddy, Magwe Region |
| JICA | Japanese yen 4,831 | 44.48 million | Sagaing Region, Shwe Bo, Kant Balu and Monywa Districts |
| Research for Community Access Partnership Programme ReCap (DFID) | Pound 1.15 million | 1.591 million | Technical support, capacity building training |

Source: DRRD (2019)

Among them Kredit Anstalt fuer Wideraufbau (KfW) German Development Bank is the first partner for rural road development under Rural Road Development Programme (RDP) since 2014 in Southern Shan State. The KfW programme has developed its own set of standards and specification, based on regional experience. Experience from the RDP in the application of these project standards and specifications is very useful in the development of Myanmar rural road standards and now DRRD and KfW are trying to set a proper road maintenance system. World Bank financed Emergency Recovery Project (ERC) in Yangon, Bago, Ayeyarwaddy, Sagaing and Magwe Region to rehabilitate road and bridges in those regions. With the

support from ADB, National Strategy for Rural Roads and Access had been developed. The road construction with ADB fund will be in Magway and Ayeyarwaddy Region. JICA is supporting in Agriculture Income Improvement Project in Sagaing Region, Shwe Bo, Kant Balu and Monywa District.

CHAPTER IV

ANALYSIS THE IMPACTS OF THE RURAL ROADS DEVELOPMENT IN STUDY AREA

4.1 Survey Profile

Ywa-Ngan is located in Taunggyi District, Southern Shan State. It extends the north latitude 20 degree 22 minutes and from East Longitude 96 degree 37 minutes. It is situated 4,082 feet above the sea level. The region is a hilly plateau, which together with the higher mountains in the north and south forms the Shan Hills system. The neighboring townships are Yatsauk Township, Pindaya Township in Southern Shan State and Thazi Township, Myittha Township, Kyaukse Township in Mandalay. Ywa-Ngan town is located on the Taunggyi-Hanmyintbo- Mandalay national road. It has an area of 1025.96 sq miles. It comprises of 3 urban wards and 28 village tracks (125 villages). According to General Administration Department, the total population in 2017 is 82,800. There are 1,235 households in Ywa-Ngan town and 17,624 households in the 25 villages' tracks. According to data from Government Administration Department (2019), only 6.5% of population lives in urban and the 93.5% lives rural area. Most people live on farming and their main products are coffee, orange, tea leaf, vegetables and some seasonal fruits. The road network which was constructed in Ywa-Ngan during 2012-2013 and 2016-2017 is shown in table (4.1).

**Table (4.1) Constructed Roads in Ywa-Ngan Township during
(2012-2013) to (2016-2017) (Miles/Furlong)**

| Year | Concrete Road | Bitumen Road | Gravel Road | Earth Road | Total |
|--------------|----------------------|---------------------|--------------------|-------------------|--------------|
| 2012-2013 | 0 | 2/4 | 5/0 | 12/4 | 20/0 |
| 2013-2014 | 0 | 2/4 | 5/3.3 | 17/6 | 25/5.3 |
| 2014-2015 | 5/0 | 1/4 | 5 | 16/4 | 28 |
| 2015-2016 | 0 | 1/1 | 8/6 | 10/0.8 | 19/7.8 |
| 2016-2017 | 0 | - | 1/0.9 | 3/0 | 4/0.9 |
| Total | 5 | 7/5 | 25/2.3 | 59/6.8 | 97/6 |

Sources: DRRD (2019)

The constructed roads between 2012-2013 and 2016-2017 were reviewed and among them 5 villages which are located around the roads are selected randomly. The selected villages and their number of households are shown in table (4.2).

Table (4.2) List of Survey Villages

| No | Name of the Village | No. of Households |
|--------------|----------------------------|--------------------------|
| 1 | Hta Min Paung | 157 |
| 2 | Kazet | 419 |
| 3 | Laekaing | 240 |
| 4 | Phayayi Gone | 215 |
| 5 | Tatkone | 168 |
| Total | | 1199 |

Source: General Administration Department (2019)

The required total sample size was calculated by using the formula of Taro Yamane, 1967 as we know the finite population. According to the sample size calculation, the required sample size was 92 households. But in this study, 108 households were participated. Therefore, a total of one hundred and eight set of questionnaires were administered in five randomly selected villages in the study area.

4.2 Survey Design

The method of study is descriptive, using quantitative and qualitative methods. The primary data are collected from 108 household living in Ywa-Ngan Township, Southern Shan State about their perception through unstructured questionnaires and three focus group discussions. The secondary data for this study are obtained from General Administration Department, Department of Rural Roads Development, relevant government departments and international organizations and internet sources. The respondents were explained about the questionnaires.

A self-administered unstructured questionnaire was used as a data collection tool. The questionnaire was developed from reviewing the literature and based on Kingdom of Morocco Impact Evaluation Report, Socioeconomic Influence of Rural Road (World Bank, 1996) and Socioeconomic Impact Assessment of Rural roads: Methodology and Questionnaires (Grootaert, 2002). There are 2 parts of the questionnaire: first part is household questionnaires and second part is Focus Group Discussion.

The first part, household questionnaire consists of the characteristic of household and income status of households. The characteristic of households includes general question about age, gender, education level of respondent, number of children and their job. Regard to income status before and after the construction of the road includes 6 questions related to the sources of income, product selling places, usages of agricultural machinery, and sources of electricity, average income and household's property. The unstructured questionnaire can be seen in appendix.

The second part of FGD involved participants with their experiences on the background of the implementation of the road rehabilitation and ability to discuss on the significant improvement before and after the construction/upgrading focusing on the socio economic of the community. The 3 FGD were conducted. Once FGD was conducted at Kazet and Htaminpaung villages and one Focus Group Discussion was conducted at Lae Kaing and Phayaguigone and the last FGD was conducted at Tat Kone villages. There are 3 parts in FGD: first part is for education, second part is for health and third part is for tourism. Regards to the impacts on education, there are ten questions about the travel time to school before and after the road construction, school enrollment rate, number of teachers and upgrading of the school. Regards to impacts on health, there are nine questions about the travel time to the nearest health care center, hospital, mobile health care team and positive and negative impacts of the

rehabilitation of the road. Regards to impacts on tourism, there are seven questions about the number of visitors, places, impacts of coming many visitors to these areas.

4.3 Survey Analysis

In this part, the analysis of the survey is divided into two parts. Part I is based on the answer from the respondents through the unstructured questionnaire and Part II is based on the answer from the three FGDs.

4.3.1 Characteristics of the Respondents

The characteristic of respondent including age group, gender and education level of respondent, number of children, children's education level and their professions are shown in table (4.3).

Table (4.3) Characteristics of the Respondents

| | | | | |
|--------------|--|---------------------------|--------------------------|-------------------|
| 1 | Age Group | Age Group | Respondent | Percentage |
| | | 25~34 | 6 | 5.6 |
| | | 35~44 | 26 | 24.1 |
| | | 45~54 | 27 | 25.0 |
| | | 55~64 | 21 | 19.4 |
| | | Above 65 | 28 | 25.9 |
| | | Total | 108 | 100 |
| 2 | Gender | Male | 76 | 70.4 |
| | | Female | 32 | 29.6 |
| | | Total | 108 | 100 |
| 3 | Education level of the respondent | Type of School | Male | Female |
| | | Primary School | 50 | 23 |
| | | Middle School | 14 | 4 |
| | | High School | 7 | 4 |
| | | Graduated | 4 | 1 |
| | | Never | 1 | 0 |
| | | Total | 76 | 32 |
| 4 | No. of Children | Children Range | No. of Respondent | Percent |
| | | 1~2 | 48 | 44.4 |
| | | 3~5 | 56 | 51.9 |
| | | None | 4 | 3.7 |
| | | Total | 108 | 100 |
| 5 | Children's education level | Name of School | No. of children | |
| | | Primary School | 46 | |
| | | Middle School | 59 | |
| | | High School | 20 | |
| | | University | 4 | |
| 6 | Occupation | Name of Occupation | No. of Respondent | |
| | | Farmer | 81 | |
| | | Brokers | 9 | |
| | | Services, transportation, | 11 | |
| | | Salary from employment | 3 | |
| | | Casual workers | 4 | |
| Total | | | 108 | |

Source: Survey data (2019)

The majority of the respondents are between 65 and 74 age group followed by 45-54 age group. The lowest age group was 25-34 age which is only 5.6% of the total respondent. The respondents are mainly house leader or the person who can make the decision. The respondent age group is shown in table (4.3).

The majority of respondents 70% are men and the remaining are 30% are female. Therefore, the ration of the female to male gender participation 1:2.3. Thus, the survey consisted of the higher percentage of men respondents and lower percentage of women respondents. The gender distribution of the households is shown in above table (4.3).

Among the respondents, most of the respondent which is 73 respondents went to primary school and followed by 18 respondents which went to middle school and only 4 respondents were graduated. There was one respondent who was never been to school. The respondents who went to primary school, middle school, high school and graduated are mainly men. Therefore, the educational level of gender for men is significantly higher than the educational level of female.

Most of the respondent has between 3 and 5 children which are 52% and the respondent who has children between 1 and 2 is 44% and 4 people doesn't have any children.

Most of the respondent's children are attending the secondary school which is 59 children followed by the number of children at primary 46 children, the number of children at high school 20 children and the number of children at university 4 children.

4.3.2 Impacts on Income

Main Sources of Income

The unstructured questions for the income sources, selling place of their products and change of income of the respondents before the road construction and after the road construction was asked to 108 respondents. As their income sources are changed and they will buy motorized vehicles and their answers can be seen as below:

Table (4.4) Sources of Respondents' Income

| Main Source of Income | Before | | After | |
|--|------------|------------|------------|------------|
| | Respondent | Percent | Respondent | Percent |
| Income from agricultural products vegetable | 76 | 70.3 | 55 | 50.9 |
| Income from agricultural products cash crops eg. coffee, tea, avocado, etc | 14 | 13 | 26 | 24.1 |
| Income from small tradings | 6 | 5.6 | 9 | 8.3 |
| Income from services, transportation | 5 | 4.6 | 11 | 10.2 |
| Income from salary, pension | 3 | 2.8 | 3 | 2.8 |
| Casual worker | 4 | 3.7 | 4 | 3.7 |
| Total | 108 | 100 | 108 | 100 |

Source: Survey Data (2019)

According to the table, after the road construction, the main source of income has slightly changed. The main source of income from agricultural products, vegetable especially is significantly decreased from 70% to 51%. The main income source from agricultural products, cash crops like coffee, tea and avocado has remarkably increased from 13 % to 24.1%. It shows that better transportation has changed the agricultural crops. Better transportation has increased of the main source of income form small tradings from 5.6% to 8.3% and the main source of income from services and transportation from 5% to 10.2%. However, the road construction doesn't effect on the main source of income from salary and pension which remains the same as 2.8% and for the casual workers before and after the road construction which is 3.7%.

The usage of agricultural machinery of the respondents is shown in below table (4.5).

Table (4.5) Usage of Machinery

| Usage of Machinery | Before | | After | |
|--------------------|------------|--------------|------------|--------------|
| | Respondent | Percent | Respondent | Percent |
| No | 106 | 98.1 | 102 | 94.4 |
| Yes | 2 | 1.9 | 6 | 5.6 |
| Total | 108 | 100.0 | 108 | 100.0 |

Source: Survey Data (2019)

The table shows that easy accessibility has also increased the usage of machinery for their agricultural products. Before the road was in bad condition, only 2 respondents were used machine to harvest the crops. But after the road constructions, the usage of machine has reached from 2 respondents to 6 respondents in terms of percentage it is from 1.9 % to 5.6 %. The effect of road construction on the usage of machinery is only slightly increased.

As most of the respondents are famer, the question about their selling places of their agricultural products was asked. Easy accessibility has changed the selling places from their villages. Changes of the selling places are shown in table (4.6).

Table (4.6) Selling Places of the Agricultural Products

| Selling Places | Before | | After | |
|--------------------------|------------|------------|------------|------------|
| | Respondent | Percent | Respondent | Percent |
| Own village | 18 | 18.7 | 23 | 24 |
| Five days/nearest market | 61 | 63.5 | 43 | 44.7 |
| Aungban | 11 | 11.5 | 16 | 16.7 |
| Mandalay/Yangon | 6 | 6.3 | 14 | 14.6 |
| Total | 96 | 100 | 96 | 100 |

Source: Survey Data (2019)

The table shows that how changed their selling place before and after the construction of the road. Most farmers who grow the crops with small farm go and sell their agricultural products to the nearest market. Normally they don't harvest at one time. They harvest times to times and sell their products at the nearest market. Their tradition is they sell their agricultural products and buy some necessary stuff for them (rice, oil, cloths, meat, etc.) at the market. Only some farmers who grow big

farms or planation goes to big cites to sell their products. Before the road construction only 6.3% of respondents sent their agricultural products to big cities Mandalay and Yangon. But after the road rehabilitation, the farmers who sell their product at Mandalay/Yangon are remarkably increased from 6.3 % to 14.6% which is followed by the increase of their selling products at Aung Ban from 11.5% to 16.7%. Further, most farmers also sells their agricultural products at the villages which is increased from 18.7 % to 24%. The easy accessibility has changed their trade location so that the farmers can earn more money. Due to the smooth road, most farmers go to the big cites which they could get more price for their products. That’s why, the selling places at the nearest market has fallen from 63.5% to 44.7%.

The properties and saving of the respondents have changed before the road construction and after the road construction. The changes of properties are shown in below table (4.7).

Table (4.7) Properties and Saving of Respondents

| Types of Properties | | Before | | After | |
|---------------------|-----|------------|---------|------------|---------|
| | | Respondent | Percent | Respondent | Percent |
| Bicycle | Yes | 43 | 39.8 | 20 | 18.5 |
| | No | 65 | 60.2 | 88 | 81.5 |
| Motorcycle | Yes | 40 | 37 | 90 | 83.3 |
| | No | 68 | 63 | 18 | 16.7 |
| Trailer Jeep | Yes | 7 | 6.5 | 11 | 10.2 |
| | No | 101 | 93.5 | 97 | 89.8 |
| Car | Yes | 2 | 1.9 | 10 | 9.3 |
| | No | 106 | 98.1 | 98 | 90.7 |
| Truck | Yes | 2 | 1.9 | 7 | 6.5 |
| | No | 106 | 98.1 | 101 | 93.5 |
| Saving | Yes | 4 | 3.7 | 9 | 8.3 |
| | No | 104 | 96.3 | 99 | 91.7 |

Source: Survey data (2019)

When the people earn more money, the demand for mobility and type of vehicle uses are changed. With the smooth travelling, the number of motor cycles has

significantly increased from 37% to 83.3% which is more than double increase. The percentage own car has increased from 2% to 9%. Due to the smooth roads, the people buy trailer jeep to transport their produce. That's why the property of trailer jeep has increased from 6.5 % 10.2%. Once the road is better, not bumpy, most people would like to travel with motorized vehicle to save the travel time. That's why the property of bicycle has decreased from 39.8% to 18.5%.

The smooth accessibility changed the sources of main income, properties of motorized vehicle and selling places of their agricultural products, other employment opportunities which effect on the income of the respondent. After the road construction, there are slightly changes in the employment as there are more people who are engaged in trading and transportation and services sector. Therefore, the change in income of the respondent is presented in below table (4.8).

Table (4.8) Change in Income

| Average Income Range (MMK) | Before | | After | |
|-------------------------------|------------|------------|------------|------------|
| | Respondent | Percent | Respondent | Percent |
| <50000 | 12 | 11.1 | 3 | 2.8 |
| 50000-100000 | 47 | 43.5 | 14 | 13 |
| 100,001-200,000 | 27 | 25 | 47 | 43.5 |
| 200,001-300,000 | 11 | 10.2 | 17 | 15.7 |
| 300,001-400,000 | 9 | 8.3 | 20 | 18.5 |
| Above 400,000 | 2 | 1.9 | 7 | 6.5 |
| Total | 108 | 100 | 108 | 100 |

Source: Survey data (2019)

Before the road was upgraded, there were only 2 respondents who earned above 400,000 MMK per month. When the road was upgraded, the respondents who earn above 400,000 MMK are increased to 7 respondents. The middle income range between 200,001 to 300,000 MMK is increased from 10.2 % to 15.7%. The income range between 50,000 and 100,000 has decreased from 43.5% to 13% and below 50,000 MMK is decreased from 11% to 3%.

Source of Electricity/Lighting

The easy accessibility brings the electricity to the survey area. The source of electricity before the road construction is shown in below table (4.9) and after the road construction is shown in table (4.10).

Table (4.9) Source of Electricity/Lighting (Before)

| Type of Lightening | Respondents | Percent |
|--------------------|-------------|------------|
| Village Generator | 3 | 2.8 |
| Candle | 32 | 29.6 |
| Solar | 55 | 50.9 |
| Others | 18 | 16.7 |
| Total | 108 | 100 |

Source: Survey data (2019)

Table (4.10) Source of Electricity/Lighting (After)

| Type of Lightening | Respondents | Percent |
|--------------------|-------------|------------|
| National Grid | 84 | 77.8 |
| Candle | 11 | 10.2 |
| Solar | 13 | 12 |
| Total | 108 | 100 |

Source: Survey data (2019)

The above tables show that the easy accessibility brings electricity to the remote area as well. Before the roads were constructed, the villages had to use solar panel, candle and other lightening sources for lightening and other purposes. Most FGD highlighted that once the road is constructed, the source of electricity has changed and 4 villages out of 5 study villages are now connected to national grid.

Focus Group Discussion on Impacts of Education, Health and Tourism

Total three FGD was conducted at the study area with the health care workers, nurses teachers, the officers from DRRD, the officers from GAD and some shop owners. The data presentation was broken down into each thematic area such as

education, health and tourism. Secondary data was also collected from township education office (TEO), Health Centers and Government Administration Department.

Impacts on Education

Most FGD respondents discussed that the road networks are upgraded, the travelling time to middle schools and high schools was reduced and the children can go smooth and easily to schools even in the raining season. As the travel route is safe, the parents are also willing to send their children to schools. As consequences, the children can obtain more chances than before. The number of students, teachers in the study area can be seen at table (4.11).

Table (4.11) Type of School, Number of Students and Teachers

| Name of Village | Type of School | | No. of Student | | No. of Teacher | | Student Teacher Ratio | |
|-----------------|----------------|-----------|----------------|------|----------------|-----------|-----------------------|-----------|
| | 2012-2013 | 2016-2017 | 2012 | 2017 | 2012-2013 | 2016-2017 | 2012-2013 | 2016-2017 |
| Hta Min Paung | PS | UPS | 92 | 168 | 2 | 4 | 46:1 | 42:1 |
| Kazet | UPS | SMS | 313 | 284 | 10 | 14 | 31:1 | 20:1 |
| Lae Kaing | UPS | SMS | 122 | 240 | 5 | 10 | 25:1 | 24:1 |
| Payagyi Gone | PS | SMS | 194 | 222 | 5 | 8 | 39:1 | 28:1 |
| Tat Kone | PS | UPS | 83 | 45 | 2 | 4 | 42:1 | 22.5 |

Source: Township Education Office (2019)

In the study area, there were three primary schools and two upper primary schools in 2012-2013. Once the road was upgraded; the two upper primary schools were upgraded to sub middle school and middle school and one primary school is upgraded to sub-middle school and one primary school is upgraded to upper primary school. The primary schools are located within the walking distance in their villages. The enrollment rate was decreased in two Kazet village and Tat Kone village in 2016-2017. The reason is that a village which is a lot 15 miles far away from Kazet village was upgraded to high school in 2014-2015. That's why some parents send their children to that school. In Tatkone village as well, the school located about 10 miles from Tatkone village was upgraded to middle school in 2014-2015. Therefore,

children are attending the middle school even though the school in their villages was upgraded to upper primary school.

FDG from Hta Min Paun, Payagigone and Tatkone pointed out that before the road construction; the students who wanted to continue at middle schools had to walk to schools which took them around 40 minutes to 60 minutes. Due to the long travel walking time and difficult accessibility to schools especially in the raining season, most students sopped to continue for the study after the completion of primary school. Before the road rehabilitation, the students from the study area had to walk to high school which are about one and half hour walking distance or had to stay at boarding houses near at the township which was also a burden for the parents. Therefore, only few students continued to the middle school and high school.

All FGD agreed that after the road rehabilitation, the students can attend easily to middle school as the schools have been upgraded. Due to upgrade of the schools, the children didn't need to travel a long way for the study. They can go easily to middle school and therefore, the enrollment rate has also increased. Even to high schools which are located at township can go daily from home with motorbikes or some parents bring their children to school with cars.

All participants from FGD appreciated the upgrade of the school status. Some FGD pointed out that it was a long way to upgrade the school status. As consequences of increasing the number of students, the schools were upgraded from primary school to middle school and some school from upper primary school to middle school. The road condition is much better and the students can easily go to high school by motorcycle or the parents can bring their children to schools for better education and the financial burdens for sending their children to boarding houses for high school education has also decreased.

FDG participants confirmed that better access also brings more qualified teachers. Before the road rehabilitation, the teachers at the school were not enough. Due to the difficult transportation, some assigned teachers didn't want to come to the villages. Before the road rehabilitation, the teachers had to walk about one and half hours to two hours from the study villages to get to the township education office and other administrative offices. After the road rehabilitation, the number of teacher assigned has increased and the assigned teachers are also happy to come to the study area. Now, if the teachers go to the administration offices or township education office, it takes only half an hour and maximum 45 minutes with motorized vehicles

and it is accessible the whole year round. Therefore, the student teacher ratio is decreased. The student teacher ratio in Lae Kaing is decreased from 25:1 to 24:1 even though the number of students was increase double. Significantly increase in student teacher ratio can be seen Payayi gone with the increase in number of students and in Kazet and tatkone with the decrease in number of students.

In addition, FGD discussed that as consequences, the number of students who continued to high school in the villages are increased due to the easy travelling to school. The complement is harmonized with the increase in the number of students who took the matriculation exam in the whole township. The number of high school students who took the matriculation exam is shown in table (4.12).

Table (4.12) Number of High School Students

| Year | No. of students took the matriculation exam | No. of students passed the matriculation exam | % of the matriculation exam pass |
|-------------|--|--|---|
| 2012-2013 | 391 | 146 | 37.3 |
| 2016-2017 | 1169 | 349 | 29.9 |

Source: Township Education Office (2019)

Due to the easy accessibility, the number of students who attended the high school and sat for the matriculation exam was increased from 391 students to 1169 students. Easy access to information has changed the perception of parents and young people are encouraged to pursue higher education instead of being content in agricultural activities as means of livelihood. All FGD confirmed that the road rehabilitation had a great impact on increase in enrollment rates to school, attendance at middle school and high school, the number of teachers; reduce travel time to schools and government offices.

Impacts on Health

Most FGD confirmed that the better access has reduced the travel time to nearest health care center and hospital. According to the data from township health office, the number of hospital, the number of rural health center, the number of rural health sub center, number of doctors, nurses and health workers are shown in table (4.13).

Table (4.13) Number of Hospitals, Rural Health Center, Doctors, Nurses

| Content | 2012-2013 | 2016-2017 | Progress |
|--------------------------------|-----------|-----------|----------|
| Number of hospital | 2 | 3 | 1 |
| No of Rural Health Center | 4 | 4 | 0 |
| No. of Rural Health Sub Center | 17 | 20 | 3 |
| No. of Doctor | 3 | 4 | 1 |
| No. of Nurses | 12 | 16 | 4 |
| No. of Health Assistant | 4 | 6 | 2 |

Source: Township Health Office (2019)

There are three rural health sub center (RHSC) are located in the three study villages namely Kazet, Lae Kaing and Tatkone. According to the data from township health office, the number of nurses and health care officer are increased. But the increase is not really significantly. The doctor and population ratio 1: 26039 in 2012-2013 and 1: 20700 in 2016-2017. The doctor and population ratio has very slightly increased. The ration of nurse to population is 1:6900 in 2012-2013 and 1:5175 in 2016-2017.

All FDG agreed that road rehabilitation had contributed a lot in easy accessibility to hospital which is located in township. Before the road rehabilitation, the people from Payagi, Tatkone and Hatminpaung villages had to travel to the nearest RHS in the emergency cases as the RHS are not located in the villages. For the travel time to the nearest RHS took about 30 minutes to 45 minutes by walking. It took them between one and half hours and two hours to get the hospitals, depending on the study villages by walking or between 45 and one hour by trailer jeep or motor cycle. Even though the communities travelled by motorized vehicles to hospital, due to the difficult and bumpy roads, the travel time was too long. Even though they brought the patients to the nearest health center, sometimes there was no sufficient medicine in the health centers. To bring patients to the hospitals, there were not enough motorized vehicles in the past. Therefore, there were cases that the patients died on the way to hospitals due to long and difficult travelling time.

All FGD mentioned that after the road rehabilitation, they prefer travelling directly to the hospitals which are located in township. The travelling time to township hospitals is also reduced to 30 minutes to 45 minutes by motorized vehicles. The pregnant women can come to hospital easily. In very urgent cases of emergency

or complications, the patients can be brought to big cities like Taunggyi and Mandalay within three to four hours. Due to the smooth road, the number of vehicle is increased. As the number of vehicle is increased, the travelling cost or car rental cost has also decreased if they need to bring the patients to hospitals. After the road construction, the children who got the vaccination have increased.

The nurse and FGD agreed that the road rehabilitation have effect on both side: for villagers and for nurses/health care worker as well. Due to easy accessibility, the villagers can visit hospital easily and the doctors can go to the villages easily as well. Better roads increased the visit of the mobile health care team visits to the rural villages so that the elderly people who are not able to travel can also have medical checkup and medical treatment as well. Health care services become more sustainable as supplying and staffing rural health care facilities becomes easier with better road access.

Some FGD pointed out that better access brings some negative impacts. Due to better access, most people own motorcycle and motorized vehicles. Due to the fast driving and lack of visible warning signs, the happening of accident has increased. The increase accessibility has also impacts on increase in consumption of manufactured foods, unhealthy food. Some FGD mentioned that the number using drugs has started and also increasing which they have never heard it before. They mentioned that it is because of the easy accessibility of road. Discussion with nurses pointed out easy access increased an undesired disease which was never happened in the past.

Impacts on Tourism

Most FGD mentioned that there are some famous sightseeing places in Ywa-Ngan township and near the study villages like Mya Thabeik Bluelagoon, Mainmaye Taung Pagoda, Padalin cave, Ye Win cave and Ye Phyu water hole. They pointed out these places are located since long time ago. Due to the difficult accessibility to those places, they were not well known. After the road rehabilitation around that area many visitors are coming to visit the blue lagoon and Mainmaye taung pagoda. The numbers of visitor are increased but unfortunately it was not documented how many people are visiting. Most FGD confirmed that the easy accessibility makes the attractions to local visitors and offers local communities the

alternative job opportunities. Some people from the villages are opening small local food stalls near the touristic places and selling the local agricultural products.

FGD mentioned that the construction of road had also introduced the new increased touristic places including Pyadalin Cave which contains earliest wall carvings and paintings in Myanmar by primitive people from Neolithic. It was only accessible on foot and it took about 6 to 7 hours to get there. The newly earth road construction to that place was done in 2015. Since then the cave can be reached within one hour in dry season from Ywa-Ngan town and the number of local visitors are increased. Due to the accessibility with only 4 wheels even in the dry season, the number of visitors is not significantly increased. Another cave is Ye Win cave which is closely located near Kazet village. Since the cave was broadcasted in Myanmar TV, the visitors are coming times to times. Another unique place is the Yephyu Waterhole near Tatkon Village. The water from this waterhole was not clear but white in color, hence the name Yephyu which mean white water.

Most FGD agreed that the road rehabilitation had impact on the increase in the number of visitors. The GAD officer also confirmed that due to the easy accessibility, the number of visitor has increased especially in dry season. The local tourist can't overnight in the touristic sites; they have to overnight in Ywa-Ngan town. Therefore, the number of hotels and guest houses has increased from 3 guest houses in 2012-2013 to 1 hotel and 5 guest houses in 2016-2017. The FGD suggested upgrading the roads connecting to Padalin cave, Yewin cave and Yephyu waterhole and these roads should be upgraded to paved roads so that visitors can visit those sites all year round which will generate the income.

The FGD pointed out that the land price in the area near the touristic sites has significantly increased. All FGD mentioned that the increase in land prices provide both positive effect and negative effect for the villagers. The positive effect is the increase in land price contributes to the income sources of the villagers. The negative effect is the poor in the study villages will not be able to buy and own land property.

CHAPTER V

CONCLUSION

5.1 Findings

Many of the findings in this study matched what was found in other studies of similar nature such as the construction of roads has both positive and negative impacts including the increased mobility of people and goods, increased income, increase of schooling students, increase in health, increased availability of undesired products and the facilitation of environmental damage.

It found that in Myanmar the most developed on rural road construction are in Shan State and Chin State. It can be seen the rehabilitation of rural road per year is around 4000 miles. It also points out that GoM is focusing also in very remote area and rural area.

This study found that easy accessibility has changed the main sources of income. Access to roads reduced prices under conditions of competitive transport services provision. Better roads provide access for the truck or trailer jeep directly to the villages. The farmers didn't need to carry their agricultural product to the main roads via ox-cart. Easy access of truck cars to their farms reduced the transport cost of their products and travel time. As a result of shorter travel times and lower vehicle operating costs, transport fares also decrease. Furthermore, cheaper transport costs mean that farmers can grow alternative exportable crops and save money. The better accessibility increased the other employment opportunities likes opening of the small shops, workshops, truck drivers and in transportation sector. The smooth roads also increased the number of motorized vehicle. The increase in number of motorized vehicle reduced the monopoly market. The usages of private car have increased and the demand for mobility has increased.

Due to the transport cost reduction, the farmers changed their selling places of their agricultural products. The farmers who sent their agricultural products at big cities have increased. Another trend is that some brokers are accessing to the villages to buy the agricultural products. Therefore, the famers who sell their products at their

firms have also increased so that the farmers can save travel time and transport cost as well. Access to information for the price of products is accessible through phones and/or social media. So the farmer can decide when they harvest their products and choose the places to sell. The change of main income sources and the reduced of travel time and travel cost increased the income of the households in the study areas. Due to easy accessibility, the private bank has already opened and the savings form the farmer at the bank is increased. 4 study villages out of 5 villages are connected with national grid. All FGD mentioned that without proper roads, it would have been difficult to bring the poles for the electricity to the villages and all FGD confirmed that better road bring electricity as well. The usage of machinery has also slightly increased.

Access to roads invited the assistance from International Non-Profit Organization. According to FDG, the farmer received the technical assistance for planting techniques and harvesting techniques especially for tea and coffee. So that the famer can produce more qualified coffee and tea and the productivity is rising.

Roads provided better access to basic education. The improved roads have contributed to upgrade of the school status. Further, it has increased the school attendance at primary and middle school. Better roads reduced the travelling time to school and provided access to school all year round. Therefore, school enrollment from primary to middle school is increased. With the increase in the number of students, the school itself has been upgraded. The supply of teacher has increased and the student teacher ratio is decreased. Even though their parents didn't completed primary school, middle school, high school due to the difficult accessibility, the parents are eager to upgrade the status of the school and send their kids to school. The children attendance at high school is also increased.

The study found that easy accessibility increased the frequency of visits to hospitals. The patients can reach to township hospitals within an hour and even to the hospitals in big cities can be reached within three to four hours. Due to the easy access the visit of mobile health care team has increased and it gives a big chance for the elderly people who can't travel to have a medical check up and medical treatment. The supply of staffs at the RHSC is also increased as the accessibility to urban area has increased. In three villages, the children who took the vaccination has increased. The improvement of roads encouraged over speeding by motorists and thus the number of accidents increased. Because young people had better access to and

communication with others outside the villages and they were also exposed to drugs and other vices.

Because of good roads, the people from other areas and brokers come and buy the land by paying higher price than the market price. As the land price is increasing, the poor villagers cannot afford to buy land for growing their own land. That's why there are more families to stay with their parents and to grow crops altogether with the whole family.

Access to road offered more attractive sightseeing places for local tourist. By receiving the many visitors, the job opportunities for the local community are increased. Because of easy accessibility, the many travelers are coming and visiting the beautiful places and they throw away their plastic bags, plastic bottles and glass bottles which are very harmful for the environment.

5.2 Suggestions

The achievement of the National Strategy for Rural Roads and Access' objective is highly dependent on the financing levels of rural roads being achieved to be connected all registered villages by 2030 and to support SDGs. Therefore, GoM should continue to increase the budget allocation and seek more funds from International Organizations. The rural roads which are frequently used should be built by BOT like the roads which lead to the touristic site. The touristic site can increase the income and employment opportunities for local people. Before the road construction, awareness discussion of health and after the road construction, safety driving awareness should be given to the villagers. The more traffic sign boards and safety sign boards should be posted along the roads. The virgin touristic sites create new economic opportunities and employment opportunities. The environmental awareness training, consequences of being visited by many visitors should be given to the villages. The signboards for environmental signs like no plastic, no glasses, keep the place clean should be posted more.

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APPENDIX I

Household Survey Questionnaire

Name of Village :
Name of Village Tract :
Name of Township :
Name of Breadwinner :

I Characteristics of Respondents

1. Age :

2. Gender :

- Male
- Female

3. Education

- Primary School
- Middle School
- High School
- Graduated
- Never

4. How many children do you have?

5. Education status of Children

- Primary School
- Middle School
- High School
- Graduated

6. Occupational Status

- Farmer
- Broker
- Drivers /Transportation
- Retired
- Casual-workers

II Income Status of Respondents

1. Where did you get income mainly from ?

Before - -----

After - -----

2. Do you have any agricultural machinery?

Before - -----

After - -----

3. Where do you sell your products?

Before - -----

After - -----

4. Monthly average income

Before - -----

After - -----

5. Main Source of Lightening from

Before - -----

After - -----

6. Household's properties

Before - -----

After - -----

APPENDIX II

FOCUS GROUP DISCUSSION QUESTIONS

III Education Status in Focus Group Discussion

1. During the last 5 years, the new roads were constructed in the villages in this township. As a result, does Ywangan town become crowded?
2. How long did it take to get to middle school and high school?
3. Now, how long does it take to go to middle school and high school?
4. How much was the transport cost for going to school?
5. How is school enrollment rate now comparing to past 5 years?
6. If it is increased, why do you think it has increased?
7. If it is decreased, why do you think it has decreased?
8. How the road network development affects the school attendant rate?
9. Are there more teachers now due to easy accessibility to school?
10. Are there any positive impact and negative impact of the road development in the rural area?

IV Health Status in Focus Group Discussion

1. During the last 5 years, the new roads were constructed in the villages in this township. As a result, how does for the health center affect?
2. How long does it take to get to health center?
3. How much was the transport cost for going to health center?
4. Compare to five years ago, what kind of health scheme has changed?
5. Could you also say that it is because of the easily accessible transport?
6. Are there many patients coming to the hospital now?
If yes, why?
If no, why?
7. Before road has not been constructed, were there any mobile team going to the villages the check the health care of the village people? How about now?
8. How did the children get vaccination?
9. Are there any positive impact and negative impact of the road development in the rural area?

V Tourism status in Focus Group Discussion

1. Are there any touristic sites around your places?
2. If yes, what are they and how long the touristic sites have been located?
3. When does it start to become famous?
4. Why does it become popular?
5. Are the touristic sites accessible all year round?
6. How does job opportunities affect with the increase of visitors?
7. Are they any positive impact and negative impact of the road development in the rural area