YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF APPLIED ECONOMICS
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A STUDY ON THE RELATIONSHIP BETWEEN ROAD AND BRIDGE INFRASTRUCTURE DEVELOPMENT AND ECONOMIC GROWTH IN NAY PYI TAW UNION TERRITORY

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EMPA – 34 (18th BATCH)

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A thesis submitted as the partial fulfillment of the requirements for the degree of Master of Public Administration (MPA)

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This is to certify that this thesis entitled "**A Study on the Relationship Between Road and Bridge Infrastructure Development and Economic Growth in Nay Pyi Taw Union Territory"**, submitted in partial fulfilment towards the requirements for the degree of Executive Master of Public Administration (EMPA) has been accepted by the Board of Examiners.

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ABSTRACT

The road and bridge infrastructure is essential for the efficient movement of individuals, goods, and services, as well as for ensuring accessibility to a wide variety of economic and social activities. Therefore, this study examines the relationship between the development of road and bridge infrastructure and economic growth in Nay Pyi Taw Union Territory. Using time-series data for Nay Pyi Taw Union Territory from the fiscal years 2011-12 to 2020-21, descriptive analysis is conducted. Investment expenditure in road and bridge infrastructure in Nay Pyi Taw Union Territory roughly increased about eighteen times and the trend was dramatically upward during the study period, except for 2015-16 and 2016-17. The total road length is significantly higher from 2016-17 to 2017-18 and gradually increases in other fiscal years. The total number of bridges substantially increased from 2011-12 to 2020-21, except for 2017-18. The trends of real GDP and per capita GDP are dramatically upward from 2011-12 to 2019-20, except for 2020-21. The real GDP growth rate fluctuated from 2011-12 to 2020-21. In general, this study highlights that both infrastructure development and economic conditions in Nay Pyi Taw Union Territory are increasing trends during the study period.

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ABBREVIATIONS

AC	Asphalt Concrete
ADB	Asian Development Bank
AMS	ASEAN Member States
ASEAN	Association of Southeast Asian Nations
BOT	Build-operate-transfer
CLMV	Cambodia, Laos, Myanmar, and Vietnam
DRRD	Department of Rural Road Development
FY	Fiscal Year
GAD	General Administration Department
GDP	Gross Domestic Product
GERBI	Government Expenditure on Road and Bridge Infrastructure Development
MOC	Ministry of Construction
MSDP	Myanmar Sustainable Development Plan
NATO	North Atlantic Treaty Organization
NLMP	National Logistics Master Plan (2018-2030)
NPTC	Nay Pyi Taw Council
NPTDC	Nay Pyi Taw Development Committee
PPP	Public-private Partnership
SDG	Sustainable Development Goals
SPDC	State Peace and Development Council

CHAPTER I

INTRODUCTION

The development of road and bridge infrastructure is the most important component of transport infrastructure that serves the foundation or the provision of transport facilities and operations for all economic sectors across the country, regionally and continentally with the primary objective of achieving national economic goals. The infrastructure of roads and bridges not only makes to provide customers with amenities in a conventional way, but it also provides transitional inputs that go into the production of other sectors. Moreover, it has long been recognized how the potential significance of road and bridge transport development.

According to the World Development Report (1994), infrastructure capacity grows step by step with economic growth. Gramlich (1994) finds that it is still unclear whether the link between economic growth and transportation infrastructure or vice versa or both exist. Canning D and Bennathan E (2000) show that the investment in paved roads, especially in countries with shortages of road infrastructure, has been proven to provide an impressive return on the economy. Ding C (2013) shows that improvements in urban roads and major regional roads have increased the GDP share for both the manufacturing and service industries in China. Nevertheless, the achievement of sustainable economic growth is a primary goal for every country. Therefore, this study is geared toward investigating the contribution of road and bridge infrastructure development to economic growth in Nay Pyi Taw Union Territory which is implementing infrastructure at high speed in a short-term period.

1.1 Rationale of the Study

Nay Pyi Taw Union Territory, the new capital city of Myanmar, is the most popular city, specially designed, planned, and constructed to be a capital. In accordance with the characteristics of capital, many infrastructures such as road networks, bridges,

hospitals, schools, markets, gardens, playgrounds, and water supply are being built, upgraded and renovated within the Nay Pyi Taw area. A well-developed infrastructure always makes sure society from roads and bridges to the socio-economic development of any region. In other words, infrastructure is also fundamental for the overall development of a region. Especially, the infrastructure of roads and bridges plays a vital function in connecting diverse locations and also facilitates trade and cooperation between countries around the globe. The provision of roads and bridges not only lowers the physical barrier by stimulating the movement of people, goods, and services but also improves access to markets, social services, and employment by reducing total transit times and costs. Moreover, it is a basic form of transformation and communication and constitutes the most critical part of the national economic development drive.

Most of the roads and bridges in the townships of Nay Pyi Taw Union Territory have been transformed into higher-level conditions in accordance with Nay Pyi Taw Capital City. Most of the roads in the townships of Nay Pyi Taw Union Territory have been upgraded to asphalt concrete (AC) roads from earth roads in accordance with getting funds permitted by relevant fiscal years. Planning and implementation of government infrastructure are hampered by the uncertainty and shortage of available funds for road and bridge infrastructure investment as well as conflicting priorities. However, the population in Nay Pyi Taw Union Territory is increasing year by year. Therefore, more road and bridge infrastructure investments are needed to build, upgrade and maintain in there. The infrastructure of roads and bridges still occupies an important role over other transport facilities and they are encouraged through BOT schemes and PPPs. The government has extended and upgraded road and bridge infrastructure quantitatively and qualitatively throughout the country. Therefore, road and bridge infrastructure expansion necessitates significant and ongoing investment; hence its availability in different states is determined by the differential priority accorded by state governments.

It is essential to manage the nation's road and bridge infrastructure through suitable frameworks for pricing, funding, and prioritization in order to gain benefits for the development of the nation's fundamental social and economic structure. To stimulate economic growth in economically lagging regions, the role of road and bridge infrastructure development is crucial. And so, modern road network and bridge helps

traffic move around the country more easily and is essential for the economic growth of any country.

The relationship between road and bridge infrastructure development and economic growth has received a lot of attention in theoretical and empirical studies of foreign countries but economists have different perspectives. Economic growth is hampered by underinvestment in infrastructure, according to empirical studies. At the same time, multiple studies have demonstrated that infrastructure investment may be an effective strategy in the fight against poverty. There is still a great deal of doubt and discussion surrounding the relationship between the availability of road and bridge infrastructure and economic growth. The success of the government in providing road and bridge infrastructure will be determined not by the amount of money invested, but rather by how much road and bridge infrastructure helps it to achieve its economic, social, and environmental goals.

Many developing countries are developing in line with their infrastructure development and the availability of adequate infrastructure facilities is an important pre-condition for sustainable economic and social development. And so the road and bridge infrastructure development is surely anticipated to fetch economic changes to the people of Nay Pyi Taw Union Territory. However, there is no prior investigation into the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory. Therefore, it is important to explore the implementation of road and bridge infrastructure development and the situation of economic growth there. In view of this, this study intends to investigate the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory by utilizing secondary data from the long period between (2011-2012) and (2020-2021).

1.2 Objective of the Study

This study aims to explore the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory. In concrete, it aims to identify whether the development of road and bridge infrastructure and the economic growth is related in Nay Pyi Taw Union Territory.

1.3 Method of Study

The relationship between the development of road and bridge infrastructure and economic growth in Nay Pyi Taw Union Territory will be conducted in this study using secondary information with time series data from financial years (2011-2012) to (2020-2021). The data was collected from the Ministry of Construction (MOC), Department of Rural Road Development (DRRD), Planning Department, General Administration Department (GAD), and Nay Pyi Taw Development Committee (NPTDC) as major sources. The relevant books, research papers, internet sources, and Yangon University of Economics' library were gathered for the literature reviews. This research uses the descriptive method by analyzing the quantitative data with tables, graphs, and figures, and then doing a description and interpretation.

1.4 Scope and Limitations of the Study

According to the available facts and figures from financial years (2011-2012) to (2020-2021), this study mainly focuses on the road and bridge infrastructure development and the economic growth in Nay Pyi Taw Union Territory. This study targets to measure the development of infrastructure by (i) the government expenditure on road and bridge infrastructure development, (ii) total road lengths, and (iii) the total number of bridges to describe road and bridge infrastructure development without considering the road network capacity, and connectivity. The study will use to measure economic growth through (i) GDP, (ii) per capita GDP, and (iii) growth rate of GDP with constant year based. Therefore, all of the indicators of economic growth focus on real rather than nominal.

1.5 Organization of the Study

This study is comprised of five chapters and chapter one is an introduction which includes a brief introduction, rationale of the study, objectives of the study, methods of study, scope and limitations of the study, and organization of the study. Chapter two describes the literature review of the study on how important road and bridge infrastructure development to economic growth. Lately, chapter three describes background information on road and bridge infrastructure development in Myanmar between 2011-2012 and 2020-2021. Chapter four is provided descriptive analysis on the

relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory. Finally, chapter five is the conclusion which includes findings and suggestions.

CHAPTER II

LITERATURE REVIEW

This chapter includes a theoretical background of road and bridge infrastructure development and economic growth including definitions and concepts of infrastructure, the concept of road and bridge infrastructure development, economic growth, the importance of road and bridge infrastructure development on economic growth, previous studies, and a conceptual framework of the study.

2.1 Definition and Concept of Infrastructure

Infrastructure is the fundamental physical and organizational components required for the smooth function of a society, business, or reproductive system, as well as the services and facilities essential to operate an economy. It is also the set of interconnected structural components that serve as the framework for providing an entire structure of development. It is a crucial term for evaluating the level of development in a country or region (Wikipedia.org, 2012).

Since 1875, the French language has used the word "infrastructure", and since 1887, the English language has as well, initially referring to "the foundational installations for any activity or system". The term was imported from French, where it was previously used to describe laying down a roadbed of substrate material that was necessary before constructed pavement could be laid on top of it. The word is a combination of the Latin prefix "infra", meaning "below", as many of these constructions are underground, and the French word "structure" (derived from the Latin word "structure"), meaning "building". After NATO was established in the 1940s, the army's use of the term became popular in the United States, and by 1970, urban planners were using it in its modern civilian sense (Wikipedia.org, 2012).

In economic research, there is no common definition of infrastructure. Infrastructure is defined as the sum of material, institutional and personal facilities and data which are available to the economic agents and which contribute to realizing the

equalization of the remuneration of comparable inputs in the case of a suitable allocation of resources, which is complete integration and maximum level of economic activities (Jochimsen, 1966).

Infrastructure is defined as “the sum of all relevant economic data such as rules, stocks, and measures with the function of mobilizing the economic potentialities of economic agents” (Buhr, 2003). Fulmer, Jeffrey, (2009) states that infrastructure is defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions and maintain the surrounding environmen".

According to Merriam Webster dictionary, infrastructure can be defined as “the basic equipment and structures such as roads and bridges that are needed for a country, region, or organization to function properly”. Arthur, S., & Sheffrin, S. M., (2003) states that the set of facilities and systems that serve a country, city, or other area and encompasses the services and facilities necessary for its economy, households and firms to function is called infrastructure.

Highways, ports, bridges and other transport facilities, power generation and distribution, water and sewerage treatment, and telecommunications systems would be regarded as part of a country’s infrastructure. Therefore, infrastructure refers to the collection of fundamental structures and mechanisms that enable a family or business to function sustainably.

2.2 Types of Infrastructure

While there would be a general consensus that tangible capital assets such as bridges, roads, streets and tunnels are infrastructure, others would cast the net much wider. A distinction is often made between ‘economic’ and ‘social’ infrastructure and within each of these between ‘hard’ (physical) and ‘soft’ infrastructure (Argy et al., 1999). On this basis, there are four categories:

1. Hard Economic Infrastructure
2. Soft Economic Infrastructure
3. Hard Social Infrastructure
4. Soft Social Infrastructure.

These classifications are set out in table 2.1.

Table (2.1) Classification of Infrastructure by Type

	Hard	Soft
Economic	Roads	Vocational Training
	Motorways	Financial Institutions
	Bridges	R & D Facilitation
	Ports	Technology Transfer
	Railways	Export Assistance
	Airports	
	Telecommunications	
	Power	
Social	Hospitals	Social Security
	Schools	Community Services
	Water Supply	Environmental Agencies (EPAs)
	Housing	
	Sewerage	
	Child Care	
	Prisons	
	Aged Care Homes	

Source: Grimsey, D., & Lewis, M. (2007). "Public Private Partnerships: The Revolutioin Infrastructure"

According to table 2.1, there are two main types of infrastructure such as economic infrastructure and social infrastructure. Economic and social infrastructure can be broadly categorized into two categories (Heymans, C., & Thome-Erasmus, J., 1998).

2.2.1 Economic Infrastructure

Economic infrastructure is considered to provide key intermediate services to business and industry and its principal function is to enhance productivity and innovation

initiatives. Since much economic infrastructure is wholly or partially required to export commodities, the sustained commodity boom has important implications for infrastructural investment and particularly for investment in economic infrastructure. There are two types of economic infrastructure; hard economic infrastructure and soft economic infrastructure (Arthur, S., & Sheffrin, S. M., 2003).

Hard economic facilities include roads, highways, bridges, ports, railways, airports, public transport, telecommunications, electricity and gas generation, transmission and distribution whereas soft economic infrastructure encompasses vocational training, financial facilities for business (payments, credit, equity, derivatives, venture capital, etc.), the facilitation of R & D and technology transfer, and organizations encouraging export orientation and productive cooperation among individuals and entities. This study is focus on hard economic infrastructure (Arthur, S., & Sheffrin, S. M., 2003).

2.2.2 Social Infrastructure

Social infrastructure can be broadly defined as the construction and maintenance of facilities that support social services (Cohen, Gershon, 2017). Social infrastructures are created to increase social comfort and promote economic activity (Torrisi and Gianpiero, 2009). These include schools, parks and playgrounds, structures for public safety, waste disposal plants, hospitals, sports area, etc (Torrisi and Gianpiero, 2009).

2.3 Concept of Road and Bridge Infrastructure Development

Opawole, Jagboo, Bababola & Babatunde (2012) state that the topic of infrastructure development has been heavily debated since experts from different nations have used the issue of infrastructure development as a parameter and index to measure each country's ability to compete worldwide. The construction and improvement of foundational services in order to stimulate economic growth and quality of life improvement is infrastructure development. Infrastructure development is also an instrumental component in encouraging a country’s economic growth and development. In other words, infrastructure development is a fundamental cause of regional inequality due to migration from underdeveloped to developed infrastructure regions.

Das, R. C. (Ed.), (2016) highlights that infrastructure development involves not only any type of infrastructure but also the improvement of the quality of the various components of infrastructure. Road and bridge infrastructure is a critical public asset. Road and bridge infrastructure consists of the installation of fixed assets including surface roads and bridges. The use of automobiles on these infrastructures reduce travel times and creates jobs in the areas, both of which collectively have an impact on the broader demand for products and services and ultimately raise GDP and global development.

Road and bridge infrastructure development can impact the employment rate, productivity, and income as well as give an added value. The construction of roads and bridges can promote political integration and minimize geographic disparities in society. Road and bridge infrastructure development can significantly shows how well a nation is doing and how it is developing. Therefore, the lack of basic road and bridge infrastructure development indicates that the nation or area is underdeveloped and has been left behind in modernization and progress (Das, R. C. (Ed.), 2016).

2.3.1 Road

A road is a wide way connecting from one place to a different place, typically one with a usually prepared surface that vehicles can use. Road infrastructure is a land transportation infrastructure that covers all parts of the road, including complementary buildings and equipment intended for traffic that is on the surface of the land, below the surface of the land and / or water, and above the water surface, except railroad tracks and cable road. J Roberts (2004) states that road infrastructure is understood to include all physical assets within the road reserve, including not only the road itself, but all associated furniture (signage etc), and all earthworks, drainage, structures (culverts, bridges, buildings etc). According to Cohen, Gershon, (2017), land used for the transport of goods and passengers via road and may include national, provincial and municipal roads, facilities to park and stop, road reserves, maintenance and maneuvering facilities called road infrastructure.

There are seven kinds of roads such as bituminous roads, metaled roads, surface roads, earth road, mule roads, concrete road and asphalt concert road. Road transportation continues to play a significant role, over other forms of transportation. In

addition, the road aims to support mobility of goods and passengers between the city center and industrial and service areas, offices, and residential and residential areas as well as suburban areas. According to Peng (2012), new infrastructure put into operation is able to alleviate the transport pressure to reduce the crowded road ways, transportation time and transportation costs. Therefore, roads make the existing transportation network more dense and smooth, thereby increasing the accessibility and safety, resulting to high relative speed of vehicles, and flexibility of route choice (Cohen, Gershon, 2017).

2.3.2 Bridge

Bridges have played one of the most important roles in the evolution of humanity's early civilizations and a structure built to span a physical obstacle such as a body of water, valley, road, or rail without blocking the way underneath is a bridge. The main function of these bridges is to handle the highway's traffic loads while navigating any obstacles and performing efficient communication between two destinations (Latuni, F. 2019).

There are eight types of bridges such as beam bridges, truss bridges, arch bridges, cantilever bridges, suspension bridges, moveable bridges, tied-arch bridges and cable-stay bridges. A bridge infrastructure that can support both citizen transit demands and business transactions is provided by counties, states, and countries with significant financial resources. Therefore, by creating a route that might otherwise be unequal or impractical, a bridge serves the objective of allowing people or freight to easily cross over an obstruction (Latuni, F, 2019).

2.4 Concept of Economic Growth

“Economic growth is a process in which a nation's wealth increases over time.” Economic growth is defined as "an increase in the overall output (goods or services) created by a country" (Matiti, C., 2013). A process that provides opportunities to increase the production of goods and services in the country is called economic growth, and quantitative growth of human and natural capital (Pelsa, I., & Balina, S., 2022). Cornwall (2018) states that economic growth means an economy in which per capita income is

already incerasing. Therefore, increasing economic growth often enhances the living standards of humanity.

GDP is calculated from a country's national accounts which report annual data on incomes, expenditure and investment for each sector of the economy. The aggregate value of all services and goods produced within a country in any given year is defined as GDP. The income approach, the output approach and the expenditure approach are three different ways of measuring GDP. The income approach, as the name suggests measures people's incomes, the output approach measures the value of the goods and services used to generate these incomes, and the expenditure approach measures the expenditure on goods and services. In theory, each of these approaches should lead to the same result, so if the output of the economy increases, incomes and expenditures should increase by the same amount (Cornwall, 2018).

Figures for economic growth are often expressed as the annual percentage growth in real GDP. By adjusting nominal GDP to take account of inflation is called real GDP. GDP per capita, which is a proxy of living standard, is calculated by the GDP of an economy divided by its total population. Although GDP per capita is highly sensitive to variations in population size, a high GDP per capita usually relates with a high standard of living, as well (Cornwall, 2018).

2.5 Importance of Road and Bridge Infrastructure Development on Economic Growth

Infrastructure is just like a backbone of a country's economy. Infrastructure is regarded as being essential to fostering inclusive and sustainable economic growth. The development of a country’s road and bridge infrastructure is essential for its industries and the economy as a whole to grow (R Bhattacharyya, 2020).

Increased investment of road and bridge infrastructure is required to maintain growth and fight poverty. More than $2.5 trillion is spent globally on infrastructure each year, but until 2035, $3.7 trillion will be required just to keep up with predicted GDP growth (Nicklas Garemo, Martin Hjerpe and et.al, 2016). The McKinsey Global Institute estimates that the average rate of return on infrastructure is about 20%. In other words, a long-term $1 investment in infrastructure can increase GDP by 20 cents (Nicklas Garemo, Martin Hjerpe and et.al, 2016).

It may take years for infrastructure investments to provide economic benefits. A larger stock of road and bridge infrastructure will stimulate economic growth by reducing the production cost and transportation of goods and services, boosting the productivity of input elements, and providing indirect positive externalities. Therefore, the expansion of a country's road and bridge infrastructure is essential to the development of its sectors and its economy as a whole and road and bridge infrastructure development has received a lot of attention from policymakers (Cornwall, 2018).

Improved road and bridge infrastructure can boost worker productivity by moving commodities more efficiently. The World Economic Forum (2014) states that having a well-developed road and bridge infrastructure not only shortens the distance between areas but also integrates national markets and connects them inexpensively to other economies.

Most advanced economies have gone through periods of intense infrastructure development that have boosted their economies' productivity and competitiveness. Faster economic growth and reduction of poverty in the nation depend on its road and bridge infrastructure. At a certain point in a nation’s development, its economy requires an adequate network of roads and bridges. Major investment may then take place in building road and bridge infrastructure. Up to economic progress, a society's ability to access jobs, healthcare, education, and social connections depends on a good road and bridge system (Cornwall, 2018).

The important economic forces in the area rely greatly on the quality of the regional road and bridge network. The majority of the funding is needed for roads and bridges, which are the core elements of the region's infrastructure. The improvement of the nation's road and bridge infrastructure offers a chance for economic sectors to magnify, grow and contribute implicitly to the economic progress of the country. It is essential to the localized growth of a community as well as the national and international economic growth of a nation. Therefore, road and bridge infrastructure development has received a lot of policy attention in an effort to boost the economic growth, productivity, and quality of life of the citizens of developing nations (Cornwall, 2018).

Therefore, depending on each country's economic priorities, it is scientifically demonstrated from the literature that indeed road and bridge infrastructure expansion contributes absolutely to economic growth. At the same time, however, economic growth

can also create demand for more innovative types of road and bridge infrastructure and render existing infrastructures and installations obsolete, due to this two-way interdependency between infrastructure development and economic growth (Cornwall, 2018).

2.6 Reviews on Previous Studies

In recent years, the linkage between the development of roads and bridges and economic expansion has been a key topic of research for economists and the field of development finance. There are several difficulties in analyzing the effect of road and bridge infrastructure on economic growth. Moreover, the outcomes of these researches have been ambiguous. While some studies contend there is a negative correlation between the two factors, others contend that infrastructure development has a favorable impact on economic growth. Some various authors and researchers explored the empirical analysis of the relationship between road and bridge infrastructure development and economic growth.

Owolabi-Merus, O (2015) explores the impact that infrastructural development has on Nigeria’s economic growth and to investigate whether there is causal relationship existing between infrastructural development and economic growth in Nigeria. In this study, the impact of infrastructural development on Nigeria's economic growth is estimated using the Ordinary Least Squares method, and the relationship between infrastructural development and economic growth in Nigeria is examined using Granger Causality econometric tools. Gross Fixed Capital Formation (GFCF) serves as a proxy for the former, while Gross Domestic Product serves as a proxy for the latter (GDP). The World Bank's Africa Development Indicators provided the data for the evaluation period, which runs from 1983 to 2013. According to the empirical findings of this study, infrastructure development positively and statistically significantly affects Nigeria's economic growth. The Granger Causality test indicates that there was no mutual correlation between the two variables in Nigeria throughout the study period, nonetheless.

Siyan Peter, Eremionkhale Rita, et al. (2015) use both primary and secondary data to analyze the impact of road transportation on economic growth in Nigeria. To ascertain the long-term association between growth and road transportation in Nigeria,

the probit model was used to evaluate the primary data and the multivariate model to assess the secondary data. The analysis tool used to examine the connection between the infrastructure for road transportation and economic growth was econometric methodology. Therefore, the Ordinary Least Squares approach was used to explore at their long-term relationship. The study employed Johanson's Cointegration Test to further examine the relationship. The outcome demonstrates that the transportation sector has a positive impact on the economic growth in and also, economic growth in Nigeria depended on the level of good and accessible road transportation and facilitates business activities.

Louis Mungendje (2018) looks at the short- and long-term correlations as well as the directional causality flow between Namibia's economic growths from 1990 to 2014. The auto regression distributive lag (ARDL) bounds testing approach to co-integration is used in the study to look at examine the short-run and long-run relationship between Namibia's economic growth and road transport infrastructure development. The Roads Authority Annual Reports from 1999 to 2014, the Namibia National Planning Commission's MTEF (Medium-Term Expenditure Framework from 1990-2015), and the World Bank's GDP database from 1990 to 2014 were used as the data sources. These sources were imported into the E-view tool to perform quarterly regressions from 1990 to 2014.

A link between the variables is supported by the results. The findings of the auto regression distributive lag (ARDL) bounds test show that there is a long-run relationship between the variables. According to the projected long-run model, Namibian road transportation spending and economic growth, as well as ICT spending and economic growth, is positively correlated although statistically insignificantly. The short-run model, however, showed a favorable and statistically significant correlation between road transportation spending and economic growth. The short-run projections, on the other hand, indicated a statistically negligible and adverse link between foreign direct investment and economic growth. Finally, the findings of the Granger Causality test indicated that there was no causal relationship between Namibia's road transportation spending and economic development.

P Ng, T H Law, and colleagues (2019) examine how the development of road infrastructure and other socio-economic factors influenced economic growth. Fixed-effects panel linear regression analysis with exogenous covariates was used to examine

the relationship between economic growth and factors like road development, export level, education level, physical capital stock, and urbanization level using time-series cross-sectional data for 60 countries over the course of three decades, from 1980 to 2010. To account for heterogeneity and provide accurate and consistent estimates of model parameters in the presence of heterogeneity, panel linear regression uses either fixed effects (FE) or a random-effects (RE) model.

This study showed that, as independent variables, increases in road length per thousand people, per capita export, per capita education spending, and physical capital stock per worker positively influenced economic growth, with per capita GDP as the dependent variable. However, the road length per thousand people was utilized in this study to represent the development of the road infrastructure without taking connection and capacity into account. Using OLS regression models, it was discovered that there is an inverse U-shaped dependency relationship between urbanization and economic growth. In other words, economic growth increases at low levels of urbanization but declines if urbanization rises above a certain point. Additionally, it was noted that an increase in road length per thousand people would support export growth.

According to Fandy Latuni (2019), the construction of the Boulevard 2 bridge and infrastructure is favorable for the socioeconomic makeup of the coastal area in the Tuminting district of Manado. In this study, real national income, real per capita income, population welfare, and labor are the dependent variables of the growth of coastal communities (Y), while road infrastructure (X), such as road infrastructure, bridge infrastructure, and transportation facilities, is the independent variable. The time of the study is scheduled for 2018 for 3 months, starting in January and the plan will end in March 2018 by using primary data and secondary data. Pursuant to the results of research the development of infrastructure walke and bridge of Boulevard 2 having relation 98.5 % with make-up of coastal area society economics of district of Tuminting town of Manado indicated with a very strong relationship.

Therefore, the findings of the relationship between road and bridge infrastructure development and economic growth are based on econometric models such as the Ordinary Least Squares (OLS) regression model, the auto regressive distributive lag (ARDL) bounds test and Granger Causality econometric techniques, respectively, by various authors and researchers. The summary of all literature reviews applied in this study is presented in the appendix A.

CHAPTER III

BACKGROUND INFORMATION OF ROAD AND BRIDGE INFRASTRUCTURE DEVELOPMENT AND ECONOMIC GROWTH IN MYANMAR

3.1 Overview of Myanmar Infrastructure

Myanmar, known as the Republic of the Union of Myanmar, with a land area covering 261,228 square miles (676,578 square kilometers), is the second largest country in Southeast Asia as well as the 40th largest country in the world and has the 24th-highest population. The country's proximity to Asia's largest and fastest-growing markets offers a great opportunity for Myanmar to become the land link between China, India, and the ASEAN countries.

The State Peace and Development Council (SPDC), took over from 1988-2010 and adopted the market-oriented system using an open-door economic policy reform. In 2011, the newly elected first government initiated and improved to develop physical, legal, and institutional infrastructure with several political and economic reforms to achieve the vision of becoming a modern, democratic and developed nation by 2030. Especially, the investments in infrastructure development are being emphasized, following Myanmar's transition to a more open economy. Because there are large significant gaps in Myanmar's infrastructure development and the Government of Myanmar sees infrastructure development as one of its top priorities. It has also developed overarching goals and strategies in the Myanmar Sustainable Development Plan (MSDP) and the new National Logistics Master Plan (2018-2030) (NLMP). They include the long-term vision of the government's priorities to dramatically improve the status of infrastructure in the country.

Myanmar government is investing in various types of infrastructure in the whole country to reduce regional disparities and promote trade and economic development. According to the Asian Development Bank (ADB) (2014), Myanmar would have an infrastructure shortfall of $120 billion between 2017 and 2030. Three critical challenges

need to be addressed by infrastructural development in Myanmar in the coming years, especially:

(1) Modernizing roads and integrating them with nearby networks of transportation;

(2) Development of regional airports, improvement of airport capacity, and

(3) Maintenance and consolidation of urban transport infrastructure, through instalments of innovative transportation tools including but not limited to water-taxis and air-conditioned buses.

Moreover, World Bank (2018) states that Myanmar needs to strengthen its supportive infrastructures like transport, power supply, and public utilities.

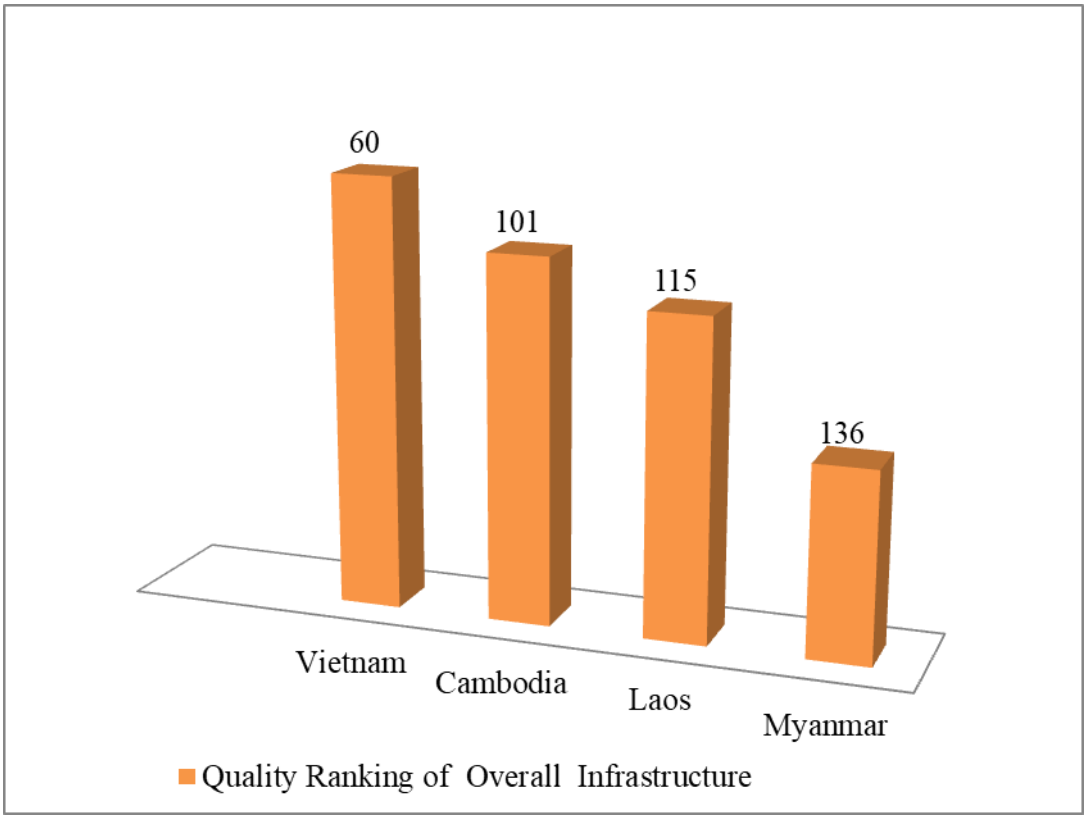
Table (3.1) Ranking of Infrastructure Indicators for CLMV Countries among 138 World Nations

Infrastructure Indicators	Myanmar	Cambodia	Laos	Vietnam
Quality of overall infrastructure	136	101	115	60
Quality of road infrastructure	129	72	60	94
Quality of railroad infrastructure	96	83	N.A.	55
Quality of port infrastructure	127	74	128	90
Quality of air transport infrastructure	136	85	71	87
Individuals using internet (%)	137	122	114	78
Mobile telephone subscription / 100 population	138	34	119	22
Fixed broadband internet Subscription / 100 population	130	113	117	74

Source: The World Economic Forum: Global Enabling Trade Report (2014)

According to the source from the global competitiveness report of The World Economic Forum in 2014, the rank of Myanmar's infrastructure among 138 world nations with a comparison of CLMV countries is shown in table 3.1. Myanmar's overall infrastructure quality ranks 136th out of 138 nations, which is lower than its CLMV counterparts. Additionally, Myanmar ranks significantly lower than CLMV countries in other infrastructure such as road, railroad and aviation infrastructure. Nonetheless, the government is stepping up its efforts to tackle these infrastructure connectivity deficiencies.

Figure (3.1) Ranking of Quality of Overall Infrastructure for CLMV Countries among 138 World Nations in 2014



Source: The World Economic Forum: Global Enabling Trade Report (2014)

The qualities of the overall infrastructure of CLMV ranking among 138 countries in the world in 2014 are highlighted in figure 3.1. Vietnam had the best overall infrastructure quality among CLMV countries with ranking 60 among the 138 countries across the globe. Cambodia had the second best quality of infrastructure among CLMV countries, ranking 101st, and then Laos, with the third best quality country, was ranked

115th. Among the infrastructure quality of 138 countries in the world, Myanmar was ranked 136th, the lowest quality country.

In short, there are glaring infrastructural development gaps in Myanmar and Myanmar needs to make more investments in the improvement of its infrastructures. The improvement in the infrastructure helps to increase the level of national growth rate (Madden and Savage, 1998). Therefore, the future of Myanmar's infrastructural development and economic growth remains bleak.

3.2 Road and Bridge Infrastructure Development in Myanmar

To encourage sustainable and inclusive economic growth, infrastructure is regarded as being crucial. So a great deal of policy emphasis has been placed on infrastructure development for enhancing the economic growth, productivity, and quality of life of the people of the developing country. Among many types of infrastructure development, especially, road and bridge infrastructure development can also boost political integration and reduce societal geographical gaps. When road and bridge infrastructure is expanded, overall pollutant loads can be reduced as average congestion decreases. Routes are shortened and vehicle speeds increase. In addition to encouraging car use, road improvements can help reduce emissions. Therefore, the basic road and bridge infrastructure development is considered important as it serves as an indicator of the progress and developmental process of a particular country.

The data for road transport facilities in Myanmar from 2011-12 to 2020-21 is described in table 3.2. The data in table 3.2 is based on the fiscal year from Myanmar statistical yearbooks, Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC). Due to the government's emphasis on road construction in recent years, the length of roads increases accordingly. The ten years interval figures in table 3.2 exposes the increasing trend in road miles, from that of 24,285 miles in 2011-12 to 84,115 miles in 2020-21. The length of bituminous roads is 10,678 miles in 2011-12, and it increases to 18,910 miles in 2020-21. Concrete roads and asphalt concrete roads have also increased. In general, length of other types of road also increases every year, however, from the years 2012-13 onward to 2016-17, metalled roads and mule tracks are less significant in terms of road miles, as are surface roads and earth roads from years 2013-14 to 2016-17.

Table (3.2) Road Transport Facilities in Myanmar (in Miles)

Road Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Length of Roads	24,285	24,670	24,935	25,212	25,881	26,599	81,614	82,237	83,298	84,115
1.Bituminous	10,678	11,362	12,692	14,285	15,491	16,118	18,336	18,538	18,725	18,910
2.Metalled	3,567	3,266	2,874	2,681	2,325	2,298	9,600	9,671	9,697	9,790
3.Surface	3,506	3,600	3,447	3,085	3,296	3,040	7,542	8,711	10,156	10,255
4.Earth	5,263	5,323	4,893	4,244	3,409	3,581	35,647	33,956	32,446	32,770
5.Mule	860	687	448	161	161	161	7,220	6,505	6,237	6,295
6.Concrete	411	432	581	756	986	1,020	2,148	3,033	3,856	3,895
7.AC	-	-	-	-	213	381	1,121	1,823	2,181	2,200

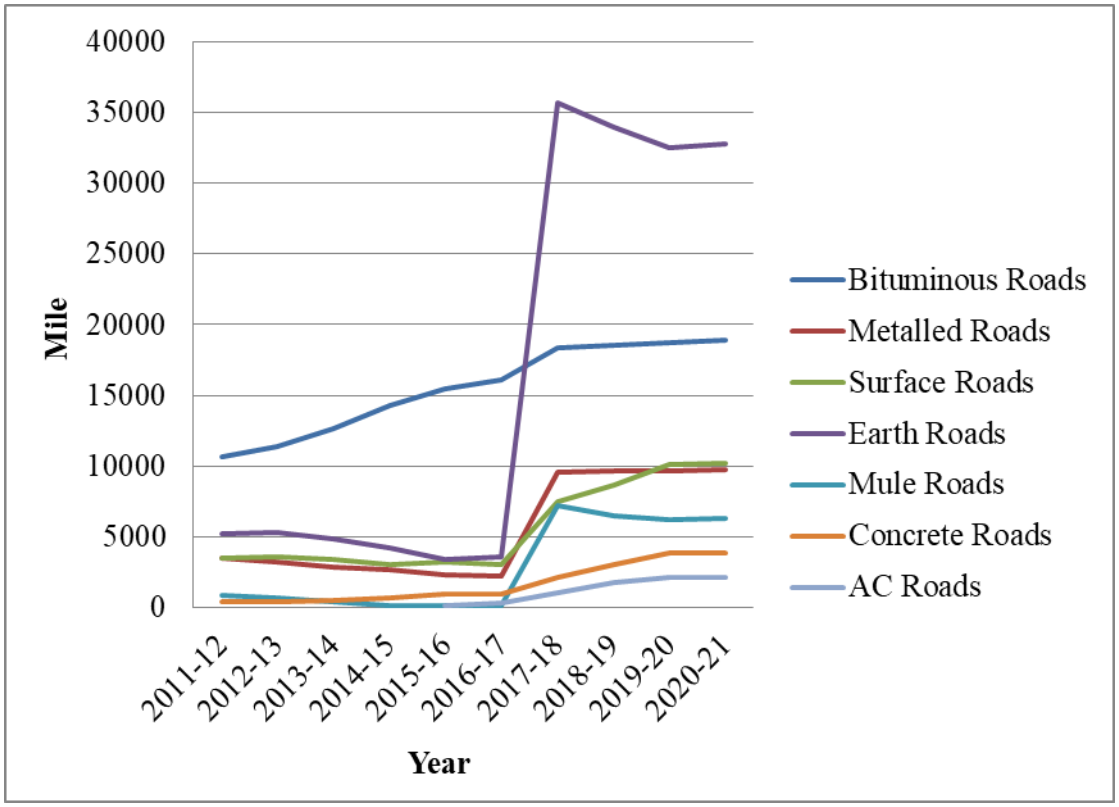
Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Note: '-' not available at the time of publication

In general, from 2011-12 to 2016-17 and from 2017-18 to 2020-21, the total road lengths for all types of road infrastructure gradually increased, but significantly rose from 2016-17 to 2017-18.

Figure 3.2 shows the changes in road infrastructure by type of roads from 2011-12 to 2020-21. Table 3.2 is the source of the information used in figure 3.2. There are seven types of roads in Myanmar, such as bituminous roads, metalled roads, surface roads, earth roads, mule roads, concrete roads, and asphalt concrete roads. The bituminous roads, the concrete roads, and the asphalt concrete roads are significantly higher from 2011-12 to 2020-21, but other types of roads, such as metalled roads, surface roads, earth roads, and mule roads, tend to fluctuate in number during the same period of 2011-12 to 2020-21.

Figure (3.2) Changes in Road Infrastructure by Types of Road in Myanmar



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

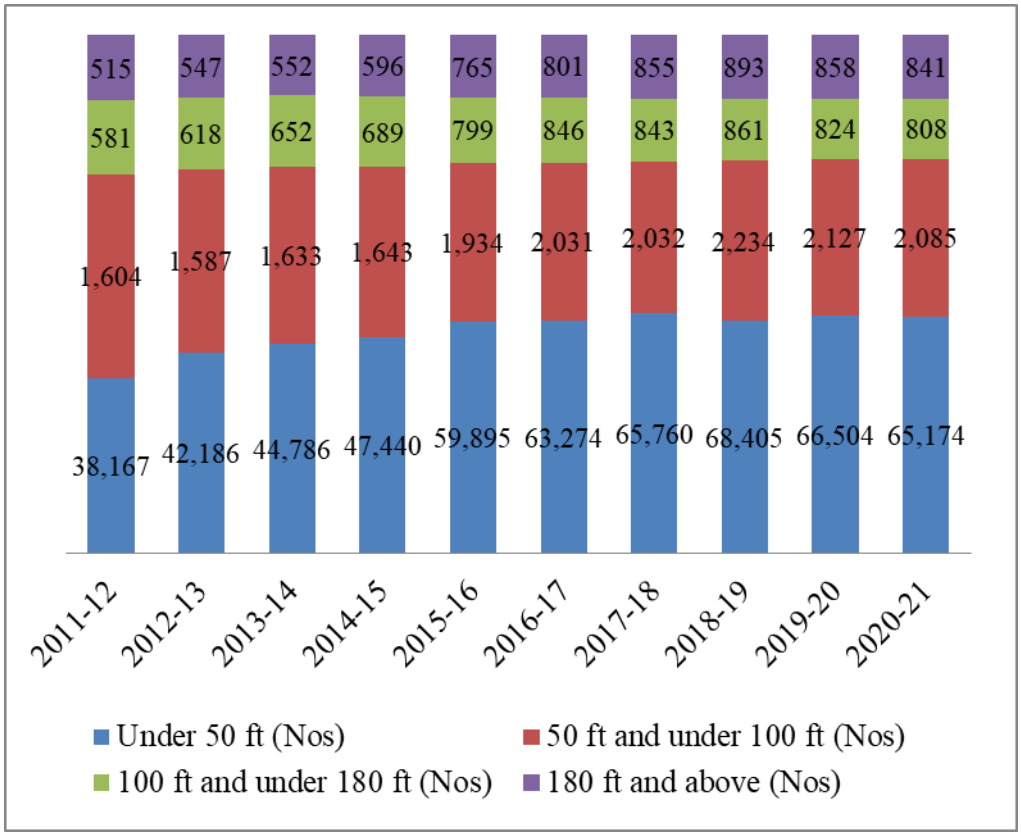
Table (3.3) Bridge Transport Facilities in Myanmar (in Numbers)

Bridge Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Number of Bridges	40,867	44,938	47,623	50,368	63,393	66,952	69,490	72,393	70,313	68,908
1. Under 50 ft	38,167	42,186	44,786	47,440	59,895	63,274	65,760	68,405	66,504	65,174
2. 50 ft and under 100 ft	1,604	1,587	1,633	1,643	1,934	2,031	2,032	2,234	2,127	2,085
3. 100 ft and under 180 ft	581	618	652	689	799	846	843	861	824	808
4. 180 ft and above	515	547	552	596	765	801	855	893	858	841

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Table 3.3 provides information about how many bridges were built in Myanmar between 2011-12 and 2020-21. The data in table 3.3 is based on the fiscal year from Myanmar statistical yearbooks, Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC). In 2020-21, the number of developed bridges in Myanmar amounted to approximately 28.04 thousand bridges, which slightly increased compared to the previous fiscal year, 2011-12. There were 27,715 small and 326 large developed bridges in 2020-21. It means that the total number of bridges, which reached 68,908 in 2020-21, as compared to 2011-12 at 40,867, and more than approximately one and half times its quantity in 2011-12.

Figure (3.3) Changes in Bridge Infrastructure by Length of Bridges in Myanmar



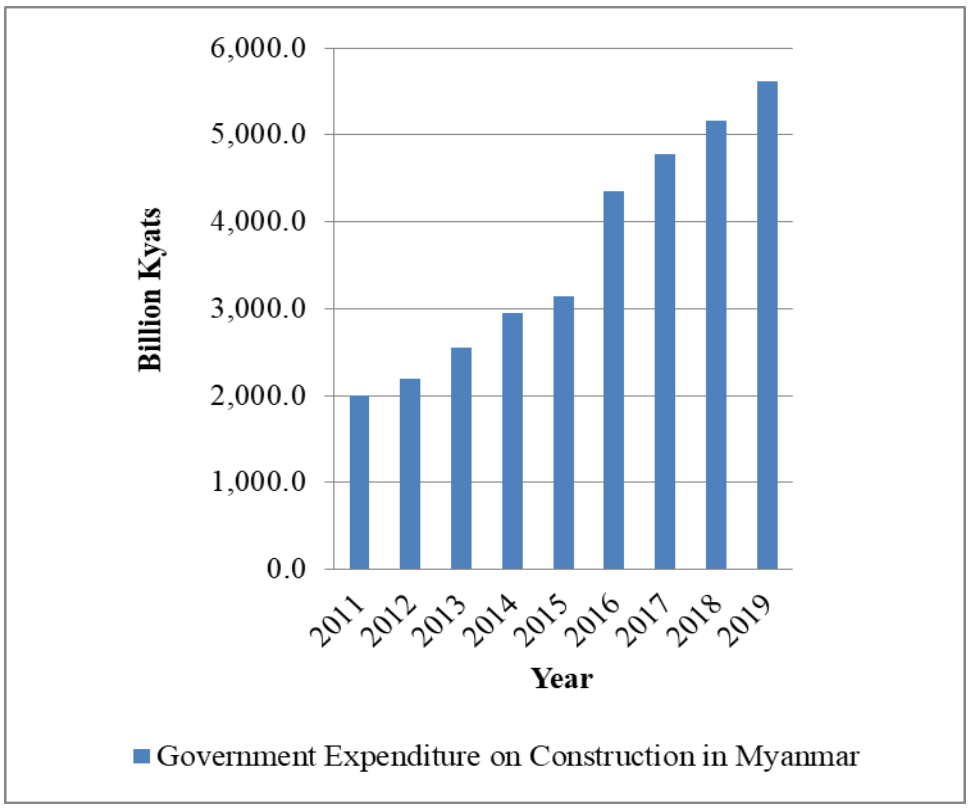
Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

The development of bridge infrastructure in Myanmar from 2011-12 to 2020-21 is described in figure 3.3. Based on data from table 3.3, figure 3.3 is created. The number of bridge infrastructure in Myanmar gradually increased from 2011-12 to 2018-19 but slightly decreased in 2019-20 and 2020-21. The total number of all types of bridges built

reached its highest level in 2018-19. It means that in 2018-19, there is a maximum of 893 bridges that are 180 feet or higher, 68,405 bridges that are under 50 feet, 2,234 bridges that are 50 feet or under 100 feet, and 861 bridges that are 100 feet or under 180 feet.

Myanmar's road and bridge networks have expanded slightly over the last decade. However, the transport sector of Myanmar is presently significantly underdeveloped for a nation of its size, population, and potential. The government has also structured the relevant agencies in the transport infrastructure sectors to ensure a clear separation of responsibility between regulatory authorities and service providers and operators. The long-term sustainable development of Myanmar depends on greater infrastructure investment. Now, the government is keen to expand its efforts into the crucial areas for infrastructure investment, such as improving its infrastructures of roads and bridges.

Figure (3.4) Government Expenditure on Construction in Myanmar



Source: ASEAN Key Figures (2021)

Figure 3.4 highlights the government expenditure on construction in Myanmar, based on the ASEAN Key Figures (2021). The government expenditure on construction is slightly increased from 2011 to 2015 and from 2016 to 2019. However, the

expenditure is significantly increased from 2015 to 2016. It means that the government expenditure on construction in Myanmar had been on a positive trend through the period of 2011 to 2019.

For any community, a well-developed transport infrastructure network is necessary to catch the essential economic activities and services. It is also essential for enabling effective business operations and any potential connections between incoming foreign investments and the local economy. Therefore, increased investment in road and bridge infrastructure is critical to Myanmar's long-term sustainable development and the development of road and bridge infrastructure is one of the crucial areas requiring special attention from the authorities of a developing country such as Myanmar.

3.3 Economic Growth Status in Myanmar

Myanmar can operate as a lifeline between South and Southeast Asia and China due to its strategic location between some of the world's fastest-growing economies, and its geographical position can also improve overall trade. In the Southeast Asia region, Myanmar had a population of over 54.8 million and urban population in Myanmar was 17,235,395 in 2021, according to the World Bank collection of development indicators (2022).

Table (3.4) Population Status of Myanmar

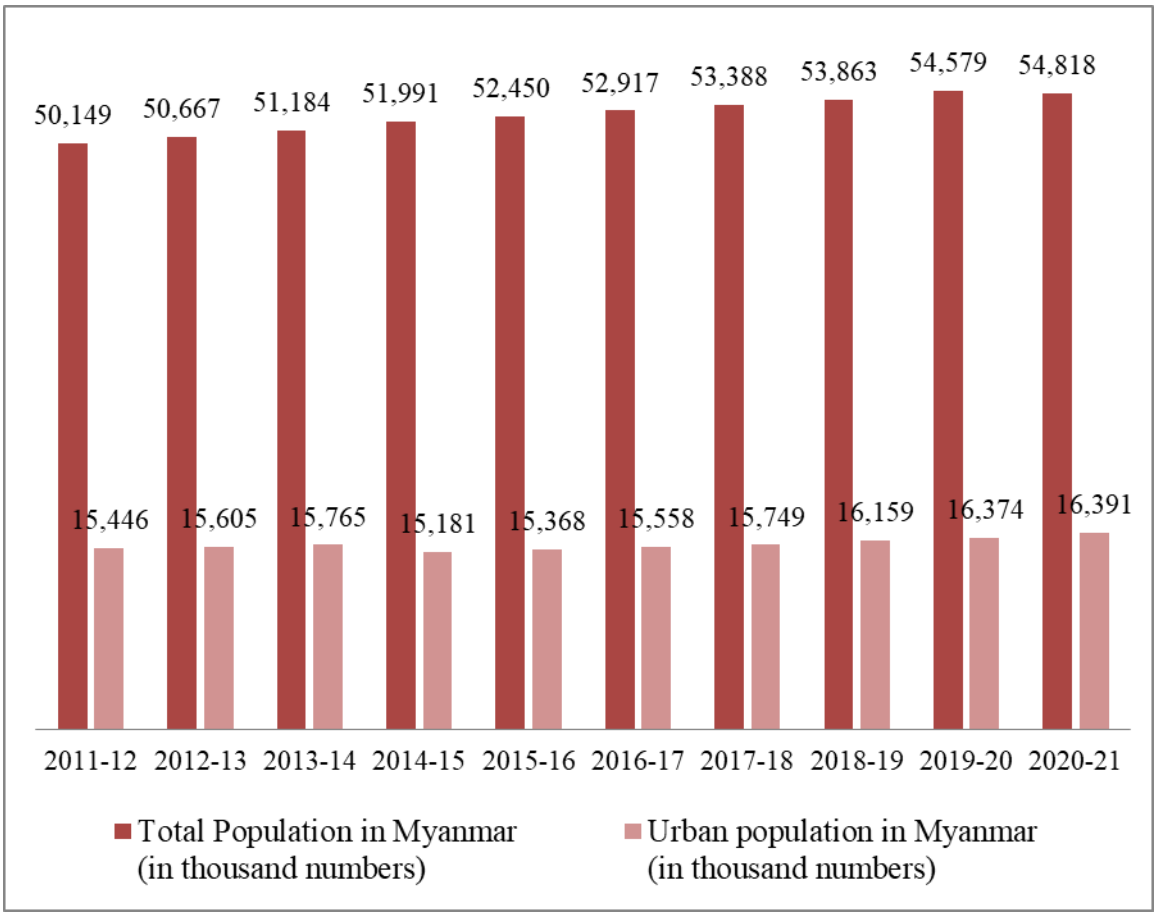
Fiscal Year	Total Population in Myanmar (in thousand numbers)	Urban population in Myanmar (in thousand numbers)	Urban population in Myanmar (% of total population)
2011-12	50,149	15,446	30.8
2012-13	50,667	15,605	30.8
2013-14	51,184	15,765	30.8
2014-15	51,991	15,181	29.2
2015-16	52,450	15,368	29.3
2016-17	52,917	15,558	29.4
2017-18	53,388	15,749	29.5
2018-19	53,863	16,159	30.0

2019-20	54,579	16,374	30.0
2020-21	54,818	16,391	29.9

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

The status of the total population and urban population in Myanmar from 2011-12 to 2020-21 are shown in table 3.4. The data in table 3.4 is based on the fiscal year from Myanmar statistical yearbooks. It states that the total population in Myanmar increases from 50,149 thousand in 2011-12 to 54,818 thousand in 2020-21. With the exception from 2014-15 to 2017-18, the number of people living in urban areas rises from 15,446 thousand in 2011-12 to 16,391 thousand in 2020-21. However, the proportion of the people living in urban areas in Myanmar is progressively declining, from 30.8% in 2011-12 to 29.9% in 2020-21. Additionally, Myanmar's urban population in 2014-15 reaches its lowest point ever.

Figure (3.5) Total Population and Urban Population in Myanmar



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

Figure 3.5 describes the condition of the total population and urban population in Myanmar from 2011-12 to 2020-21. The data from figure 3.5 is based on table 3.4. The population in Myanmar is slightly increased from year to year. Myanmar's population had been on a positive trend through the period of 2011-12 to 2020-21. Moreover, it indicates that roughly one-third of Myanmar's population resides in urban areas.

Myanmar is very rich in natural resources, such as jade, gems, oil, natural gas, teak, and other minerals, as well as also endowed with renewable energy, having the highest solar power potential compared to other countries of the Great Mekong Sub-region. However, Myanmar has long suffered from instability, factional violence, corruption, poor infrastructure, as well as a long history of colonial exploitation with little regard for human development (Vakulchuk, Roman; Kyaw Kyaw Hlaing and et.al, 2017). Since 2011, Myanmar has been implementing significant reforms in the areas of taxation, foreign investment laws, currency exchange rate regulation, and anti-corruption. The economy of Myanmar has been directed by several five-year plans, with annual plans for specific sectors. To solve political, economic, and social difficulties, the plans are focused on the guiding principles of the government. Moreover, the Myanmar Sustainable Development Strategy attests to its goals, by implementing its potential as an engine of environmentally and socially responsible economic growth.

Table (3.5) Economic Condition in Myanmar

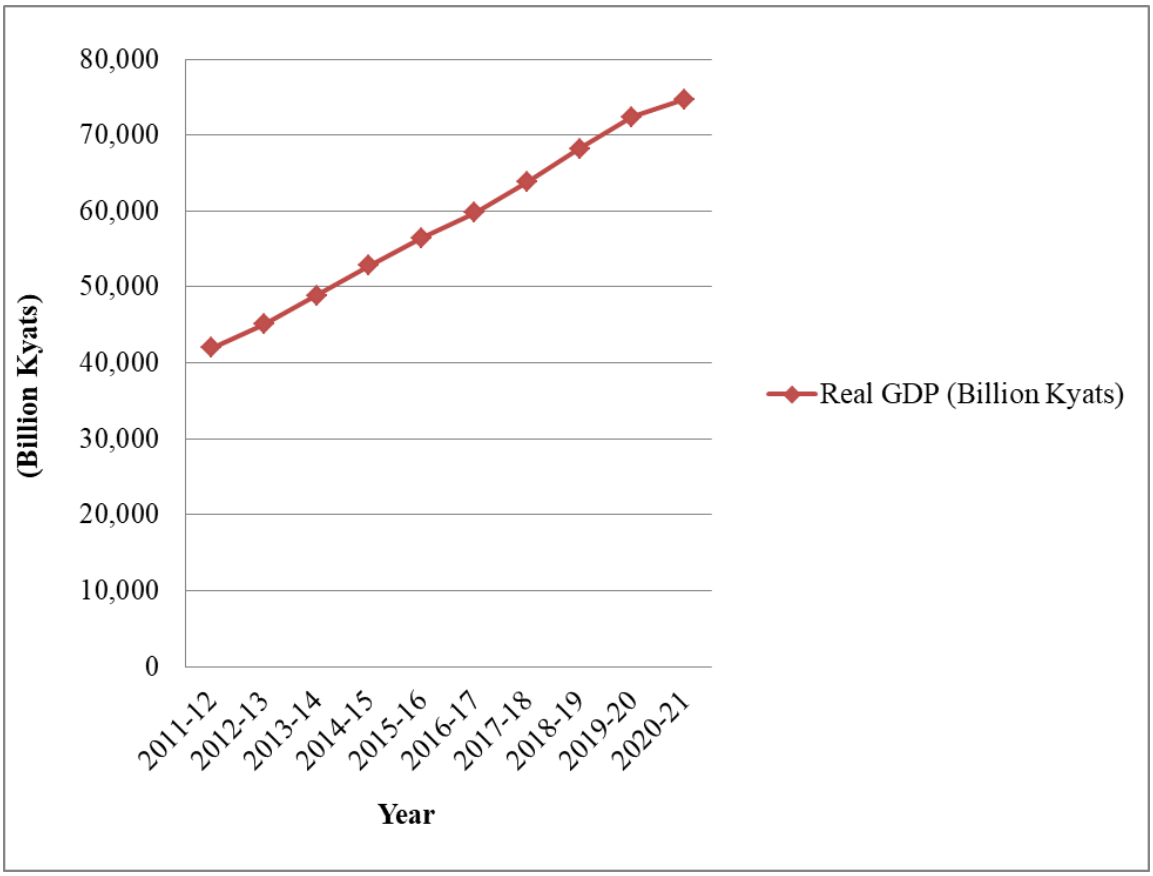
Fiscal Year	Real GDP (Billion Kyats)	Growth Rate of Real GDP (%)	Per Capita GDP (Kyats)
2011-12	42,001	5.6	837,522
2012-13	45,081	7.3	889,744
2013-14	48,879	8.4	954,969
2014-15	52,785	8.0	1,015,273
2015-16	56,476	7.0	1,076,763
2016-17	59,787	5.9	1,129,828
2017-18	63,828	6.8	1,195,548
2018-19	68,168	6.8	1,265,585
2019-20	72,394	6.2	1,326,408
2020-21	74,711	3.2	1,373,440

Note: GDP is calculated based on constant prices at 2010-2011 and 2015-16.

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

The economic condition in Myanmar for the fiscal years from 2011-12 to 2020-21 is described in table 3.5. The real GDP, real GDP growth rate, and per capita GDP are regarded as key indicators of economic performance. The real GDP increased significantly from 42,001 billion kyats in 2011-12 to 74,711 billion kyats (at constant price) in 2020-21. The real GDP is calculated by (2010-11 and 2015-16) constant prices. The per capita GDP increased about one and half times, from 837,522 kyats in 2011-2012 up to 1,373,440 kyats in 2020-2021.

Figure (3.6) Real Gross Domestic Product (GDP) of Myanmar



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

Figure 3.6 highlights that the economic growth situation in Myanmar straightly increased between 2011-12 and 2020-21. Figure 3.6 is based on data from table 3.5. Moreover, the real gross domestic product (GDP) in Myanmar is a minimum amount in 2011-12 and a maximum amount in 2020-21. It means the economy of Myanmar is positively upward.

During the last two decades, ASEAN's economy grew at an average annual growth of 5.0% as can be seen in table 3.6. ASEAN Key Figures (2021) states that (Real GDP Growth) Growth of real GDP is a year-to-year comparison of the value of all goods and services produced in an economy expressed in base-year prices.

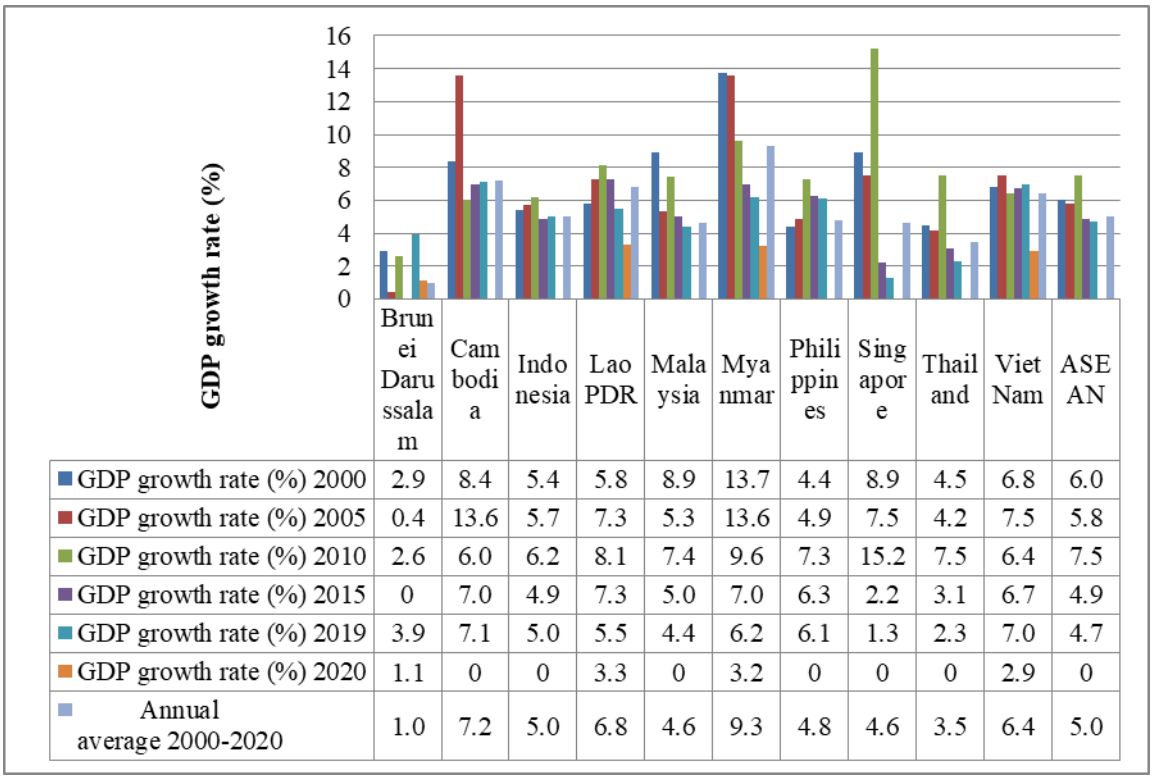
Table (3.6) Real GDP Growth Rate of ASEAN Countries (%)

ASEAN Member States	GDP Growth Rate (%)						Annual Average
	2000	2005	2010	2015	2019	2020	2000-2020
Brunei	2.9	0.4	2.6	-0.4	3.9	1.1	1.0
Cambodia	8.4	13.6	6.0	7.0	7.1	-3.1	7.2
Indonesia	5.4	5.7	6.2	4.9	5.0	-2.1	5.0
Lao PDR	5.8	7.3	8.1	7.3	5.5	3.3	6.8
Malaysia	8.9	5.3	7.4	5.0	4.4	-5.6	4.6
Myanmar	13.7	13.6	9.6	7.0	6.2	3.2	9.3
Philippines	4.4	4.9	7.3	6.3	6.1	-9.6	4.8
Singapore	8.9	7.5	15.2	2.2	1.3	-5.4	4.6
Thailand	4.5	4.2	7.5	3.1	2.3	-6.1	3.5
Vietnam	6.8	7.5	6.4	6.7	7.0	2.9	6.4
ASEAN	6.0	5.8	7.5	4.9	4.7	-3.3	5.0

Source: ASEAN Secretariat, ASEANstats database and ASEAN Key Figures (2021)

Among ASEAN Member States (AMS), Myanmar, Cambodia, Lao PDR, and Vietnam recorded the highest real GDP growth, with average annual growth of 9.3%, 7.2%, 6.8%, and 6.4%, respectively, between the years 2000 and 2020.

Figure (3.7) Real GDP Growth Rate in ASEAN Countries from 2000 to 2020



	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	ASEAN
GDP growth rate (%) 2000	2.9	8.4	5.4	5.8	8.9	13.7	4.4	8.9	4.5	6.8	6.0
GDP growth rate (%) 2005	0.4	13.6	5.7	7.3	5.3	13.6	4.9	7.5	4.2	7.5	5.8
GDP growth rate (%) 2010	2.6	6.0	6.2	8.1	7.4	9.6	7.3	15.2	7.5	6.4	7.5
GDP growth rate (%) 2015	0	7.0	4.9	7.3	5.0	7.0	6.3	2.2	3.1	6.7	4.9
GDP growth rate (%) 2019	3.9	7.1	5.0	5.5	4.4	6.2	6.1	1.3	2.3	7.0	4.7
GDP growth rate (%) 2020	1.1	0	0	3.3	0	3.2	0	0	0	2.9	0
Annual average 2000-2020	1.0	7.2	5.0	6.8	4.6	9.3	4.8	4.6	3.5	6.4	5.0

Source: ASEAN Key Figures (2021)

Figure 3.7 describes the economic growth rate of ASEAN countries from 2000 to 2020. The data from figure 3.7 is based on table 3.6. In the annual average, Myanmar is the highest economic growth rate with 9.3% and Cambodia is the second highest with 7.2% in an annual average GDP growth rate from 2000 to 2020.

Table (3.7) Shares of Main Economic Sectors to Myanmar's Real GDP (%)

Sectoral Share in Real GDP	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Agriculture	32.5	30.6	29.5	27.8	26.8	25.5	23	21.3	22.3	22
Industry	31.3	32.4	32.4	34.5	34.5	35	36.7	38	36	36.3
Services	36.2	37	38.1	37.7	38.7	39.5	40.3	40.7	41.7	41.8

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

The decomposition of real GDP by its three main sectors, namely agriculture, industry, and services, indicates the economic structure of the country and the contribution of each sector to the economy. The shares of main economic sectors to Myanmar's real GDP can be seen in table 3.7.

During the period 2011-12 to 2020-21, economic structures differ across Myanmar, and services are the leading sector in Myanmar's economy, shown in table 3.7, with the share of the services sector to the total GDP increasing from 36.2% in 2011-12 to 41.8% in 2020-21. On the contrary, the share of the agriculture sector was found to be the smallest in Myanmar, reaching 22% of the country's total GDP over the same period. Manufacturing contributed 36.3% of the total GDP in 2020-21, an increase of 5% from 2011-12. It means that, although the service sector becomes an important role in the economy, the industrial sector is considerably advancing in line with the market-oriented system.

CHAPTER IV

ROAD AND BRIDGE INFRASTRUCTURE DEVELOPMENT AND ECONOMIC GROWTH IN NAY PYI TAW UNION TERRITORY

4.1 Socio-economic Information of Nay Pyi Taw Union Territory

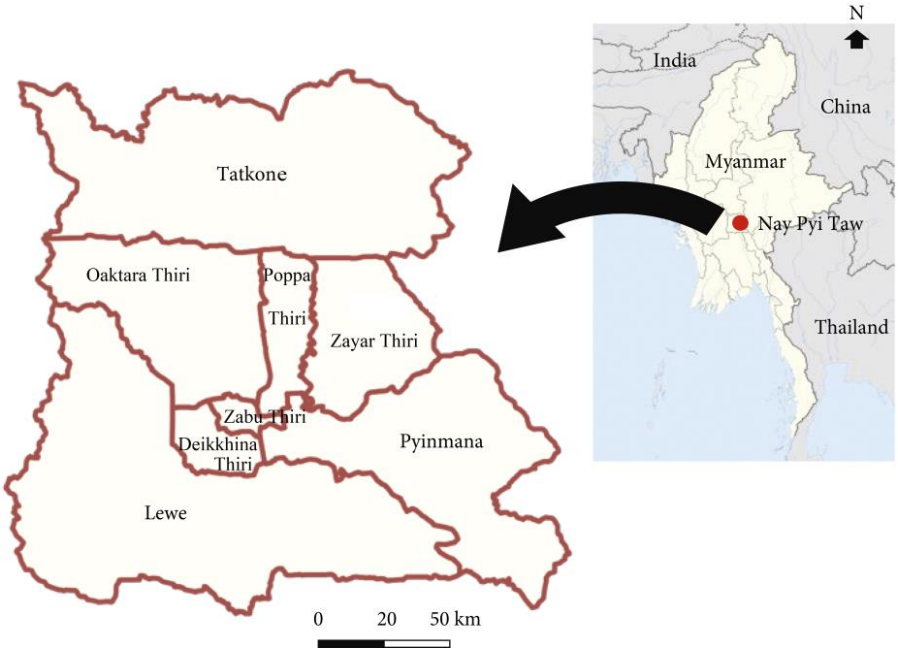
Nay Pyi Taw Union Territory, a new capital city of Myanmar, the most modern city of Myanmar, is also fascinatingly known to be one of the 10 fastest-growing cities in the world (Myanmar National Portal). Nay Pyi Taw (pronounced 'Naypiddaw', meaning 'Abode of Kings', and sometimes abbreviated to NPT) officially replaced Yangon as the administrative capital of Myanmar on 6 November 2005; its official name was revealed to the public on Armed Forces Day, 27 March 2006 (Dulyapak Preecharushh, 2020). According to the reasons of military, security, and administration to protect the country in the future, such a place was strategically located in central Myanmar and, had chosen to establish the new capital city of Myanmar, Nay Pyi Taw Union Territory. Construction of the capital city started in 2002 and was completed by 2012 (Marshall Cavendish Corporation, 2007). Its population size was approximately 1.35 million as of 2021 (Department of Population).

Covering an area of 7,054 km2 (2,724 square miles), Nay Pyi Taw Union Territory is located on the southern edge of the dry zone and in the upper Sittang valley. It is surrounded by the Shan plateau to the east and the Bago Yoma range to the west, giving it unique geographic features. Alison Millington (2017) states Nay Pyi Taw Union Territory is around four and a half times the size of London at 7,054 square kilometers (1,569 square kilometers). Centrally located in Myanmar, Nay Pyi Taw Union Territory has been founded on a green-field site near Pyinmana, about 320 kilometers (200 miles) north of the old capital, Yangon. The topography includes mountainous regions with a wealth of mineral deposits, sloping highlands, and river basins. Therefore, this ideal

geographic setting, which combines river plains with mountains covered in lush woods, provides every benefit of beauty and tranquility.

Additionally, by combining administrative buildings, constructing new roads, roundabouts, and shopping complexes, as well as creating several artificial lakes, the government has artificially changed Nay Pyi Taw Union Territory's scenery into a stunning and wonderful capital. It is constituted of 8 townships namely Zabu Thiri Township, Zayar Thiri Township, Oaktara Thiri Township, Poppa Thiri Township, Deikkhina Thiri Township, Pyinmana Township, Lewe Township, and Tatkone Township, 58 quarters, 187 village tracts, and 796 villages in 4 districts (Fig. 4.1).

Figure (4.1) Nay Pyi Taw Union Territory



Source: Hmoon, M. M., Htun, L. L., et.al. (2021)

It is governed by two separate entities at the state/regional level and as a municipality at the local level. Along with Mandalay and Yangon, Nay Pyi Taw Union Territory is one of only three cities in Myanmar with municipal governance (The Asia Foundation, 2021). Under the direct supervision of the President of Myanmar, Nay Pyi Taw Council (NPTC) is the regional administrative body and Nay Pyi Taw Development Committee (NPTDC) is the local government body of the territory.

Nay Pyi Taw Union Territory's main objective of Smart City Action Plan is to promote itself as a city that provides core infrastructure and high quality of life to its citizens. In addition, it aims to provide a clean and sustainable environment and apply

smart solutions in providing key infrastructures. It is organized into a number of distinct functional zones such as residential zones, ministry zone, military zone, diplomatic zone, hotel zones. As part of the construction of its new capital, Myanmar has been striving to strengthen its transportation connections with Nay Pyi Taw Union Territory in the meantime.

It is a fully constructed large city but with very few inhabitants compared to its size. The uncommon combination of Nay Pyi Taw Union Territory's large size and very low population density makes the city stand out. Moreover, compared to the rest of poverty-stricken Myanmar, Nay Pyi Taw Union Territory seems to have fallen from the sky because it has been built at such a rapid pace and it is full of tall modern buildings, large hotels, and extensive shopping malls including government offices, housings for civil service personnel.

According to the census data of 2014, 68 persons reside in rural regions and 32 persons live in places that General Administration Department (GAD) has designated as urban for the Nay Pyi Taw Union Territory. At the Union level, 28.8% of the total population lives in urban areas while 71.2% lives in rural areas (Inter-censal Survey, 2020). When compared to other States/Regions, Nay Pyi Taw Union Territory's population is the fourth most likely to live in an urban setting, following Yangon 70%, Kachin 36%, and Mandalay 35% (Census Report Volume 3-O (Nay Pyi Taw), 2015). Nearly 2% of Myanmar's adult population, which is roughly 830 thousand adults, lives in Nay Pyi Taw Union Territory. Mandalay 13 % and Yangon 17 % have the highest concentration of adult residents (Nay Pyi Taw Union Territory Dashboard on financial inclusion, 2019). In Nay Pyi Taw, the percentages of Buddhists are 96.8%, Christians are 1.1%, Muslims are 2.1%, and Hindus, Animists, Other Religions, and Atheists are all less than 0.1% respectively (Department of Population, 2017). Its literacy rate for those aged 15 and over is 94.4%, which is higher than the Union's 89.1% rate (The 2019 Inter-censal Survey, 2020). The literacy percentage for female is 91.4%, but it is 98.0% for males (Department of Population, 2017). Yangon, Mandalay, and Nay Pyi Taw Union Territory have literacy and numeracy rates of over 92%, making up the highest rates in Myanmar (Inter-censal Survey, 2020).

Nay Pyi Taw Union Territory offers potential for the development of hydroelectric energy and possesses mineral deposits, which naturally provide the city the capacity for self-sufficiency (Dulyapak, 2009). It is deeply linked to hinterland nation-

building initiatives, especially the growth of agricultural plantations, hydropower networks, transportation infrastructure, and border development. It has a lot of irrigated areas that have not been developed, and self-sufficient community projects can open up. Therefore, Nay Pyi Taw Union Territory will eventually develop into an agricultural and self-sufficient strategic city. Moreover, Nay Pyi Taw Union Territory has a high quality of life and functions efficiently in terms of urban efficiency, unlike most of the congested and crowded capitals of Southeast Asia.

4.2 Descriptive Analysis of Road and Bridge Infrastructure Development and Economic Growth in Nay Pyi Taw Union Territory

In this section, the data, variables and descriptive analysis method used in this study are described.

4.2.1 Data Profile

All of the data and variables were secondary data gathered from a variety of sources, including the Ministry of Construction (MOC), Department of Rural Road Development (DRRD), General Administration Department (GAD), Planning Department, Nay Pyi Taw Development Committee (NPTDC), Myanmar Statistical Yearbooks (2010-2021) and ASEAN Statistical Yearbooks. The study uses time series data from 2011 to 2020, in particular, annual observations on gross domestic products at 2010-11 and 2015-16 constant prices.

The study utilizes ten years of annual data (from 2011-12 to 2020-21) for the variables, such as (i) the real gross domestic product (GDP), (ii) the per capita GDP, (iii) the growth rate of the real GDP, (iv) the government expenditure on road and bridge infrastructure development, (v) the total road length, and (vi) the total number of bridges in Nay Pyi Taw Union Territory. The real gross domestic product (GDP), the per capita GDP, and the growth rate of the real GDP are used to describe the economic growth of Nay Pyi Taw Union Territory. The government expenditure on road and bridge infrastructure development, the total road length, and the total number of bridges are used to describe the development of road and bridge infrastructure in Nay Pyi Taw Union Territory. The period of data collection is determined by the availability of the data.

4.2.2 Description of Variables

The following is an explanation of the variables used in this study to measure how road and bridge infrastructure development contributes to economic growth. The description of variables and data sources is given in table 4.1.

Table (4.1) Description of Variables and Data Sources

Variable	Definition	Data Sources
Road and Bridge Infrastructure Development		
Government Expenditure on Road and Bridge Infrastructure Department	Government expenditure on road and bridge infrastructure department is defined as the annual budget used for road and bridge infrastructure implementation across ministries.	MOC, DRRD, NPTDC, Myanmar Statistical Yearbooks (2010~2021)
Total Road Length	Total road length is the total mile length of the various types of road networks paved in a given year.	MOC, DRRD, NPTDC, Myanmar Statistical Yearbooks (2010~2021)
Total Number of Bridges	The total number of bridges is the sum of the number of all bridge types in the country constructed in a given year.	MOC, DRRD, NPTDC, Myanmar Statistical Yearbooks (2010~2021)
Economic Growth		
Real Gross Domestic Product (GDP)	Real GDP is calculated by (2010-11 and 2015-16) constant prices.	Planning Department
Per Capita GDP	Per Capita GDP is computed by the real GDP of an economy divided by its total population.	Planning Department
Growth Rate of Real GDP	The growth rate of real GDP is the percentage rate at which a nation's real GDP changes/grows from one year to another.	Planning Department

Source: Own compilation based on data collected from departments

4.3 Road and Bridge Infrastructure Development in Nay Pyi Taw Union Territory

Nay Pyi Taw Union Territory is a city specially planned, designed, and built to be a capital. In accordance with the characteristics of the capital, many urban infrastructures such as hospitals, schools, road networks, markets, gardens and playgrounds, and water supply are being built, upgraded, and renovated within the Nay Pyi Taw area. The four-lane, 323.2 km (200.8 miles) Yangon-Naypyidaw highway links Nay Pyi Taw with Yangon directly and is part of the 563 km (350 miles) long Yangon-Nay Pyi Taw-Mandalay Expressway. Including a 20-lane boulevard, Nay Pyi Taw has four-lane roads and multilevel, flower-covered roundabouts (traffic circles).

Most of the roads and bridges in the townships of Nay Pyi Taw have been transformed into higher-level conditions by Nay Pyi Taw Capital City. All roads have been upgraded to asphalt concrete (AC) roads from earth roads in accordance with budgets permitted by relevant fiscal years. The roads and bridges of Nay Pyi Taw Union Territory are mainly constructed by the Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC). And then the three government agencies in Nay Pyi Taw continue to upgrade the roads and bridges to all parts of the Nay Pyi Taw Union Territory so that they are accessible in any season. Moreover, recently, the government has been spending more generously on infrastructure, focusing on key priorities like the construction of roads and bridges. The development of all economic sectors can be facilitated by better road and bridge infrastructure, which should be planned in consideration of the current and future requirements of other sectors.

Since 2011-12, the government has boosted its overall investment annually from a six-digit figure to a seven-digit number, generally allocating 20% to 40% of its budget expenditure to infrastructure development. Moreover, the private sector is primarily given a significant role in the development of road and bridge infrastructure and this involvement encourages an increase in infrastructure investment. Therefore, investments in economic infrastructures, such as roads and bridges, have generally increased and the government expenditure on road and bridge infrastructure of Nay Pyi Taw Union Territory can be seen in table 4.2.

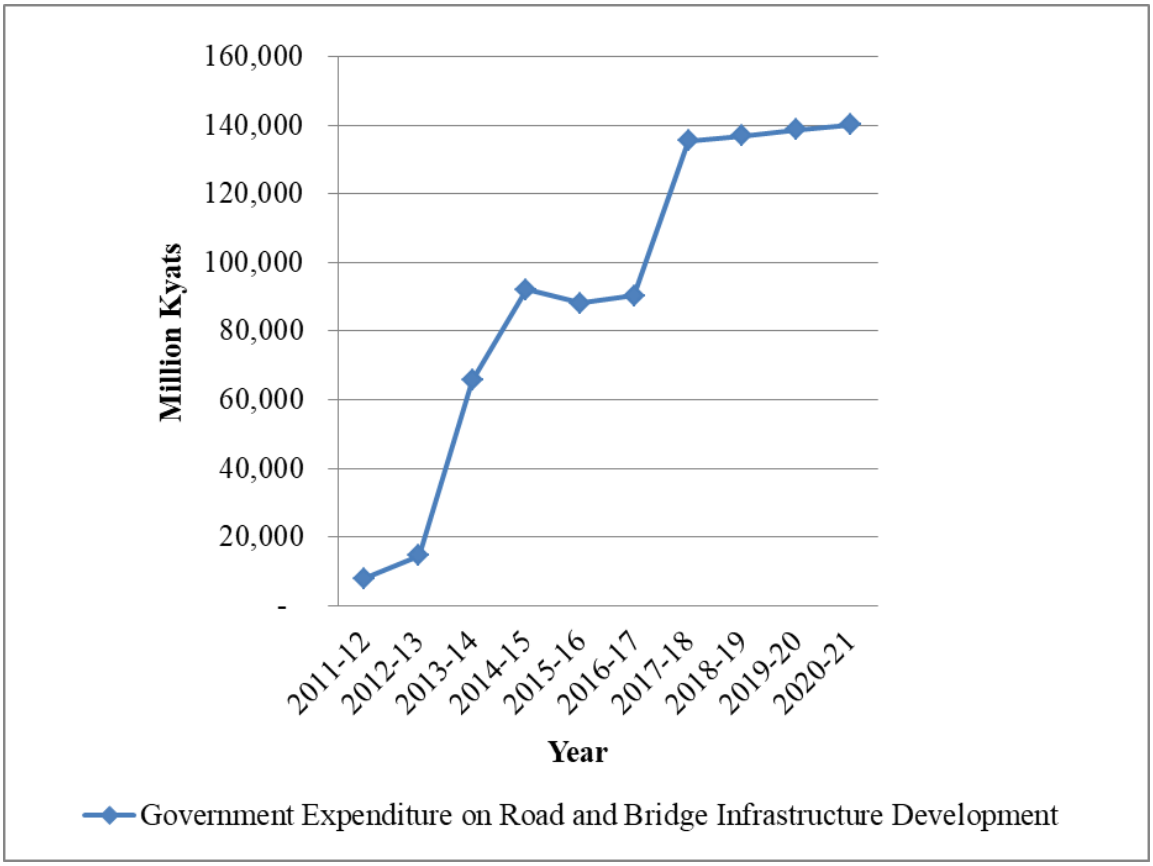
Table (4.2) Government Expenditure on Road and Bridge Infrastructure in Nay Pyi Taw Union Territory

Year	Government Expenditure on Road and Bridge Infrastructure	Growth Rate of Government Expenditure on Road and Bridge Infrastructure
	(Million Kyats)	(%)
2011-12	7,795	
2012-13	14,491	86
2013-14	65,616	353
2014-15	92,134	40
2015-16	88,121	-4
2016-17	90,369	3
2017-18	135,554	50
2018-19	136,909	1
2019-20	138,703	1.3
2020-21	140,090	1

Source: Ministry of Construction (MOC), Department of Rural Road Development (DRRD), Nay Pyi Taw Development Committee (NPTDC) and Plannig Department

The information in table 4.2 is obtained according to the Ministry of Construction (MOC), the Department of Rural Road Development (DRRD), the Nay Pyi Taw Development Committee (NPTDC), and the Planning Department. It shows that the government expenditure on road and bridge infrastructure in Nay Pyi Taw Union Territory achieves the most significant expansion, with an average annual growth of 54.13% in the period of 2011-12 to 2020-21, from 7,795 million kyats to 140,090 million kyats.

Figure (4.2) Government Expenditure Conditions for Road and Bridge Infrastructure Development in Nay Pyi Taw Union Territory



Source: Ministry of Construction (MOC), Department of Rural Road Development (DRRD), Nay Pyi Taw Development Committee (NPTDC) and Plannig Department

The conditions for government spending on the construction of road and bridge infrastructure in Nay Pyi Taw Union Territory can be seen in figure 4.2. The data in figure 4.2 is based on table 4.2. It illustrates that the government expenditure on road and bridge infrastructure development increases the highest in Nay Pyi Taw Union Territory, during the period from 2011-12 to 2020-21. From 2011-12 through 2012-13 and from 2017-18 through 2020-21, government spending slightly increased. However, the government spending on road and bridge infrastructure is gradually reducing, from 2014-15 to 2016-17.

Overall, the trend of government expenditure on road and bridge infrastructure development is dramatically upward during the study period, except for 2015-16 and 2016-17. It is because one of the main facts is to consistently invest in various types of

infrastructure, especially in road and bridge infrastructures in Nay Pyi Taw Union Territory, according to its Smart City Plan. In addition, realizing the importance of the basic infrastructure sector, the government is implementing new basic infrastructure policies along with the democratic political transition. This is so that whenever there are extra funds per fiscal year, these funds are mostly reallocated to the basic infrastructure sector in Nay Pyi Taw Union Territory.

A greater variety of roads of all types and sizes are constructed and maintained throughout Nay Pyi Taw Union Territory over the study period, including bituminous roads, metalled roads, surface roads, earth roads, mule roads, concrete roads, and asphalt concrete roads. Most of the roads in urban areas are constructed by the Nay Pyi Taw Development Committee (NPTDC), and roads in rural areas are mostly constructed by the Department of Rural Road Development (DRRD). Highways are mainly undertaken by the Ministry of Construction (MOC). The data for road transport facilities from 2011-12 to 2020-21 in Nay Pyi Taw Union Territory is shown in table 4.3.

Table (4.3) Road Transport Facilities in Nay Pyi Taw Union Territory (in Miles)

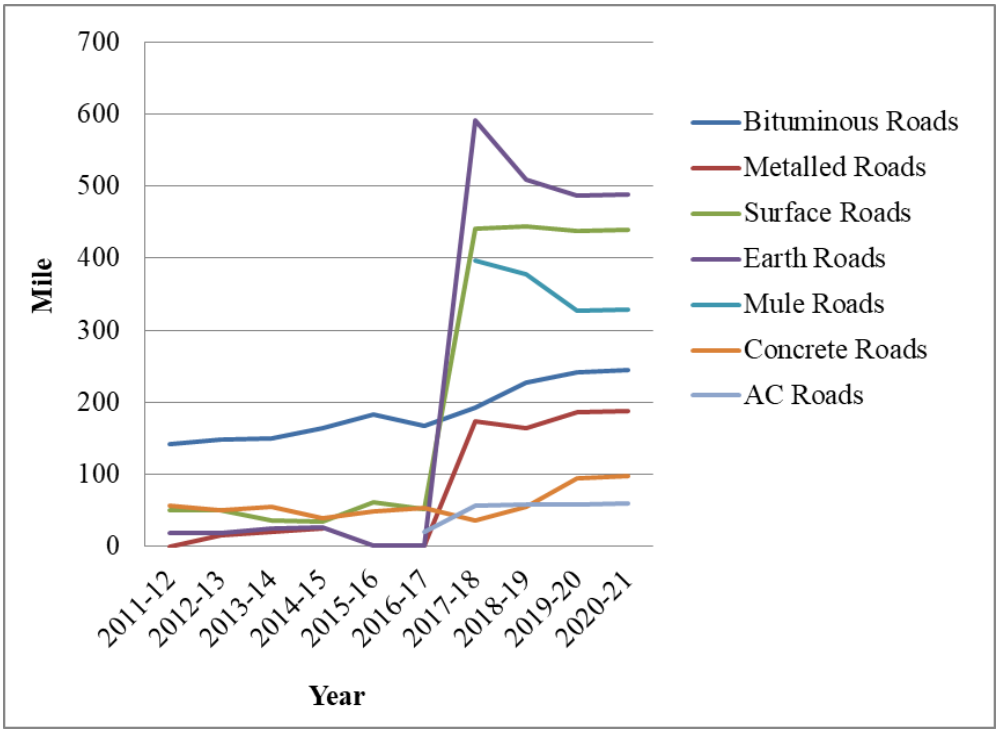
Road Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Length of Roads	280	283	286	290	295	298	1,888	1,836	1,834	1848
1.Bituminous	142	148	150	165	183	168	193	227	242	245
2.Metalled	13	15	20	25	-	2	174	165	187	188
3.Surface	50	51	36	34	62	52	441	444	438	440
4.Earth	18	19	25	26	1	2	591	509	487	488
5.Mule	-	-	-	-	-	-	396	378	327	329
6.Concrete	57	50	55	40	49	54	36	55	95	98
7.AC	-	-	-	-	-	20	57	58	58	60

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Note: '-' not available at the time of publication

The data in table 4.3 is based on the Myanmar statistical yearbooks, the Ministry of Construction, the Department of Rural Road Development, and the Nay Pyi Taw Development Committee. The length of all types of roads increases in accordance with the capital city of Myanmar. In 2011-12, there are 142 miles of bituminous roads; in 2020-21, there are 245 miles, or more than 1.7 times as much as there are in 2011-12. The metalled roads are 13 miles long in 2011-12 and 188 miles long in 2020-21, and their quantity increases by more than approximately 14 times in 2020-21. Surface road length increases by approximately nine times in 2020-21, from 50 miles in 2011-12 to 440 miles in 2020-21. The length of the earth roads expanded from 18 miles in 2011-12 to 488 miles in 2020-21, and their number increased by more than 27 times. The mule roads are 396 miles long in 2017-18 and 329 miles long in 2020-21. The length of the concrete roads increased by more than one and a half times in 2020-21, from 57 miles in length in 2011-12 to 98 miles in 2020-21. The length of the asphalt concrete roads increased from 20 miles in 2016-17 to 60 miles in 2020-21, a factor of three times. In general, the length of bituminous roads and asphalt concrete roads increases yearly, and other types of roads likewise fluctuate during the study period.

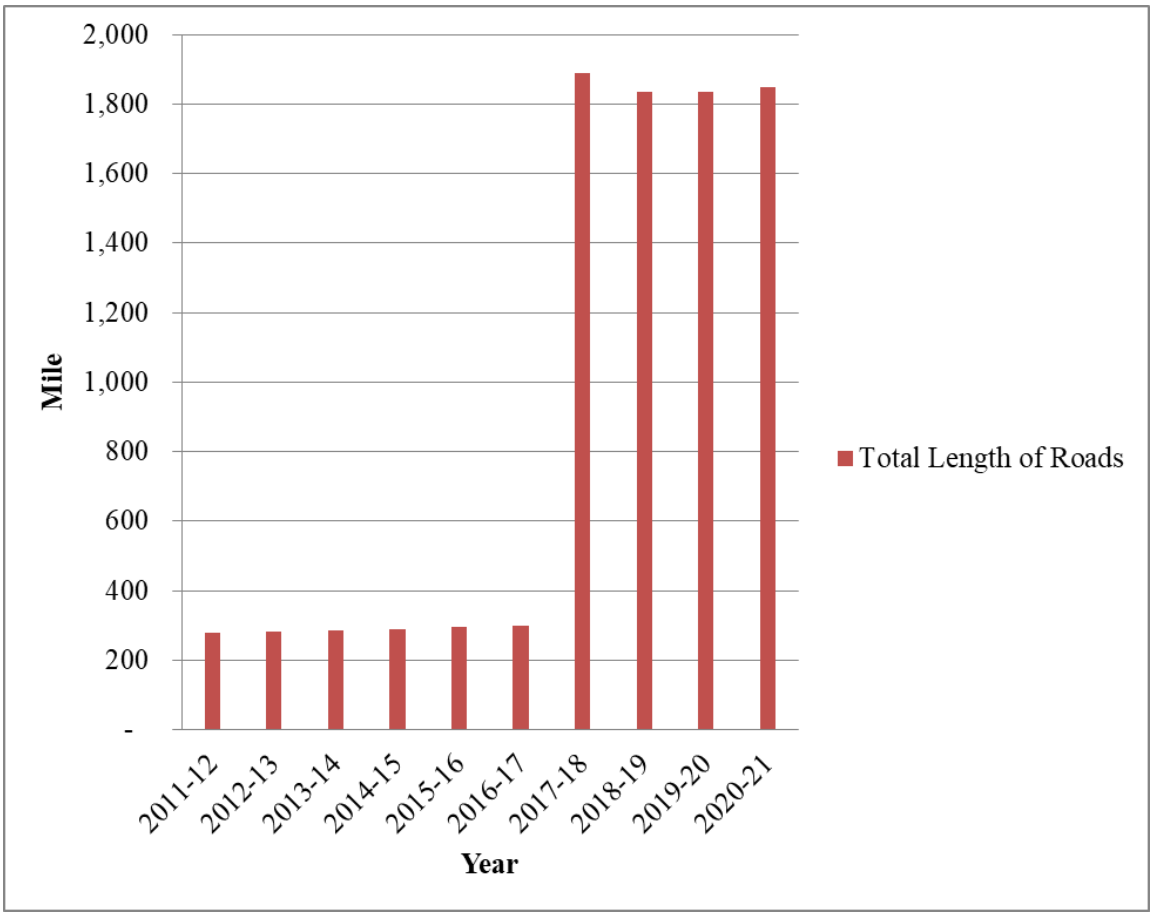
Figure (4.3) Changes in Road Infrastructure by Types of Road in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), MOC, DRRD and NPTDC

Figure 4.3 indicates the changes in road infrastructure by type of road in Nay Pyi Taw Union Territory from 2011-12 to 2020-21. There are seven types of roads in Nay Pyi Taw Union Territory, such as bituminous roads, metalled roads, surface roads, earth roads, mule roads, concrete roads, and asphalt concrete roads. The bituminous roads are significantly higher from 2011-12 to 2020-21, except for 2016-2017. The asphalt concrete roads also gradually increase from 2016-17 to 2020-21, but other types of roads, such as metalled roads, surface roads, earth roads, mule roads and concrete roads, tend to fluctuate in number during the same period of 2011-12 to 2020-21.

Figure (4.4) Total Length of Roads in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

The conditions for the total length of roads in Nay Pyi Taw Union Territory can be seen in figure 4.4. The information in figure 4.4 is based on table 4.3. It illustrates that the total length of roads in miles increases to its maximum in Nay Pyi Taw Union Territory, during the period from 2011-12 to 2020-21. From 2011-12 through 2016-17,

the total length of roads slightly increased. Moreover, the total length of roads significantly increases from 2016-17 to 2017-18. However, the total road length is gradually reducing, from 2017-18 to 2019-20, and gradually rising in 2020-21.

Ultimately, the trend of the total length of roads in Nay Pyi Taw Union Territory is significantly higher from 2016-17 to 2017-18, and the total road length gradually increases in other fiscal years. This is because one of the key factors is that since Nay Pyi Taw is the main administrative capital of Myanmar, it is to prioritize the implementation of basic infrastructure to match the features of the city. Additionally, in accordance with the provisions of the new democratic government, relevant government ministries are regularly improving and upgrading road infrastructure during the study period from 2011-12 to 2020-2021.

Throughout the study period, an increasing number of bridges are constructed and maintained in Nay Pyi Taw Union Territory. This study divides bridges into four categories based on their lengths, such as bridges that are less than 50 feet long, between 50 and 100 feet long, between 100 and 180 feet long, and greater than and equal to 180 feet long. In Nay Pyi Taw Union Territory, under and equal 50 ft long bridges and under 100 ft long bridges are mostly constructed by the Department of Rural Road Development (DRRD) and Nay Pyi Taw Development Committee (NPTDC). Others longer bridges are mainly undertaken by the Ministry of Construction (MOC).

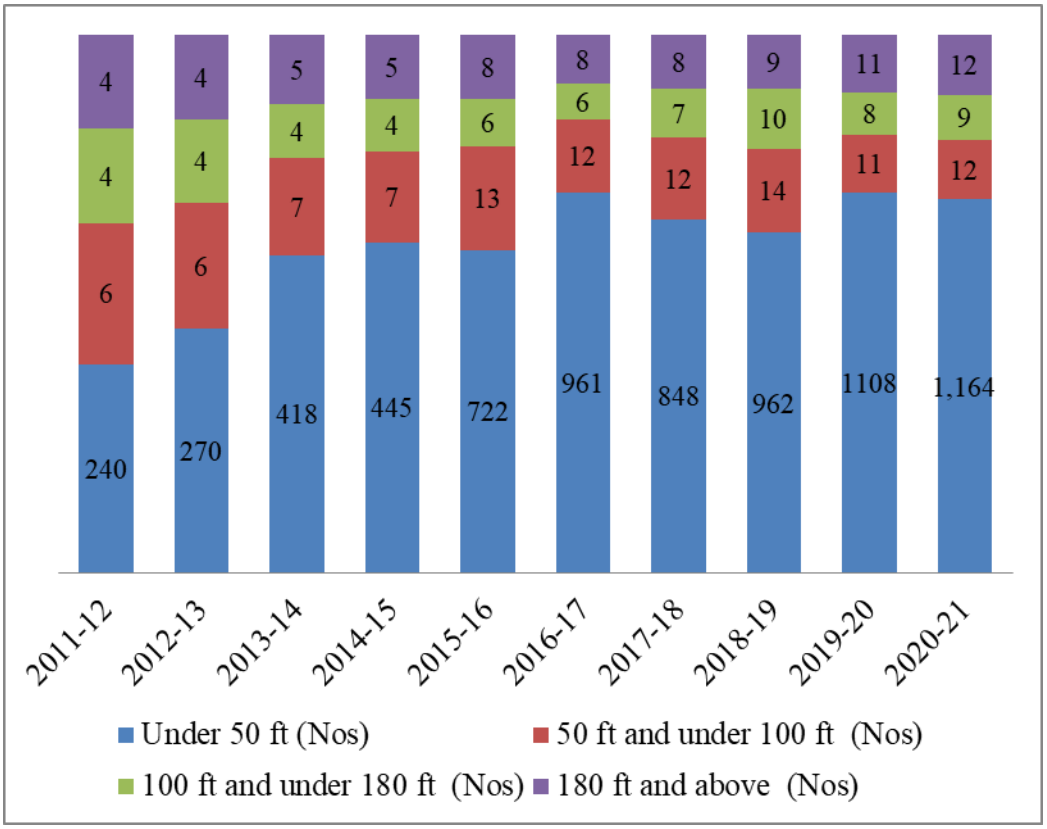
Table 4.4 provides information about how many bridges are built in Nay Pyi Taw Union Territory between 2011-12 and 2020-21. The data in table 4.4 is based on the Myanmar statistical yearbooks, the Ministry of Construction (MOC), the Department of Rural Road Development (DRRD), and the Nay Pyi Taw Development Committee (NPTDC). According to the table 4.4, in 2020-21, there is 12 bridges that are 180 feet or higher, 1,164 bridges that are under 50 feet, 12 bridges that are 50 feet or under 100 feet, and 9 bridges that are 100 feet or under 180 feet. Therefore, in 2020-21, the number of developed bridges in Nay Pyi Taw amounted to approximately 941, which slightly increase compared to the previous fiscal year, 2011-12. There were 935 small and 8 large developed bridges in 2020-21. It means that the total number of bridges reached 1,197 in 2020-21, as compared to 2011-12 at 254, and more than approximately five times its quantity in 2011-12.

Table (4.4) Bridge Transport Facilities in Nay Pyi Taw Union Territory (in Numbers)

Bridge Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Number of Bridges	254	284	434	461	749	987	875	995	1,138	1,197
1. Under 50 ft	240	270	418	445	722	961	848	962	1,108	1,164
2. 50 ft and under 100 ft	6	6	7	7	13	12	12	14	11	12
3. 100 ft and under 180 ft	4	4	4	4	6	6	7	10	8	9
4. 180 ft and above	4	4	5	5	8	8	8	9	11	12

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

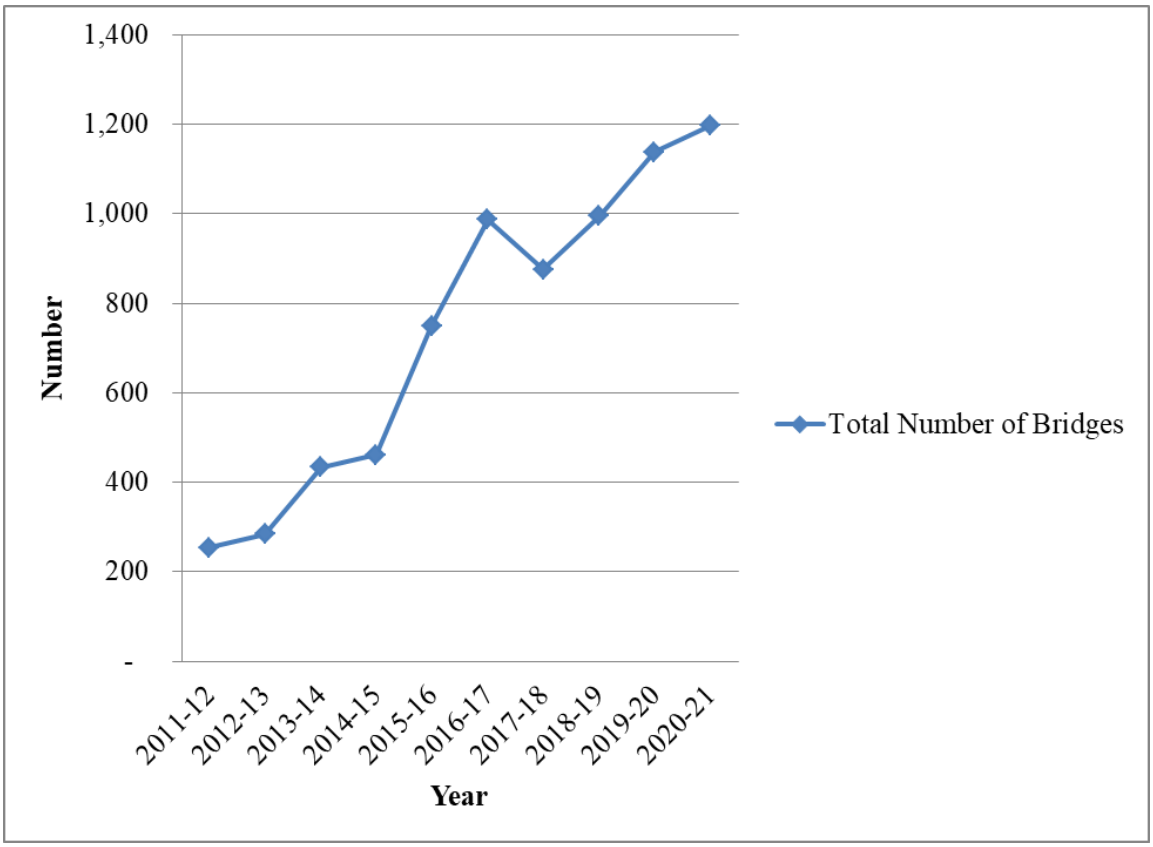
Figure (4.5) Changes in Bridge Infrastructure by Length of Bridges in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Figure 4.5 details the development of Nay Pyi Taw's bridge infrastructure from 2011-12 to 2020-21. According to their lengths, there are four types of bridges in Nay Pyi Taw Union Territory. With the exception of 2017-18, all bridges under 50 feet are dramatically higher from 2011-12 to 2020-21. The bridges that are greater than and equal to 180 feet long gradually increase during the study period, but other types of bridges that are between 50 and 100 feet long, between 100 and 180 feet long, fluctuate in number during the same period of 2011-12 to 2020-21.

Figure (4.6) Total Number of Bridges in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

The conditions for the total number of bridges in Nay Pyi Taw Union Territory can be seen in figure 4.6. The information in figure 4.6 is based on table 4.4. It illustrates that the total number of bridges increases to its maximum in Nay Pyi Taw Union Territory, during the study period from 2011-12 to 2020-21. Nay Pyi Taw Union Territory's bridge infrastructure is a large increase from 2011-12 to 2016-17, a little decrease in 2017-18, but a more significant increase from 2018-19 to 2020-21. It means that the total number of bridges significantly increased from 2011-12 through 2016-17, moreover, the total number of bridges slightly decreases from 2016-17 to 2017-18. However, the total number of bridges is gradually rising, from 2017-18 to 2020-21.

In general, the trend of the total number of bridges in Nay Pyi Taw Union Territory is substantially increased from 2011-12 to 2020-21, except for 2017-18. It highlights that, during the study period from 2011-12 to 2020-2021, relevant government ministries routinely upgraded and maintained the nation's road and bridge infrastructure

in compliance with the new democratic government's regulations. Moreover, Nay Pyi Taw's infrastructure construction sectors have not been prohibited during the Covid-19 pandemic, and they are still operating for their construction works in accordance with the Covid-19 rules that are specially regulated for construction works. Therefore, the allocation and investment of funds in the basic infrastructure sectors of Nay Pyi Taw have been expanded year by year.

Therefore, in order to address the policies to promote physical and economic linkages between regions, get balanced development, and narrow down the socio-economic development gap between rural and urban areas of Nay Pyi Taw Union Territory, a large expenditure in infrastructure development, such as roads and bridges, is needed to be invested more significantly than now. For the Nay Pyi Taw Union Territory's economy to be linked with the development of the country's economies, adequate infrastructure in the form of an effective road and bridge transportation system is also required. Therefore, more road and bridge infrastructure investments are needed to build, upgrade and maintain there. If so, the production and movement of rural commodities in the Nay Pyi Taw Union Territory will automatically expand, and socio-economic life will unavoidably progress quickly.

4.4 Economic Growth Status in Nay Pyi Taw Union Territory

After being announced by the army as the capital of Myanmar in 2005, Nay Pyi Taw Union Territory replaced Yangon and became the nation's capital. Nay Pyi Taw Union Territory is strategically located between the Bago Yoma Mountain and the Shan Yoma Mountains, in central Myanmar, and is the key region for communication and transportation. Along with those regions, it shares boundaries with Mandalay Region, Magway Region, Bago Region, Shan State, Kayah State, and Kayin State. And then, it is a strategic location from which each part of the country can be more easily controlled.

Despite having a geographic area of 4,800 square kilometers and having all the facilities required to function as capital, including broad highways, upgraded government buildings, five-star hotels, and enormous shopping centers, the first condition of the new capital city of Nay Pyi Taw was lacking population. That is because the Myanmar Government built Naypyidaw in secrecy in the early 2000s and it was formally declared as the country's new capital on November 6th, 2005. Due to the relocation of all

government offices and ministries, government workers must be transferred to Nay Pyi Taw and were given two months' notice that they would need to leave Yangon. At that time, Nay Pyi Taw Union Territory had little more than one million populations.

Table (4.5) Population Status of Nay Pyi Taw Union Terrirory

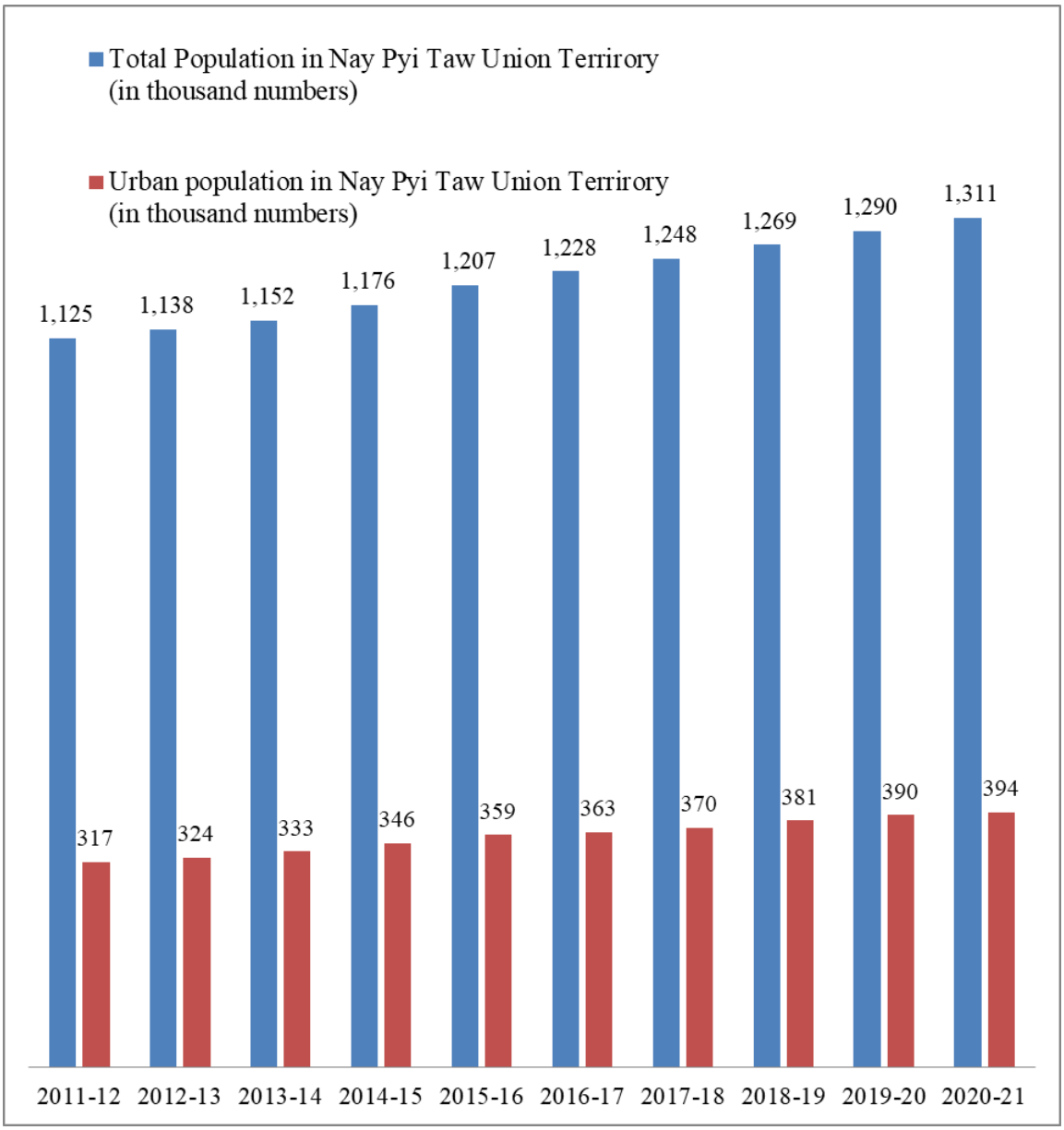
Fiscal Year	Total Population in Nay Pyi Taw (in thousand numbers)	Urban population in Nay Pyi Taw (in thousand numbers)	Ratio of Urban Population to Total Population in Nay Pyi Taw
2011-12	1,125	317	0.2818
2012-13	1,138	324	0.2847
2013-14	1,152	333	0.2891
2014-15	1,176	346	0.2942
2015-16	1,207	359	0.2974
2016-17	1,228	363	0.2956
2017-18	1,248	370	0.2965
2018-19	1,269	381	0.3002
2019-20	1,290	390	0.3023
2020-21	1,311	394	0.3005

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Planning Department, General Administration Department (GAD), Nay Pyi Taw Union Territory

Table 4.5 displays the conditions for the total population and urban population of Nay Pyi Taw Union Territory from 2011-12 to 2020-21. The overall population of the Nay Pyi Taw Union Territory rises from 1,125 thousand in 2011-12 to 1,311 thousand in 2020-21. From 317 thousand in 2011-12 to 394 thousand in 2020-21, more people live in urban areas. On the other hand, it means that, from 317,000 in 2011-12 to 394,000 in 2020-21, there is a 25% increase in the number of people living in urban areas between 2011-12 and 2020-21. However, the proportion of the people living in urban areas in

Nay Pyi Taw Union Territory is steadily rising from 28.18% in 2011-12 to 30.05% in 2020-21, with the exception of 29.56% in 2016-17 and 29.65% in 2017-18.

Figure (4.7) Total Population and Urban Population in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Planning Department, General Administration Department (GAD), Nay Pyi Taw Union Territory

Figure 4.7 shows the total population and urban population of Nay Pyi Taw Union Territory from 2011-12 to 2020-21, respectively. It states a slight annual increase in the total population and urban population of Nay Pyi Taw Union Territory during the

study period. Moreover, it also shows that around one-third of the residents of Nay Pyi Taw Union Territory live in urban areas.

The decomposition of GDP by three main sectors of Nay Pyi Taw Union Territory, namely production/industry, services, and trade indicates its economic structure and the contribution of each sector to the economy. The shares of main economic sectors to Nay Pyi Taw Union Territory's real GDP can be seen in table 4.6. From 2011-12 to 2020-21, economic structures differ across Nay Pyi Taw Union Territory, and services are the dominant sector in the Nay Pyi Taw Union Territory's economy during the study period, as shown in table 4.6.

Table (4.6) Shares of Economic Sectors to Nay Pyi Taw Union Territory's Real GDP (Million Kyats)

Sectoral Share in GDP	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Production	261,876	327,345	433,050	492,257	467,423	460,667	488,797	603,883	604,027	345,851
Services	114,694	143,367	230,471	598,500	654,301	727,138	787,747	1,151,981	1,148,065	617,300
Trade	63,517	64,191	70,187	71,767	75,300	90,706	96,067	138,257	138,257	87,835

Source: General Administration Department (GAD), Nay Pyi Taw Union Territory

The service sector's contribution to total GDP increased from 114,694 million kyats in 2011-12 to 617,300 million kyats in 2020-21. On the other hand, the Nay Pyi Taw Union Territory's trade sector's contribution to the overall GDP for the same period is the smallest, at 87,835 million kyats. Production contributed 345,851 million kyats of the total GDP in 2020-21, approximately an increase of 6% from 2011-12. It indicates that while the service sector is playing a bigger role in the economy, the industrial sector is still making significant strides toward a system that is more geared toward the market.

Opportunities are also plentiful in Nay Pyi Taw Union Territory. Moreover, the roads and bridges of all rural and urban areas in the Nay Pyi Taw Union Territory are being strived to make accessible in all seasons. There are quite a lot of attractions and things to do in Nay Pyi Taw Union Territory to trade, connect markets, enhance mobility, and boost productivity. The economic condition in Nay Pyi Taw Union Territory from 2011-12 to 2020-21 is described in table 4.7.

Table (4.7) Economic Condition in Nay Pyi Taw Union Territory

Fiscal Year	Real GDP (Million Kyats)	Growth Rate of Real GDP (%)	Per Capita GDP (Kyats)
2011-12	725,257	19.60	644,673
2012-13	831,050	14.59	730,273
2013-14	1,109,549	33.51	963,150
2014-15	1,215,411	9.54	1,033,513
2015-16	1,477,397	21.56	1,224,024
2016-17	1,612,997	9.18	1,313,515
2017-18	1,745,590	8.22	1,398,710
2018-19	1,890,348	8.29	1,489,636
2019-20	2,034,811	7.64	1,577,373
2020-21	1,925,492	5.37	1,468,720

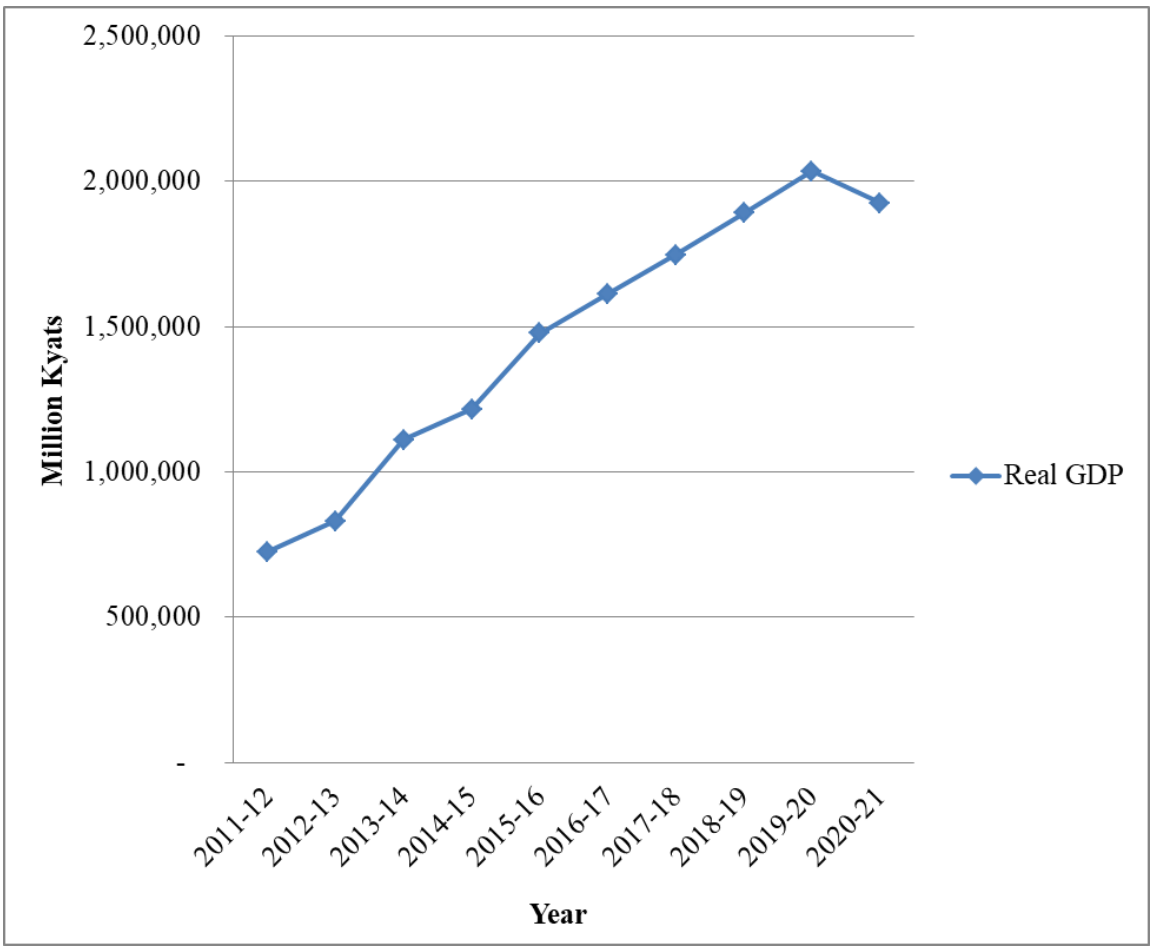
Note: GDP is calculated based on constant prices at 2010-2011 and 2015-16.

Source: Planning Department

The economic growth in Nay Pyi Taw Union Territory is directly related to the real GDP of this region. The real GDP is calculated by (2010-11 and 2015-16) constant

prices. The real GDP increased significantly from 725,257 million kyats in 2011-12 to 2,034,811 million kyats in 2019-20 except for 2020-21. The real GDP growth rate of the Nay Pyi Taw Union Territory is the highest amount of 33.51% at 2013-14 and the lowest amount of 5.37% at 2020-21. The per capita GDP increased about 3 times, from 644,673 kyats in 2011-12 up to 1,468,720 kyats in 2020-21.

Figure (4.8) Real Gross Domestic Product (Real GDP) of Nay Pyi Taw Union Territory

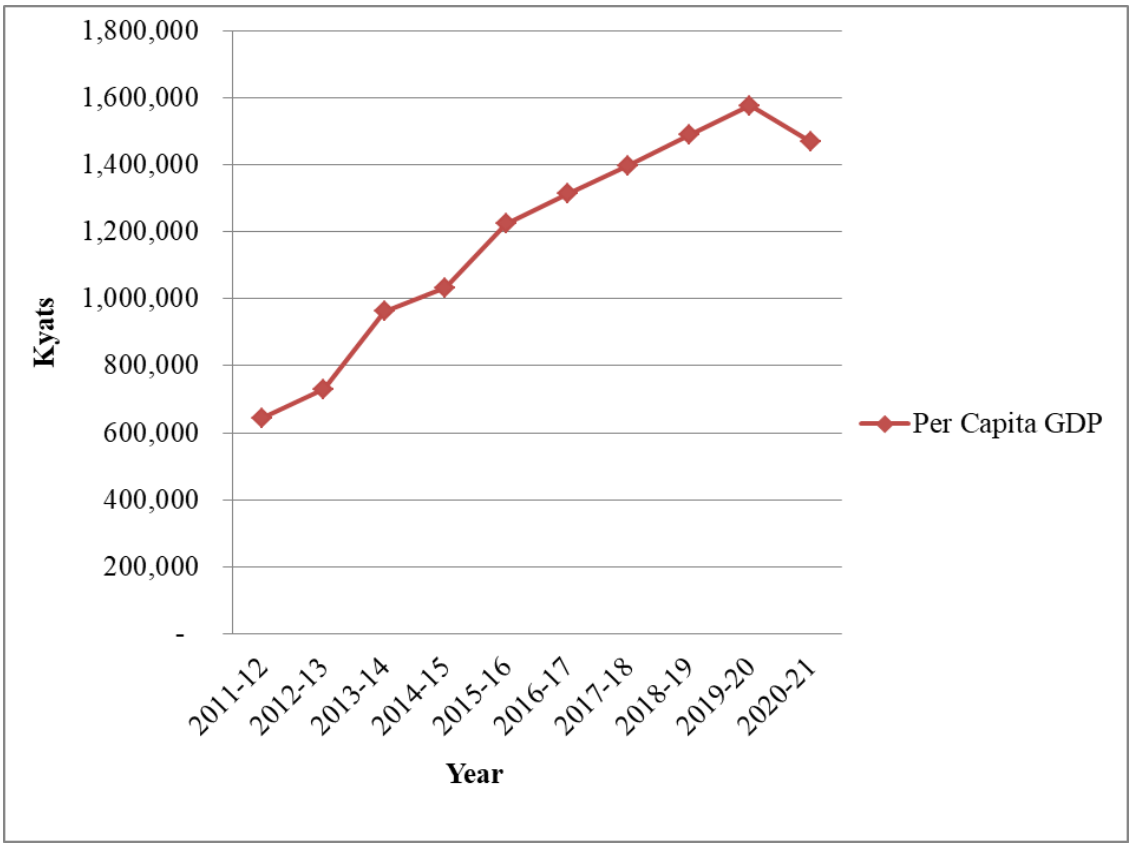


Source: Planning Department

Figure 4.8 shows how much Nay Pyi Taw Union Territory's economic growth situation developed steadily between 2011-12 and 2020-21. The information in figure 4.8 is based on table 4.7. It illustrates that Nay Pyi Taw Union Territory's real GDP is a large increase from 2011-12 to 2019-20, a little decrease in 2020-21. Therefore, the real GDP significantly increases from 2011-12 to 2019-20. However, the real GDP is gradually reducing, from 2019-20 to 2020-21.

Generally, the trend of the real GDP in Nay Pyi Taw Union Territory is dramatically upward from 2011-12 to 2019-20, except for 2020-21. It indicates that Nay Pyi Taw Union Territory's economy is growing except for 2020-21. The study period from 2011-12 to 2020-21 is a period of Myanmar's political transition and its economic policies established and implemented for its comprehensive development. In addition, the comprehensive development of Nay Pyi Taw Union Territory is one of the main goals of the country. As Nay Pyi Taw City's infrastructure improves, residents of Nay Pyi Taw Union Territory have better transportation, and employment opportunities, and their GDP increases year by year. In addition, the main events of the country, such as the Sea Games and the ASEAN summit, were held in Nay Pyi Taw Union Territory, so the service sectors of Nay Pyi Taw Union Territory are further developed, employment opportunities are increasing, and the economy is growing. However, when the COVID-19 virus reached Myanmar on March 23, 2020, with different impacts of COVID-19 restrictions on Myanmar's various economic sectors, the local economy in Nay Pyi Taw Union Territory declined slightly, and its real GDP decreased.

Figure (4.9) Per Capita GDP of Nay Pyi Taw Union Territory

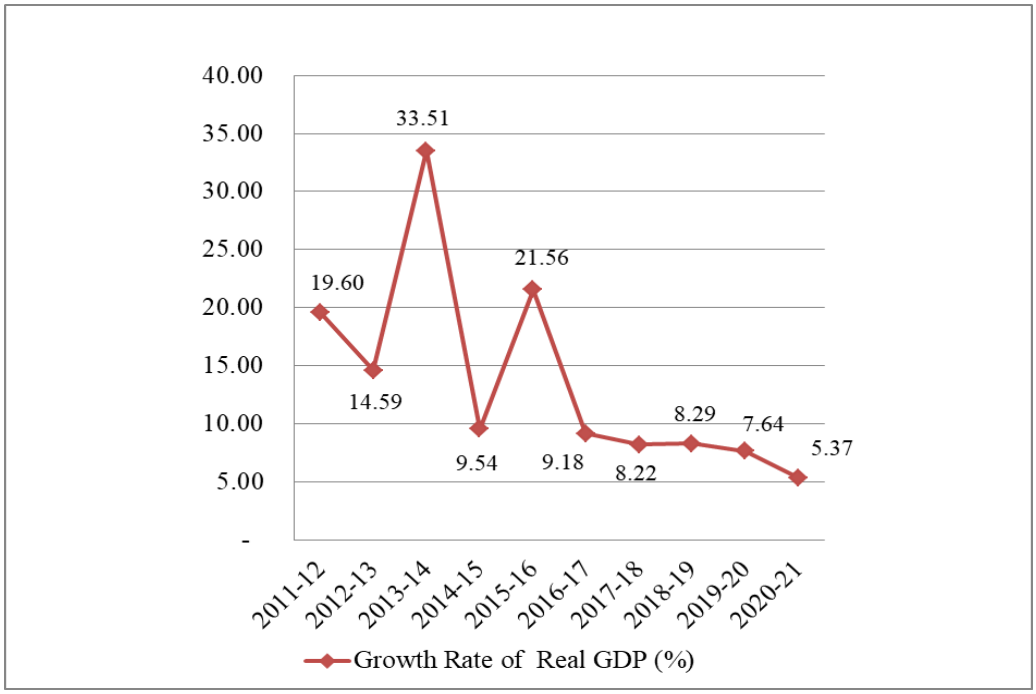


Source: Planning Department

From 2011-12 to 2020-21, Nay Pyi Taw Union Territory's per capita GDP is depicted in figure 4.9. The data in figure 4.9 is based on table 4.7. It shows that the per capita GDP of Nay Pyi Taw Union Territory gradually increased from 2011-12 to 2019-20. With the exception of 2020-21, the per capita GDP of the Nay Pyi Taw Union Territory is rising steadily. In other words, the per capita GDP increased to its maximum in Nay Pyi Taw Union Territory, during the period from 2011-12 to 2019-20, except for 2020-21.

During the study period, Nay Pyi Taw's service industries had expanded, there were more job prospects, and the city's economy was expanding as a result of the hosting of major national events like the ASEAN summit and the Sea Games there. In addition, Nay Pyi Taw Union Territory, in addition to increasing government spending, being the center of Myanmar, the local goods flow is better, and the production sector and commercial trade sectors are increasing, and the economy is growing. The fact that the Nay Pyi Taw Union Territory's infrastructure is always being improved ensures that residents benefit from better road connections, employment opportunities, and an increase in their per capita GDP. However, due to the COVID-19 pandemic arriving in Myanmar in 2020, the per capita GDP of Nay Pyi Taw Union Territory in 2020-21 remained the lowest.

Figure (4.10) Growth Rate of Real GDP of Nay Pyi Taw Union Territory



Source: Planning Department

From 2011-12 to 2020-21, Nay Pyi Taw Union Territory's growth rate of real GDP is depicted in figure 4.10. The data in figure 4.10 is based on table 4.7. It highlights that the rate of growth of real GDP of Nay Pyi Taw Union Territory fluctuated from 2011-12 to 2020-21. The rate of growth of real GDP of the Nay Pyi Taw Union Territory is the highest amount of 33.51% at 2013-14 and the lowest amount of 5.37% at 2020-21. The real GDP growth rate of 2020-21 remains the lowest in Nay Pyi Taw Union Territory because of the effect of the COVID-19 pandemic by hitting the economy hard.

According to the above figures, Nay Pyi Taw Union Territory has a lot of potential for economic growth. Because of the better location of Nay Pyi Taw Union Territory, the people can earn money easily by trading goods and services across the country. Since Nay Pyi Taw Union Territory mostly serves as the seat of Myanmar all people can stay and do business safely with the several restrictions of government and political activities. Therefore, Nay Pyi Taw Union Territory has huge economic growth potential and then the city is anticipated to develop further and acquire the features of a city in the next decade.

CHAPTER V
CONCLUSION

This chapter describes a summary of findings from the interpretation of the descriptive results with support from both the theoretical and empirical literature. This study uses descriptive analysis to shape the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory during the study period from 2011-12 to 2020-21.

5.1 Findings

The main objective of this study is adjusted to identify the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory with the descriptive analysis method.

Along the years, Myanmar's government has also expanded overall road and bridge infrastructure across the country. The total road length in Myanmar and Nay Pyi Taw Union Territory increases significantly from 2011-12 to 2020-21, respectively. In general, Nay Pyi Taw Union Territory is achieving positive trends in its road infrastructure sector, similarly to the national level of Myanmar, due to the government's emphasis on road construction as community development in recent years.

Moreover, the total number of bridges in Myanmar and Nay Pyi Taw Union Territory has also significantly increased from 2011-12 to 2020-21. The total number of all types of bridges built reached its highest level in 2018-19 in Myanmar and 2020-21 in Nay Pyi Taw Union Territory. In sum, except for the decrease in bridge infrastructure of 2019-20 and 2020-21 in Myanmar and the decrease in bridge infrastructure of 2017-18 in Nay Pyi Taw Union Territory, the sector of bridge infrastructure is generally indicating positive trends in both Myanmar and Nay Pyi Taw Union Territory. In addition, with the exception of 2015-16 and 2016-17, the trend of government expenditure on road and bridge infrastructure development in Nay Pyi Taw Union Territory is dramatically increasing during the study period.

On the other hand, the economic condition in Nay Pyi Taw Union Territory, its real GDP growth rate slightly fluctuates between 2011-12 and 2020-21, just like the

national level of Myanmar. Myanmar's real GDP growth rate gradually fluctuates from 5.6% in 2011-12 to 3.2% in 2020-21 while that of Nay Pyi Taw Union Territory, 5.37% in 2020-21, compared to 19.6% in 2011-12, shows dramatically decreased because 2011-12 is an extraordinary situation that happened with democratization.

Therefore, Myanmar's economy is bombing as a consequence of relief sanctions and greater investment. Myanmar's per capita GDP, from 2011-12 to 2020-21, rises about 1.5 times. The per capita GDP of Nay Pyi Taw Union Territory increases about 2.5 times, from 2011-12 up to 2019-20 except for 2020-21. Real GDP in Myanmar increased significantly from 2011-12 to 2020-21, while Nay Pyi Taw Union Territory's real GDP increased substantially from 2011-12 to 2019-20 and decreased slightly in 2020-21. Therefore, except for 2020-21, Nay Pyi Taw's economy is expanding slightly along with Myanmar as a whole. It is certain that for the economy to be linked with the development of the country's economies, adequate infrastructure in the form of an effective road and bridge transportation system is also required.

In summary, this analysis shows that a large number of road miles and bridges were built in the Nay Pyi Taw Union Territory. Futhermore, the expanded government expenditure on infrastructure development proves how the infrastructure has been developed, moreover, Nay Pyi Taw Union Territory's economy had significant growth from 2011-12 to 2019-20, followed by a slight decline in 2020-21. Therefore, the main finding of this study indicates that there are positive trends on both road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory during the research period.

5.2 Suggestions

This study meets the overall requirements of objectives. Therefore, all of the findings will be a remarkable contribution to public policy-making in Myanmar, particularly in infrastructure contexts. This study found that a large number of bridges and roads have been constructed in Nay Pyi Taw Union Territory over a period of 10 years. According to the findings, since infrastructure development is well improved in recent years by increasing the number of roads and bridges, the economy is growing slightly in Nay Pyi Taw Union Territory. Therefore, this study reveals there is a positive, relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory since they two have the same upward trend by

descriptive result. However, to be sure whether there is actual causal relation or not is, this study has to conduct the regression analysis.

It is observed that there are a number of benefits such as travel times, cost and distance due to the improvement of roads and bridges. Roads and bridges reduced travel time and provided better access to markets, facilitates domestic market integration, lowers cost of production and transportation, it also helps to access better services and opportunities. Nay Pyi Taw Union Territory to promote the well-being of residents is essential. Therefore, in order to reduce the development gap between the rural and urban parts of Nay Pyi Taw Union Territory and to ensure sustainable economic growth, greater support for road and bridge infrastructure should be provided.

Moreover, further research papers are also advised to explore the relationship between other types of infrastructure and economic growth and consider poverty as well. In addition, a more comprehensive analysis of the other socioeconomic factors affecting the country's economic growth by conducting empirical analysis should be examined in further studies. Finally, the policymakers should also adopt an appropriate strategic policy to develop the infrastructure sector considering hand-in-hand with other socioeconomic and urban development policies to achieve sustainable economic growth.

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APPENDIX - A

Findings from Previous Studies

Sr. No	Title	Author(s)/Year	Independent Variable(s) (X)	Dependent Variable(s) (Y)	Finding(s)
1.	Infrastructure Development and Economic Growth Nexus in Nigeria	Owolabi-Merus, O (2015)	Infrastructural Development (Gross Fixed Capital Formation, GFCF)	Economic Growth (Gross Domestic Product, GDP)	Infrastructural development has a positive and statistically significant impact on Nigeria's economic growth. However, there is no mutual correlation between both variables in Nigeria in the period under review.
2.	The Impact of Road Transportation Infrastructure on Economic Growth in	Siyan Peter, Eremionkhale Rita, Makwe Edith (2015)	The amount of road transportation in GDP (ROT), capital utilization (CUR), government expenditure on road	Economic Growth (Gross Domestic Product, GDP)	The road transport sector positive impact on the economic growth in Nigeria. Economic growth in Nigeria depended on the level of good and accessible road transportation and

	Nigeria		transportation (GENOT), and exchange rate (EXCHR)		facilitates business activities.
3.	The Causal Relationship Between Road Transport Infrastructure Development And Economic Growth In Namibia	Louis Mungendje (2018)	Information and communication and technology (ICT), government expenditure on road transportation (GERT), and foreign direct investment [Exchange] (FDI) values	Economic Growth (Gross Domestic Product, GDP)	Government spending on road transport infrastructure development has a significant and positive impact on economic growth in Namibia although there is no directional causality flow between government expenditure on road transport infrastructure development and economic growth in Namibia. The nexus between information communication technology and economic growth also have a similar relationship. Contrary to that, a negative relationship between foreign direct investment and economic growth does exist slightly, though not

					significant.
4.	Road infrastructure development and economic growth	C P Ng, T H Law, F M Jakarni and S Kulanthayan (2019)	Road Infrastructure Development (road length per thousand population, roadpp) and (ratio of urban population to total population (urb), physical capital stock per worker (kpw), per capita government expenditure on education (edu), per capita export of goods and services (exp))	Economic Growth (purchasing power parity converted gross domestic products per capita, rgdpch)	The growth in road length per thousand population, per capita export, per capita education expenditure and physical capital stock per worker contributed positively to economic growth. There is an inverted Ushaped dependency relationship between urbanization and economic growth. That is, the economic growth increases at low urbanization levels but decreases once urbanization exceeds a threshold level. Moreover, the growth in road length per thousand populations would facilitate export growth.
5.	Development of Road and Bridge Infrastructure	Fandy Latuni (2019)	Road Infrastructure (X) (road infrastructure, bridge infrastructure,	Economic Growth of Coastal Communities (Y) (Real National Income, Real Per	Under the result of research, the development of infrastructure walke and bridge of Boulevard 2 has a relation 98.5 % with the make-up of coastal area

	to Enhance Economic Growth in the Coastal Communities of Tuminting District in Manado City		transportation facilities)	capita Income, Population Welfare, Labor)	society economics of district of Tuminting town of Manado.

Source: Own compilation based on previous research studies

CHAPTER I

INTRODUCTION

The development of road and bridge infrastructure is the most important component of transport infrastructure that serves the foundation or the provision of transport facilities and operations for all economic sectors across the country, regionally and continentally with the primary objective of achieving national economic goals. The infrastructure of roads and bridges not only makes to provide customers with amenities in a conventional way, but it also provides transitional inputs that go into the production of other sectors. Moreover, it has long been recognized how the potential significance of road and bridge transport development.

According to the World Development Report (1994), infrastructure capacity grows step by step with economic growth. Gramlich (1994) finds that it is still unclear whether the link between economic growth and transportation infrastructure or vice versa or both exist. Canning D and Bennathan E (2000) show that the investment in paved roads, especially in countries with shortages of road infrastructure, has been proven to provide an impressive return on the economy. Ding C (2013) shows that improvements in urban roads and major regional roads have increased the GDP share for both the manufacturing and service industries in China. Nevertheless, the achievement of sustainable economic growth is a primary goal for every country. Therefore, this study is geared toward investigating the contribution of road and bridge infrastructure development to economic growth in Nay Pyi Taw Union Territory which is implementing infrastructure at high speed in a short-term period.

1.1 Rationale of the Study

Nay Pyi Taw Union Territory, the new capital city of Myanmar, is the most popular city, specially designed, planned, and constructed to be a capital. In accordance with the characteristics of capital, many infrastructures such as road networks, bridges,

hospitals, schools, markets, gardens, playgrounds, and water supply are being built, upgraded and renovated within the Nay Pyi Taw area. A well-developed infrastructure always makes sure society from roads and bridges to the socio-economic development of any region. In other words, infrastructure is also fundamental for the overall development of a region. Especially, the infrastructure of roads and bridges plays a vital function in connecting diverse locations and also facilitates trade and cooperation between countries around the globe. The provision of roads and bridges not only lowers the physical barrier by stimulating the movement of people, goods, and services but also improves access to markets, social services, and employment by reducing total transit times and costs. Moreover, it is a basic form of transformation and communication and constitutes the most critical part of the national economic development drive.

Most of the roads and bridges in the townships of Nay Pyi Taw Union Territory have been transformed into higher-level conditions in accordance with Nay Pyi Taw Capital City. Most of the roads in the townships of Nay Pyi Taw Union Territory have been upgraded to asphalt concrete (AC) roads from earth roads in accordance with getting funds permitted by relevant fiscal years. Planning and implementation of government infrastructure are hampered by the uncertainty and shortage of available funds for road and bridge infrastructure investment as well as conflicting priorities. However, the population in Nay Pyi Taw Union Territory is increasing year by year. Therefore, more road and bridge infrastructure investments are needed to build, upgrade and maintain in there. The infrastructure of roads and bridges still occupies an important role over other transport facilities and they are encouraged through BOT schemes and PPPs. The government has extended and upgraded road and bridge infrastructure quantitatively and qualitatively throughout the country. Therefore, road and bridge infrastructure expansion necessitates significant and ongoing investment; hence its availability in different states is determined by the differential priority accorded by state governments.

It is essential to manage the nation's road and bridge infrastructure through suitable frameworks for pricing, funding, and prioritization in order to gain benefits for the development of the nation's fundamental social and economic structure. To stimulate economic growth in economically lagging regions, the role of road and bridge infrastructure development is crucial. And so, modern road network and bridge helps

traffic move around the country more easily and is essential for the economic growth of any country.

The relationship between road and bridge infrastructure development and economic growth has received a lot of attention in theoretical and empirical studies of foreign countries but economists have different perspectives. Economic growth is hampered by underinvestment in infrastructure, according to empirical studies. At the same time, multiple studies have demonstrated that infrastructure investment may be an effective strategy in the fight against poverty. There is still a great deal of doubt and discussion surrounding the relationship between the availability of road and bridge infrastructure and economic growth. The success of the government in providing road and bridge infrastructure will be determined not by the amount of money invested, but rather by how much road and bridge infrastructure helps it to achieve its economic, social, and environmental goals.

Many developing countries are developing in line with their infrastructure development and the availability of adequate infrastructure facilities is an important pre-condition for sustainable economic and social development. And so the road and bridge infrastructure development is surely anticipated to fetch economic changes to the people of Nay Pyi Taw Union Territory. However, there is no prior investigation into the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory. Therefore, it is important to explore the implementation of road and bridge infrastructure development and the situation of economic growth there. In view of this, this study intends to investigate the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory by utilizing secondary data from the long period between (2011-2012) and (2020-2021).

1.2 Objective of the Study

This study aims to explore the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory. In concrete, it aims to identify whether the development of road and bridge infrastructure and the economic growth is related in Nay Pyi Taw Union Territory.

1.3 Method of Study

The relationship between the development of road and bridge infrastructure and economic growth in Nay Pyi Taw Union Territory will be conducted in this study using secondary information with time series data from financial years (2011-2012) to (2020-2021). The data was collected from the Ministry of Construction (MOC), Department of Rural Road Development (DRRD), Planning Department, General Administration Department (GAD), and Nay Pyi Taw Development Committee (NPTDC) as major sources. The relevant books, research papers, internet sources, and Yangon University of Economics' library were gathered for the literature reviews. This research uses the descriptive method by analyzing the quantitative data with tables, graphs, and figures, and then doing a description and interpretation.

1.4 Scope and Limitations of the Study

According to the available facts and figures from financial years (2011-2012) to (2020-2021), this study mainly focuses on the road and bridge infrastructure development and the economic growth in Nay Pyi Taw Union Territory. This study targets to measure the development of infrastructure by (i) the government expenditure on road and bridge infrastructure development, (ii) total road lengths, and (iii) the total number of bridges to describe road and bridge infrastructure development without considering the road network capacity, and connectivity. The study will use to measure economic growth through (i) GDP, (ii) per capita GDP, and (iii) growth rate of GDP with constant year based. Therefore, all of the indicators of economic growth focus on real rather than nominal.

1.5 Organization of the Study

This study is comprised of five chapters and chapter one is an introduction which includes a brief introduction, rationale of the study, objectives of the study, methods of study, scope and limitations of the study, and organization of the study. Chapter two describes the literature review of the study on how important road and bridge infrastructure development to economic growth. Lately, chapter three describes background information on road and bridge infrastructure development in Myanmar between 2011-2012 and 2020-2021. Chapter four is provided descriptive analysis on the

relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory. Finally, chapter five is the conclusion which includes findings and suggestions.

CHAPTER II

LITERATURE REVIEW

This chapter includes a theoretical background of road and bridge infrastructure development and economic growth including definitions and concepts of infrastructure, the concept of road and bridge infrastructure development, economic growth, the importance of road and bridge infrastructure development on economic growth, previous studies, and a conceptual framework of the study.

2.1 Definition and Concept of Infrastructure

Infrastructure is the fundamental physical and organizational components required for the smooth function of a society, business, or reproductive system, as well as the services and facilities essential to operate an economy. It is also the set of interconnected structural components that serve as the framework for providing an entire structure of development. It is a crucial term for evaluating the level of development in a country or region (Wikipedia.org, 2012).

Since 1875, the French language has used the word "infrastructure", and since 1887, the English language has as well, initially referring to "the foundational installations for any activity or system". The term was imported from French, where it was previously used to describe laying down a roadbed of substrate material that was necessary before constructed pavement could be laid on top of it. The word is a combination of the Latin prefix "infra", meaning "below", as many of these constructions are underground, and the French word "structure" (derived from the Latin word "structure"), meaning "building". After NATO was established in the 1940s, the army's use of the term became popular in the United States, and by 1970, urban planners were using it in its modern civilian sense (Wikipedia.org, 2012).

In economic research, there is no common definition of infrastructure. Infrastructure is defined as the sum of material, institutional and personal facilities and data which are available to the economic agents and which contribute to realizing the

equalization of the remuneration of comparable inputs in the case of a suitable allocation of resources, which is complete integration and maximum level of economic activities (Jochimsen, 1966).

Infrastructure is defined as “the sum of all relevant economic data such as rules, stocks, and measures with the function of mobilizing the economic potentialities of economic agents” (Buhr, 2003). Fulmer, Jeffrey, (2009) states that infrastructure is defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions and maintain the surrounding environmen".

According to Merriam Webster dictionary, infrastructure can be defined as “the basic equipment and structures such as roads and bridges that are needed for a country, region, or organization to function properly”. Arthur, S., & Sheffrin, S. M., (2003) states that the set of facilities and systems that serve a country, city, or other area and encompasses the services and facilities necessary for its economy, households and firms to function is called infrastructure.

Highways, ports, bridges and other transport facilities, power generation and distribution, water and sewerage treatment, and telecommunications systems would be regarded as part of a country’s infrastructure. Therefore, infrastructure refers to the collection of fundamental structures and mechanisms that enable a family or business to function sustainably.

2.2 Types of Infrastructure

While there would be a general consensus that tangible capital assets such as bridges, roads, streets and tunnels are infrastructure, others would cast the net much wider. A distinction is often made between ‘economic’ and ‘social’ infrastructure and within each of these between ‘hard’ (physical) and ‘soft’ infrastructure (Argy et al., 1999). On this basis, there are four categories:

1. Hard Economic Infrastructure
2. Soft Economic Infrastructure
3. Hard Social Infrastructure
4. Soft Social Infrastructure.

These classifications are set out in table 2.1.

Table (2.1) Classification of Infrastructure by Type

	Hard	Soft
Economic	Roads	Vocational Training
	Motorways	Financial Institutions
	Bridges	R & D Facilitation
	Ports	Technology Transfer
	Railways	Export Assistance
	Airports	
	Telecommunications	
	Power	
Social	Hospitals	Social Security
	Schools	Community Services
	Water Supply	Environmental Agencies (EPAs)
	Housing	
	Sewerage	
	Child Care	
	Prisons	
	Aged Care Homes	

Source: Grimsey, D., & Lewis, M. (2007). "Public Private Partnerships: The Revolutioin Infrastructure"

According to table 2.1, there are two main types of infrastructure such as economic infrastructure and social infrastructure. Economic and social infrastructure can be broadly categorized into two categories (Heymans, C., & Thome-Erasmus, J., 1998).

2.2.1 Economic Infrastructure

Economic infrastructure is considered to provide key intermediate services to business and industry and its principal function is to enhance productivity and innovation

initiatives. Since much economic infrastructure is wholly or partially required to export commodities, the sustained commodity boom has important implications for infrastructural investment and particularly for investment in economic infrastructure. There are two types of economic infrastructure; hard economic infrastructure and soft economic infrastructure (Arthur, S., & Sheffrin, S. M., 2003).

Hard economic facilities include roads, highways, bridges, ports, railways, airports, public transport, telecommunications, electricity and gas generation, transmission and distribution whereas soft economic infrastructure encompasses vocational training, financial facilities for business (payments, credit, equity, derivatives, venture capital, etc.), the facilitation of R & D and technology transfer, and organizations encouraging export orientation and productive cooperation among individuals and entities. This study is focus on hard economic infrastructure (Arthur, S., & Sheffrin, S. M., 2003).

2.2.2 Social Infrastructure

Social infrastructure can be broadly defined as the construction and maintenance of facilities that support social services (Cohen, Gershon, 2017). Social infrastructures are created to increase social comfort and promote economic activity (Torrisi and Gianpiero, 2009). These include schools, parks and playgrounds, structures for public safety, waste disposal plants, hospitals, sports area, etc (Torrisi and Gianpiero, 2009).

2.3 Concept of Road and Bridge Infrastructure Development

Opawole, Jagboo, Bababola & Babatunde (2012) state that the topic of infrastructure development has been heavily debated since experts from different nations have used the issue of infrastructure development as a parameter and index to measure each country's ability to compete worldwide. The construction and improvement of foundational services in order to stimulate economic growth and quality of life improvement is infrastructure development. Infrastructure development is also an instrumental component in encouraging a country’s economic growth and development. In other words, infrastructure development is a fundamental cause of regional inequality due to migration from underdeveloped to developed infrastructure regions.

Das, R. C. (Ed.), (2016) highlights that infrastructure development involves not only any type of infrastructure but also the improvement of the quality of the various components of infrastructure. Road and bridge infrastructure is a critical public asset. Road and bridge infrastructure consists of the installation of fixed assets including surface roads and bridges. The use of automobiles on these infrastructures reduce travel times and creates jobs in the areas, both of which collectively have an impact on the broader demand for products and services and ultimately raise GDP and global development.

Road and bridge infrastructure development can impact the employment rate, productivity, and income as well as give an added value. The construction of roads and bridges can promote political integration and minimize geographic disparities in society. Road and bridge infrastructure development can significantly shows how well a nation is doing and how it is developing. Therefore, the lack of basic road and bridge infrastructure development indicates that the nation or area is underdeveloped and has been left behind in modernization and progress (Das, R. C. (Ed.), 2016).

2.3.1 Road

A road is a wide way connecting from one place to a different place, typically one with a usually prepared surface that vehicles can use. Road infrastructure is a land transportation infrastructure that covers all parts of the road, including complementary buildings and equipment intended for traffic that is on the surface of the land, below the surface of the land and / or water, and above the water surface, except railroad tracks and cable road. J Roberts (2004) states that road infrastructure is understood to include all physical assets within the road reserve, including not only the road itself, but all associated furniture (signage etc), and all earthworks, drainage, structures (culverts, bridges, buildings etc). According to Cohen, Gershon, (2017), land used for the transport of goods and passengers via road and may include national, provincial and municipal roads, facilities to park and stop, road reserves, maintenance and maneuvering facilities called road infrastructure.

There are seven kinds of roads such as bituminous roads, metaled roads, surface roads, earth road, mule roads, concrete road and asphalt concert road. Road transportation continues to play a significant role, over other forms of transportation. In

addition, the road aims to support mobility of goods and passengers between the city center and industrial and service areas, offices, and residential and residential areas as well as suburban areas. According to Peng (2012), new infrastructure put into operation is able to alleviate the transport pressure to reduce the crowded road ways, transportation time and transportation costs. Therefore, roads make the existing transportation network more dense and smooth, thereby increasing the accessibility and safety, resulting to high relative speed of vehicles, and flexibility of route choice (Cohen, Gershon, 2017).

2.3.2 Bridge

Bridges have played one of the most important roles in the evolution of humanity's early civilizations and a structure built to span a physical obstacle such as a body of water, valley, road, or rail without blocking the way underneath is a bridge. The main function of these bridges is to handle the highway's traffic loads while navigating any obstacles and performing efficient communication between two destinations (Latuni, F. 2019).

There are eight types of bridges such as beam bridges, truss bridges, arch bridges, cantilever bridges, suspension bridges, moveable bridges, tied-arch bridges and cable-stay bridges. A bridge infrastructure that can support both citizen transit demands and business transactions is provided by counties, states, and countries with significant financial resources. Therefore, by creating a route that might otherwise be unequal or impractical, a bridge serves the objective of allowing people or freight to easily cross over an obstruction (Latuni, F, 2019).

2.4 Concept of Economic Growth

“Economic growth is a process in which a nation's wealth increases over time.” Economic growth is defined as "an increase in the overall output (goods or services) created by a country" (Matiti, C., 2013). A process that provides opportunities to increase the production of goods and services in the country is called economic growth, and quantitative growth of human and natural capital (Pelsa, I., & Balina, S., 2022). Cornwall (2018) states that economic growth means an economy in which per capita income is

already incerasing. Therefore, increasing economic growth often enhances the living standards of humanity.

GDP is calculated from a country's national accounts which report annual data on incomes, expenditure and investment for each sector of the economy. The aggregate value of all services and goods produced within a country in any given year is defined as GDP. The income approach, the output approach and the expenditure approach are three different ways of measuring GDP. The income approach, as the name suggests measures people's incomes, the output approach measures the value of the goods and services used to generate these incomes, and the expenditure approach measures the expenditure on goods and services. In theory, each of these approaches should lead to the same result, so if the output of the economy increases, incomes and expenditures should increase by the same amount (Cornwall, 2018).

Figures for economic growth are often expressed as the annual percentage growth in real GDP. By adjusting nominal GDP to take account of inflation is called real GDP. GDP per capita, which is a proxy of living standard, is calculated by the GDP of an economy divided by its total population. Although GDP per capita is highly sensitive to variations in population size, a high GDP per capita usually relates with a high standard of living, as well (Cornwall, 2018).

2.5 Importance of Road and Bridge Infrastructure Development on Economic Growth

Infrastructure is just like a backbone of a country's economy. Infrastructure is regarded as being essential to fostering inclusive and sustainable economic growth. The development of a country’s road and bridge infrastructure is essential for its industries and the economy as a whole to grow (R Bhattacharyya, 2020).

Increased investment of road and bridge infrastructure is required to maintain growth and fight poverty. More than $2.5 trillion is spent globally on infrastructure each year, but until 2035, $3.7 trillion will be required just to keep up with predicted GDP growth (Nicklas Garemo, Martin Hjerpe and et.al, 2016). The McKinsey Global Institute estimates that the average rate of return on infrastructure is about 20%. In other words, a long-term $1 investment in infrastructure can increase GDP by 20 cents (Nicklas Garemo, Martin Hjerpe and et.al, 2016).

It may take years for infrastructure investments to provide economic benefits. A larger stock of road and bridge infrastructure will stimulate economic growth by reducing the production cost and transportation of goods and services, boosting the productivity of input elements, and providing indirect positive externalities. Therefore, the expansion of a country's road and bridge infrastructure is essential to the development of its sectors and its economy as a whole and road and bridge infrastructure development has received a lot of attention from policymakers (Cornwall, 2018).

Improved road and bridge infrastructure can boost worker productivity by moving commodities more efficiently. The World Economic Forum (2014) states that having a well-developed road and bridge infrastructure not only shortens the distance between areas but also integrates national markets and connects them inexpensively to other economies.

Most advanced economies have gone through periods of intense infrastructure development that have boosted their economies' productivity and competitiveness. Faster economic growth and reduction of poverty in the nation depend on its road and bridge infrastructure. At a certain point in a nation’s development, its economy requires an adequate network of roads and bridges. Major investment may then take place in building road and bridge infrastructure. Up to economic progress, a society's ability to access jobs, healthcare, education, and social connections depends on a good road and bridge system (Cornwall, 2018).

The important economic forces in the area rely greatly on the quality of the regional road and bridge network. The majority of the funding is needed for roads and bridges, which are the core elements of the region's infrastructure. The improvement of the nation's road and bridge infrastructure offers a chance for economic sectors to magnify, grow and contribute implicitly to the economic progress of the country. It is essential to the localized growth of a community as well as the national and international economic growth of a nation. Therefore, road and bridge infrastructure development has received a lot of policy attention in an effort to boost the economic growth, productivity, and quality of life of the citizens of developing nations (Cornwall, 2018).

Therefore, depending on each country's economic priorities, it is scientifically demonstrated from the literature that indeed road and bridge infrastructure expansion contributes absolutely to economic growth. At the same time, however, economic growth

can also create demand for more innovative types of road and bridge infrastructure and render existing infrastructures and installations obsolete, due to this two-way interdependency between infrastructure development and economic growth (Cornwall, 2018).

2.6 Reviews on Previous Studies

In recent years, the linkage between the development of roads and bridges and economic expansion has been a key topic of research for economists and the field of development finance. There are several difficulties in analyzing the effect of road and bridge infrastructure on economic growth. Moreover, the outcomes of these researches have been ambiguous. While some studies contend there is a negative correlation between the two factors, others contend that infrastructure development has a favorable impact on economic growth. Some various authors and researchers explored the empirical analysis of the relationship between road and bridge infrastructure development and economic growth.

Owolabi-Merus, O (2015) explores the impact that infrastructural development has on Nigeria's economic growth and to investigate whether there is causal relationship existing between infrastructural development and economic growth in Nigeria. In this study, the impact of infrastructural development on Nigeria's economic growth is estimated using the Ordinary Least Squares method, and the relationship between infrastructural development and economic growth in Nigeria is examined using Granger Causality econometric tools. Gross Fixed Capital Formation (GFCF) serves as a proxy for the former, while Gross Domestic Product serves as a proxy for the latter (GDP). The World Bank's Africa Development Indicators provided the data for the evaluation period, which runs from 1983 to 2013. According to the empirical findings of this study, infrastructure development positively and statistically significantly affects Nigeria's economic growth. The Granger Causality test indicates that there was no mutual correlation between the two variables in Nigeria throughout the study period, nonetheless.

Siyan Peter, Eremionkhale Rita, et al. (2015) use both primary and secondary data to analyze the impact of road transportation on economic growth in Nigeria. To ascertain the long-term association between growth and road transportation in Nigeria,

the probit model was used to evaluate the primary data and the multivariate model to assess the secondary data. The analysis tool used to examine the connection between the infrastructure for road transportation and economic growth was econometric methodology. Therefore, the Ordinary Least Squares approach was used to explore at their long-term relationship. The study employed Johanson's Cointegration Test to further examine the relationship. The outcome demonstrates that the transportation sector has a positive impact on the economic growth in and also, economic growth in Nigeria depended on the level of good and accessible road transportation and facilitates business activities.

Louis Mungendje (2018) looks at the short- and long-term correlations as well as the directional causality flow between Namibia's economic growths from 1990 to 2014. The auto regression distributive lag (ARDL) bounds testing approach to co-integration is used in the study to look at examine the short-run and long-run relationship between Namibia's economic growth and road transport infrastructure development. The Roads Authority Annual Reports from 1999 to 2014, the Namibia National Planning Commission's MTEF (Medium-Term Expenditure Framework from 1990-2015), and the World Bank's GDP database from 1990 to 2014 were used as the data sources. These sources were imported into the E-view tool to perform quarterly regressions from 1990 to 2014.

A link between the variables is supported by the results. The findings of the auto regression distributive lag (ARDL) bounds test show that there is a long-run relationship between the variables. According to the projected long-run model, Namibian road transportation spending and economic growth, as well as ICT spending and economic growth, is positively correlated although statistically insignificantly. The short-run model, however, showed a favorable and statistically significant correlation between road transportation spending and economic growth. The short-run projections, on the other hand, indicated a statistically negligible and adverse link between foreign direct investment and economic growth. Finally, the findings of the Granger Causality test indicated that there was no causal relationship between Namibia's road transportation spending and economic development.

P Ng, T H Law, and colleagues (2019) examine how the development of road infrastructure and other socio-economic factors influenced economic growth. Fixed-effects panel linear regression analysis with exogenous covariates was used to examine

the relationship between economic growth and factors like road development, export level, education level, physical capital stock, and urbanization level using time-series cross-sectional data for 60 countries over the course of three decades, from 1980 to 2010. To account for heterogeneity and provide accurate and consistent estimates of model parameters in the presence of heterogeneity, panel linear regression uses either fixed effects (FE) or a random-effects (RE) model.

This study showed that, as independent variables, increases in road length per thousand people, per capita export, per capita education spending, and physical capital stock per worker positively influenced economic growth, with per capita GDP as the dependent variable. However, the road length per thousand people was utilized in this study to represent the development of the road infrastructure without taking connection and capacity into account. Using OLS regression models, it was discovered that there is an inverse U-shaped dependency relationship between urbanization and economic growth. In other words, economic growth increases at low levels of urbanization but declines if urbanization rises above a certain point. Additionally, it was noted that an increase in road length per thousand people would support export growth.

According to Fandy Latuni (2019), the construction of the Boulevard 2 bridge and infrastructure is favorable for the socioeconomic makeup of the coastal area in the Tuminting district of Manado. In this study, real national income, real per capita income, population welfare, and labor are the dependent variables of the growth of coastal communities (Y), while road infrastructure (X), such as road infrastructure, bridge infrastructure, and transportation facilities, is the independent variable. The time of the study is scheduled for 2018 for 3 months, starting in January and the plan will end in March 2018 by using primary data and secondary data. Pursuant to the results of research the development of infrastructure walke and bridge of Boulevard 2 having relation 98.5 % with make-up of coastal area society economics of district of Tuminting town of Manado indicated with a very strong relationship.

Therefore, the findings of the relationship between road and bridge infrastructure development and economic growth are based on econometric models such as the Ordinary Least Squares (OLS) regression model, the auto regressive distributive lag (ARDL) bounds test and Granger Causality econometric techniques, respectively, by various authors and researchers. The summary of all literature reviews applied in this study is presented in the appendix A.

CHAPTER III

BACKGROUND INFORMATION OF ROAD AND BRIDGE INFRASTRUCTURE DEVELOPMENT AND ECONOMIC GROWTH IN MYANMAR

3.1 Overview of Myanmar Infrastructure

Myanmar, known as the Republic of the Union of Myanmar, with a land area covering 261,228 square miles (676,578 square kilometers), is the second largest country in Southeast Asia as well as the 40th largest country in the world and has the 24th-highest population. The country's proximity to Asia's largest and fastest-growing markets offers a great opportunity for Myanmar to become the land link between China, India, and the ASEAN countries.

The State Peace and Development Council (SPDC), took over from 1988-2010 and adopted the market-oriented system using an open-door economic policy reform. In 2011, the newly elected first government initiated and improved to develop physical, legal, and institutional infrastructure with several political and economic reforms to achieve the vision of becoming a modern, democratic and developed nation by 2030. Especially, the investments in infrastructure development are being emphasized, following Myanmar's transition to a more open economy. Because there are large significant gaps in Myanmar's infrastructure development and the Government of Myanmar sees infrastructure development as one of its top priorities. It has also developed overarching goals and strategies in the Myanmar Sustainable Development Plan (MSDP) and the new National Logistics Master Plan (2018-2030) (NLMP). They include the long-term vision of the government's priorities to dramatically improve the status of infrastructure in the country.

Myanmar government is investing in various types of infrastructure in the whole country to reduce regional disparities and promote trade and economic development. According to the Asian Development Bank (ADB) (2014), Myanmar would have an infrastructure shortfall of $120 billion between 2017 and 2030. Three critical challenges

need to be addressed by infrastructural development in Myanmar in the coming years, especially:

(1) Modernizing roads and integrating them with nearby networks of transportation;

(2) Development of regional airports, improvement of airport capacity, and

(3) Maintenance and consolidation of urban transport infrastructure, through instalments of innovative transportation tools including but not limited to water-taxis and air-conditioned buses.

Moreover, World Bank (2018) states that Myanmar needs to strengthen its supportive infrastructures like transport, power supply, and public utilities.

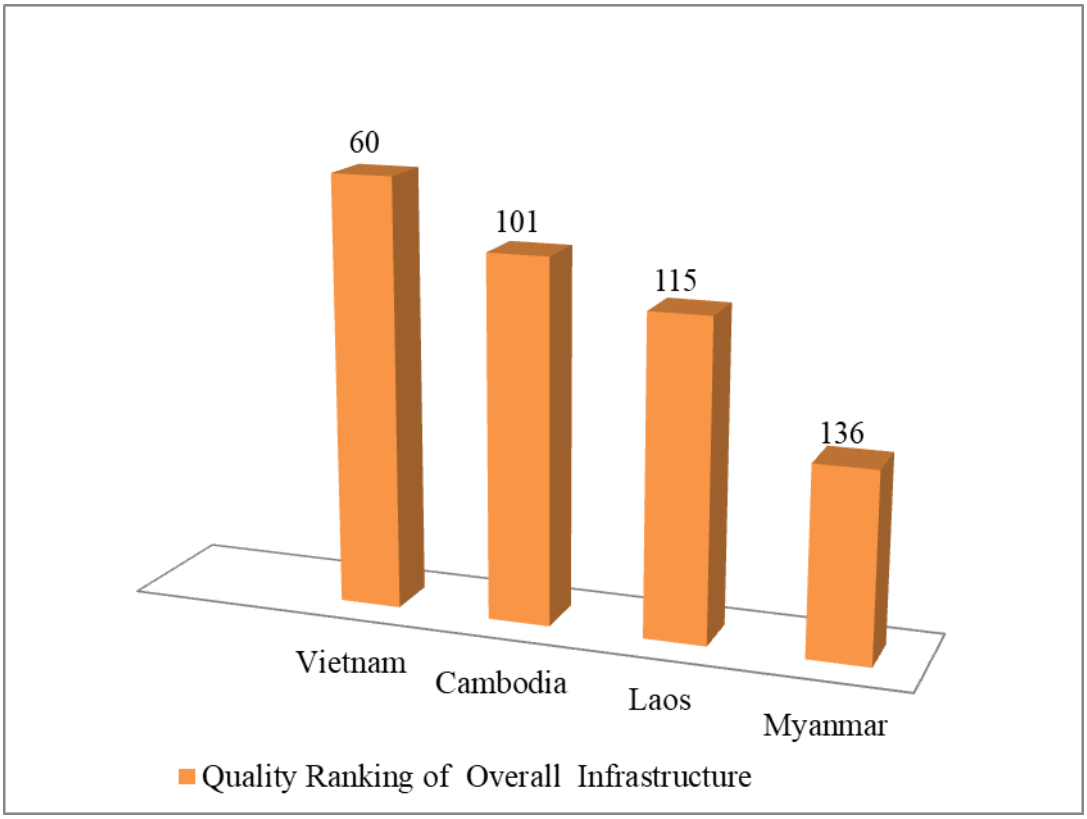
Table (3.1) Ranking of Infrastructure Indicators for CLMV Countries among 138 World Nations

Infrastructure Indicators	Myanmar	Cambodia	Laos	Vietnam
Quality of overall infrastructure	136	101	115	60
Quality of road infrastructure	129	72	60	94
Quality of railroad infrastructure	96	83	N.A.	55
Quality of port infrastructure	127	74	128	90
Quality of air transport infrastructure	136	85	71	87
Individuals using internet (%)	137	122	114	78
Mobile telephone subscription / 100 population	138	34	119	22
Fixed broadband internet Subscription / 100 population	130	113	117	74

Source: The World Economic Forum: Global Enabling Trade Report (2014)

According to the source from the global competitiveness report of The World Economic Forum in 2014, the rank of Myanmar's infrastructure among 138 world nations with a comparison of CLMV countries is shown in table 3.1. Myanmar's overall infrastructure quality ranks 136th out of 138 nations, which is lower than its CLMV counterparts. Additionally, Myanmar ranks significantly lower than CLMV countries in other infrastructure such as road, railroad and aviation infrastructure. Nonetheless, the government is stepping up its efforts to tackle these infrastructure connectivity deficiencies.

Figure (3.1) Ranking of Quality of Overall Infrastructure for CLMV Countries among 138 World Nations in 2014



Source: The World Economic Forum: Global Enabling Trade Report (2014)

The qualities of the overall infrastructure of CLMV ranking among 138 countries in the world in 2014 are highlighted in figure 3.1. Vietnam had the best overall infrastructure quality among CLMV countries with ranking 60 among the 138 countries across the globe. Cambodia had the second best quality of infrastructure among CLMV countries, ranking 101st, and then Laos, with the third best quality country, was ranked

115th. Among the infrastructure quality of 138 countries in the world, Myanmar was ranked 136th, the lowest quality country.

In short, there are glaring infrastructural development gaps in Myanmar and Myanmar needs to make more investments in the improvement of its infrastructures. The improvement in the infrastructure helps to increase the level of national growth rate (Madden and Savage, 1998). Therefore, the future of Myanmar's infrastructural development and economic growth remains bleak.

3.2 Road and Bridge Infrastructure Development in Myanmar

To encourage sustainable and inclusive economic growth, infrastructure is regarded as being crucial. So a great deal of policy emphasis has been placed on infrastructure development for enhancing the economic growth, productivity, and quality of life of the people of the developing country. Among many types of infrastructure development, especially, road and bridge infrastructure development can also boost political integration and reduce societal geographical gaps. When road and bridge infrastructure is expanded, overall pollutant loads can be reduced as average congestion decreases. Routes are shortened and vehicle speeds increase. In addition to encouraging car use, road improvements can help reduce emissions. Therefore, the basic road and bridge infrastructure development is considered important as it serves as an indicator of the progress and developmental process of a particular country.

The data for road transport facilities in Myanmar from 2011-12 to 2020-21 is described in table 3.2. The data in table 3.2 is based on the fiscal year from Myanmar statistical yearbooks, Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC). Due to the government's emphasis on road construction in recent years, the length of roads increases accordingly. The ten years interval figures in table 3.2 exposes the increasing trend in road miles, from that of 24,285 miles in 2011-12 to 84,115 miles in 2020-21. The length of bituminous roads is 10,678 miles in 2011-12, and it increases to 18,910 miles in 2020-21. Concrete roads and asphalt concrete roads have also increased. In general, length of other types of road also increases every year, however, from the years 2012-13 onward to 2016-17, metalled roads and mule tracks are less significant in terms of road miles, as are surface roads and earth roads from years 2013-14 to 2016-17.

Table (3.2) Road Transport Facilities in Myanmar (in Miles)

Road Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Length of Roads	24,285	24,670	24,935	25,212	25,881	26,599	81,614	82,237	83,298	84,115
1.Bituminous	10,678	11,362	12,692	14,285	15,491	16,118	18,336	18,538	18,725	18,910
2.Metalled	3,567	3,266	2,874	2,681	2,325	2,298	9,600	9,671	9,697	9,790
3.Surface	3,506	3,600	3,447	3,085	3,296	3,040	7,542	8,711	10,156	10,255
4.Earth	5,263	5,323	4,893	4,244	3,409	3,581	35,647	33,956	32,446	32,770
5.Mule	860	687	448	161	161	161	7,220	6,505	6,237	6,295
6.Concrete	411	432	581	756	986	1,020	2,148	3,033	3,856	3,895
7.AC	-	-	-	-	213	381	1,121	1,823	2,181	2,200

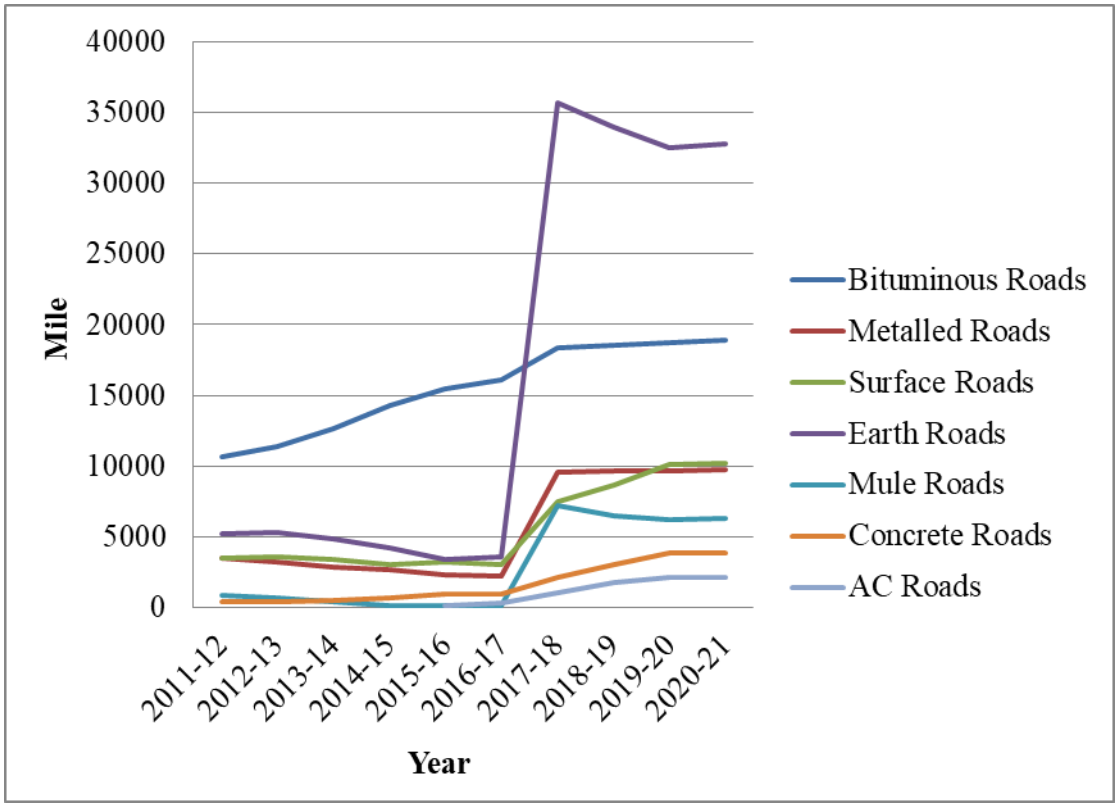
Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Note: '-' not available at the time of publication

In general, from 2011-12 to 2016-17 and from 2017-18 to 2020-21, the total road lengths for all types of road infrastructure gradually increased, but significantly rose from 2016-17 to 2017-18.

Figure 3.2 shows the changes in road infrastructure by type of roads from 2011-12 to 2020-21. Table 3.2 is the source of the information used in figure 3.2. There are seven types of roads in Myanmar, such as bituminous roads, metalled roads, surface roads, earth roads, mule roads, concrete roads, and asphalt concrete roads. The bituminous roads, the concrete roads, and the asphalt concrete roads are significantly higher from 2011-12 to 2020-21, but other types of roads, such as metalled roads, surface roads, earth roads, and mule roads, tend to fluctuate in number during the same period of 2011-12 to 2020-21.

Figure (3.2) Changes in Road Infrastructure by Types of Road in Myanmar



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

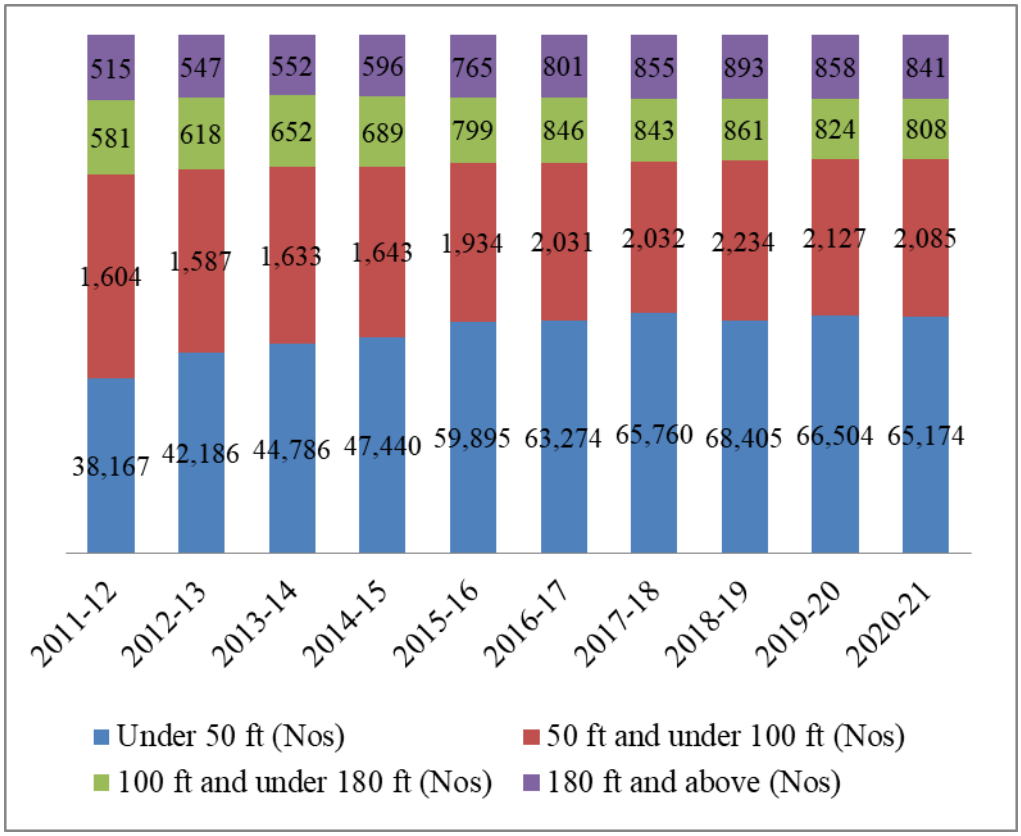
Table (3.3) Bridge Transport Facilities in Myanmar (in Numbers)

Bridge Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Number of Bridges	40,867	44,938	47,623	50,368	63,393	66,952	69,490	72,393	70,313	68,908
1. Under 50 ft	38,167	42,186	44,786	47,440	59,895	63,274	65,760	68,405	66,504	65,174
2. 50 ft and under 100 ft	1,604	1,587	1,633	1,643	1,934	2,031	2,032	2,234	2,127	2,085
3. 100 ft and under 180 ft	581	618	652	689	799	846	843	861	824	808
4. 180 ft and above	515	547	552	596	765	801	855	893	858	841

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Table 3.3 provides information about how many bridges were built in Myanmar between 2011-12 and 2020-21. The data in table 3.3 is based on the fiscal year from Myanmar statistical yearbooks, Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC). In 2020-21, the number of developed bridges in Myanmar amounted to approximately 28.04 thousand bridges, which slightly increased compared to the previous fiscal year, 2011-12. There were 27,715 small and 326 large developed bridges in 2020-21. It means that the total number of bridges, which reached 68,908 in 2020-21, as compared to 2011-12 at 40,867, and more than approximately one and half times its quantity in 2011-12.

Figure (3.3) Changes in Bridge Infrastructure by Length of Bridges in Myanmar



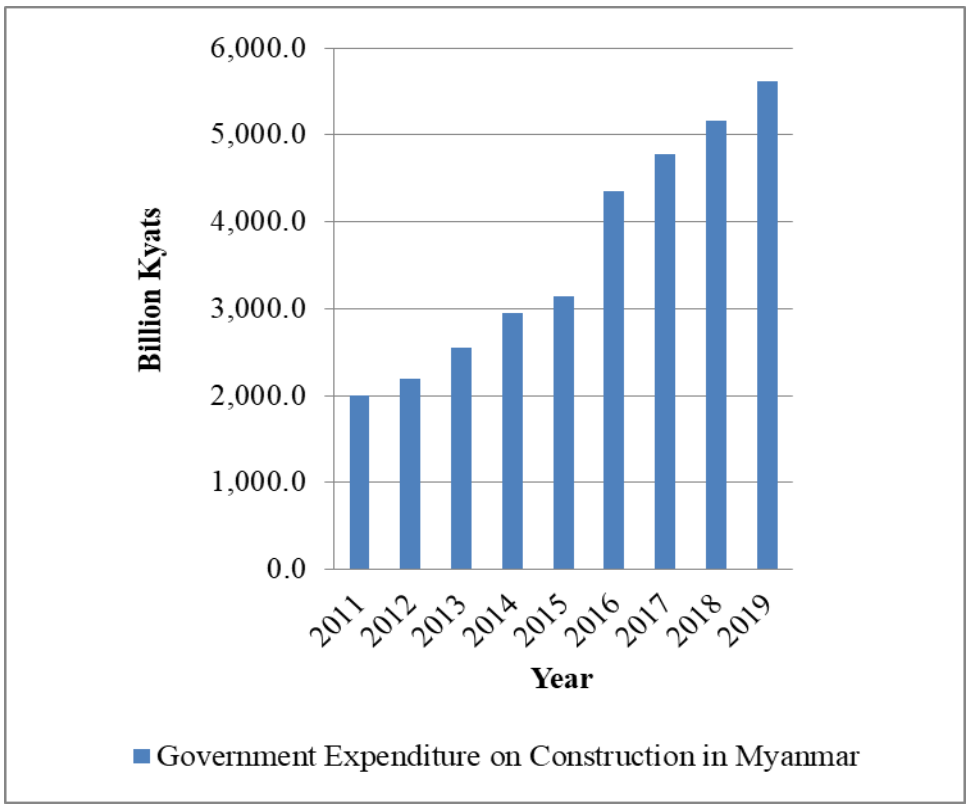
Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

The development of bridge infrastructure in Myanmar from 2011-12 to 2020-21 is described in figure 3.3. Based on data from table 3.3, figure 3.3 is created. The number of bridge infrastructure in Myanmar gradually increased from 2011-12 to 2018-19 but slightly decreased in 2019-20 and 2020-21. The total number of all types of bridges built

reached its highest level in 2018-19. It means that in 2018-19, there is a maximum of 893 bridges that are 180 feet or higher, 68,405 bridges that are under 50 feet, 2,234 bridges that are 50 feet or under 100 feet, and 861 bridges that are 100 feet or under 180 feet.

Myanmar's road and bridge networks have expanded slightly over the last decade. However, the transport sector of Myanmar is presently significantly underdeveloped for a nation of its size, population, and potential. The government has also structured the relevant agencies in the transport infrastructure sectors to ensure a clear separation of responsibility between regulatory authorities and service providers and operators. The long-term sustainable development of Myanmar depends on greater infrastructure investment. Now, the government is keen to expand its efforts into the crucial areas for infrastructure investment, such as improving its infrastructures of roads and bridges.

Figure (3.4) Government Expenditure on Construction in Myanmar



Source: ASEAN Key Figures (2021)

Figure 3.4 highlights the government expenditure on construction in Myanmar, based on the ASEAN Key Figures (2021). The government expenditure on construction is slightly increased from 2011 to 2015 and from 2016 to 2019. However, the

expenditure is significantly increased from 2015 to 2016. It means that the government expenditure on construction in Myanmar had been on a positive trend through the period of 2011 to 2019.

For any community, a well-developed transport infrastructure network is necessary to catch the essential economic activities and services. It is also essential for enabling effective business operations and any potential connections between incoming foreign investments and the local economy. Therefore, increased investment in road and bridge infrastructure is critical to Myanmar's long-term sustainable development and the development of road and bridge infrastructure is one of the crucial areas requiring special attention from the authorities of a developing country such as Myanmar.

3.3 Economic Growth Status in Myanmar

Myanmar can operate as a lifeline between South and Southeast Asia and China due to its strategic location between some of the world's fastest-growing economies, and its geographical position can also improve overall trade. In the Southeast Asia region, Myanmar had a population of over 54.8 million and urban population in Myanmar was 17,235,395 in 2021, according to the World Bank collection of development indicators (2022).

Table (3.4) Population Status of Myanmar

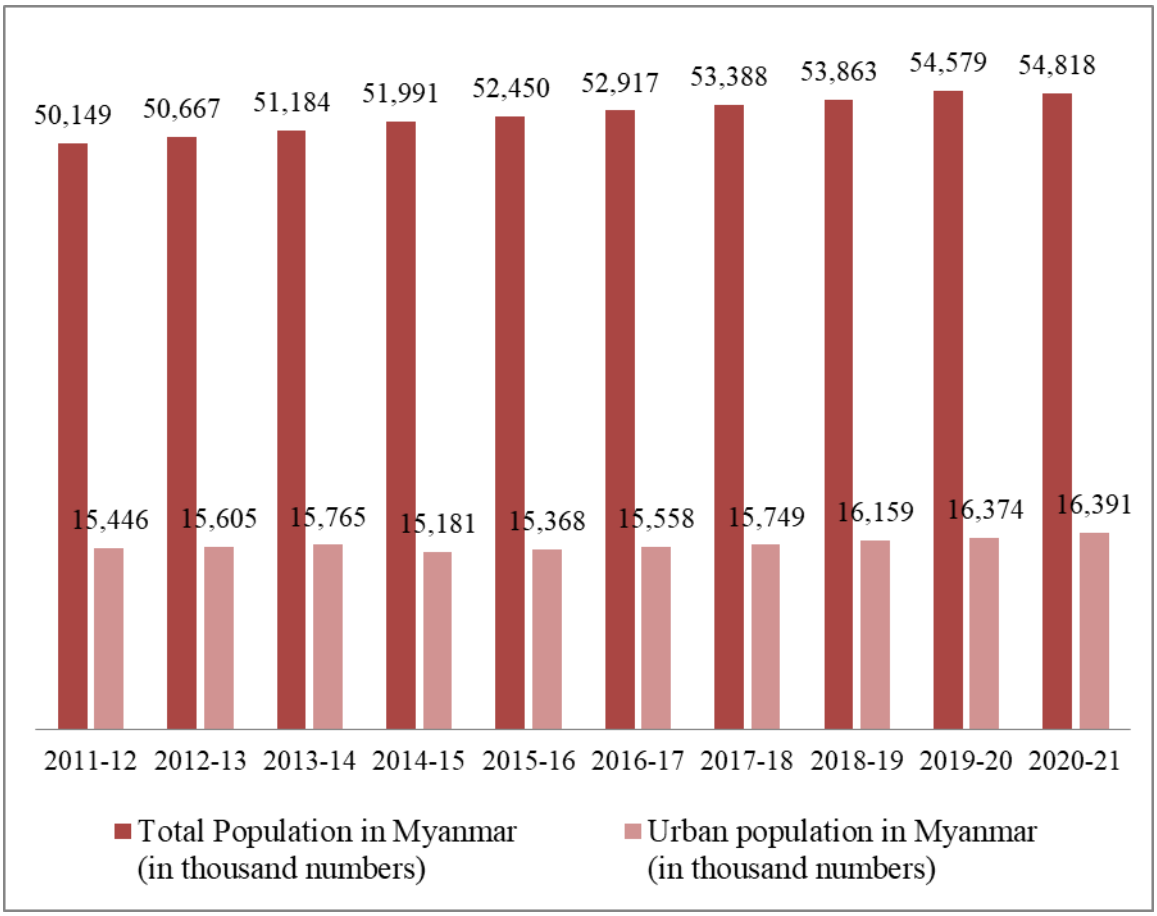
Fiscal Year	Total Population in Myanmar (in thousand numbers)	Urban population in Myanmar (in thousand numbers)	Urban population in Myanmar (% of total population)
2011-12	50,149	15,446	30.8
2012-13	50,667	15,605	30.8
2013-14	51,184	15,765	30.8
2014-15	51,991	15,181	29.2
2015-16	52,450	15,368	29.3
2016-17	52,917	15,558	29.4
2017-18	53,388	15,749	29.5
2018-19	53,863	16,159	30.0

2019-20	54,579	16,374	30.0
2020-21	54,818	16,391	29.9

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

The status of the total population and urban population in Myanmar from 2011-12 to 2020-21 are shown in table 3.4. The data in table 3.4 is based on the fiscal year from Myanmar statistical yearbooks. It states that the total population in Myanmar increases from 50,149 thousand in 2011-12 to 54,818 thousand in 2020-21. With the exception from 2014-15 to 2017-18, the number of people living in urban areas rises from 15,446 thousand in 2011-12 to 16,391 thousand in 2020-21. However, the proportion of the people living in urban areas in Myanmar is progressively declining, from 30.8% in 2011-12 to 29.9% in 2020-21. Additionally, Myanmar's urban population in 2014-15 reaches its lowest point ever.

Figure (3.5) Total Population and Urban Population in Myanmar



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

Figure 3.5 describes the condition of the total population and urban population in Myanmar from 2011-12 to 2020-21. The data from figure 3.5 is based on table 3.4. The population in Myanmar is slightly increased from year to year. Myanmar's population had been on a positive trend through the period of 2011-12 to 2020-21. Moreover, it indicates that roughly one-third of Myanmar's population resides in urban areas.

Myanmar is very rich in natural resources, such as jade, gems, oil, natural gas, teak, and other minerals, as well as also endowed with renewable energy, having the highest solar power potential compared to other countries of the Great Mekong Sub-region. However, Myanmar has long suffered from instability, factional violence, corruption, poor infrastructure, as well as a long history of colonial exploitation with little regard for human development (Vakulchuk, Roman; Kyaw Kyaw Hlaing and et.al, 2017). Since 2011, Myanmar has been implementing significant reforms in the areas of taxation, foreign investment laws, currency exchange rate regulation, and anti-corruption. The economy of Myanmar has been directed by several five-year plans, with annual plans for specific sectors. To solve political, economic, and social difficulties, the plans are focused on the guiding principles of the government. Moreover, the Myanmar Sustainable Development Strategy attests to its goals, by implementing its potential as an engine of environmentally and socially responsible economic growth.

Table (3.5) Economic Condition in Myanmar

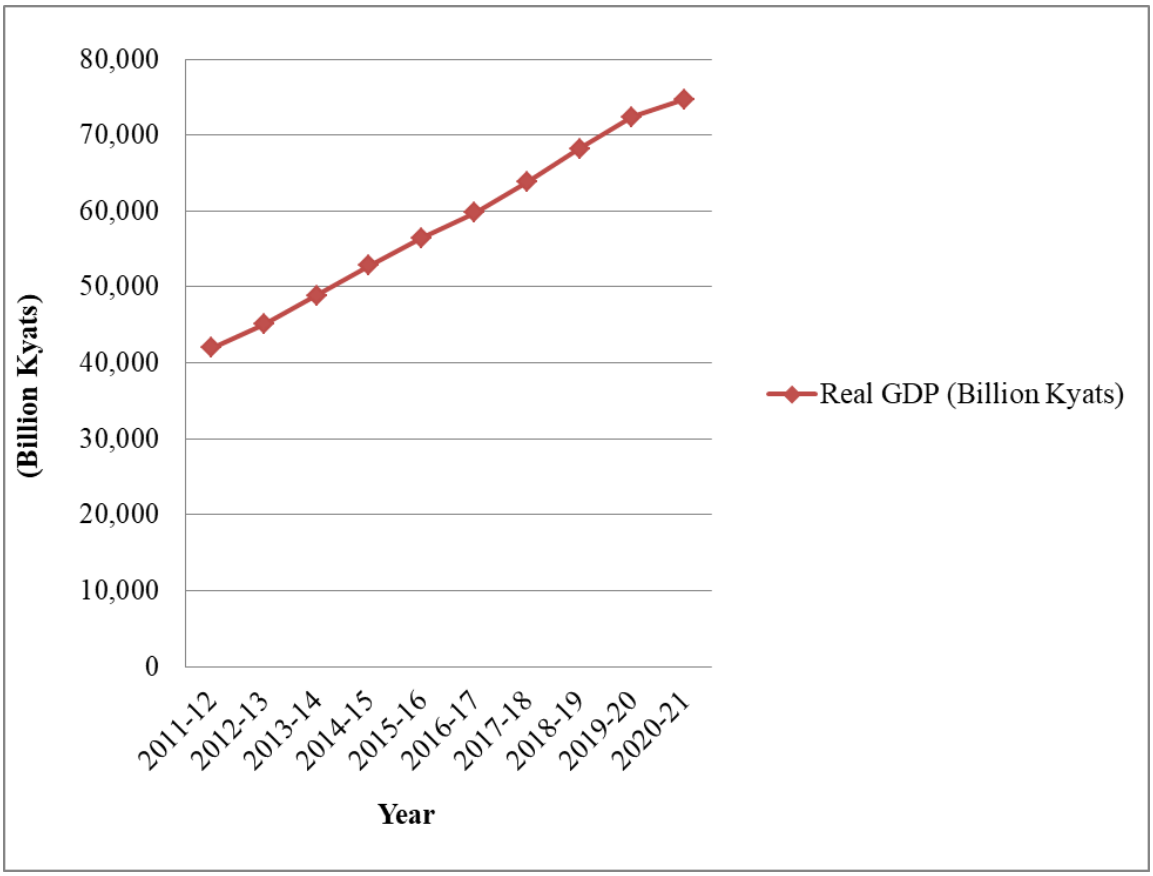
Fiscal Year	Real GDP (Billion Kyats)	Growth Rate of Real GDP (%)	Per Capita GDP (Kyats)
2011-12	42,001	5.6	837,522
2012-13	45,081	7.3	889,744
2013-14	48,879	8.4	954,969
2014-15	52,785	8.0	1,015,273
2015-16	56,476	7.0	1,076,763
2016-17	59,787	5.9	1,129,828
2017-18	63,828	6.8	1,195,548
2018-19	68,168	6.8	1,265,585
2019-20	72,394	6.2	1,326,408
2020-21	74,711	3.2	1,373,440

Note: GDP is calculated based on constant prices at 2010-2011 and 2015-16.

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

The economic condition in Myanmar for the fiscal years from 2011-12 to 2020-21 is described in table 3.5. The real GDP, real GDP growth rate, and per capita GDP are regarded as key indicators of economic performance. The real GDP increased significantly from 42,001 billion kyats in 2011-12 to 74,711 billion kyats (at constant price) in 2020-21. The real GDP is calculated by (2010-11 and 2015-16) constant prices. The per capita GDP increased about one and half times, from 837,522 kyats in 2011-2012 up to 1,373,440 kyats in 2020-2021.

Figure (3.6) Real Gross Domestic Product (GDP) of Myanmar



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

Figure 3.6 highlights that the economic growth situation in Myanmar straightly increased between 2011-12 and 2020-21. Figure 3.6 is based on data from table 3.5. Moreover, the real gross domestic product (GDP) in Myanmar is a minimum amount in 2011-12 and a maximum amount in 2020-21. It means the economy of Myanmar is positively upward.

During the last two decades, ASEAN's economy grew at an average annual growth of 5.0% as can be seen in table 3.6. ASEAN Key Figures (2021) states that (Real GDP Growth) Growth of real GDP is a year-to-year comparison of the value of all goods and services produced in an economy expressed in base-year prices.

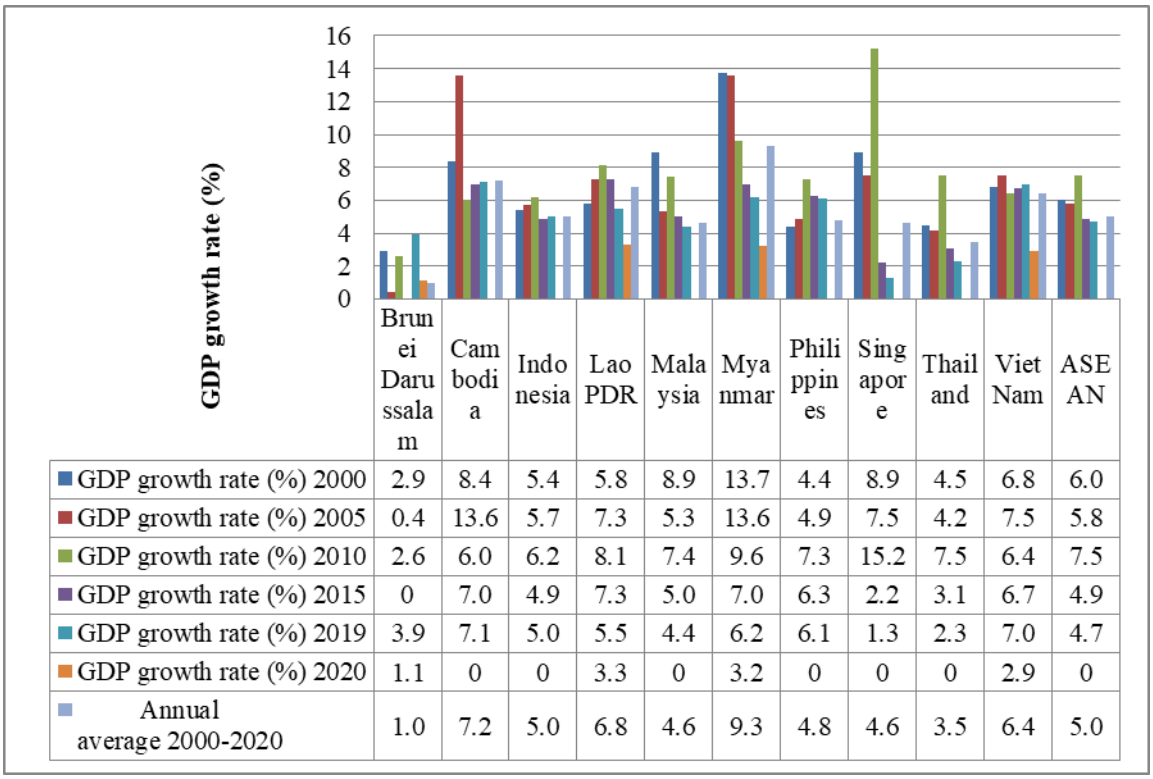
Table (3.6) Real GDP Growth Rate of ASEAN Countries (%)

ASEAN Member States	GDP Growth Rate (%)						Annual Average
	2000	2005	2010	2015	2019	2020	2000-2020
Brunei	2.9	0.4	2.6	-0.4	3.9	1.1	1.0
Cambodia	8.4	13.6	6.0	7.0	7.1	-3.1	7.2
Indonesia	5.4	5.7	6.2	4.9	5.0	-2.1	5.0
Lao PDR	5.8	7.3	8.1	7.3	5.5	3.3	6.8
Malaysia	8.9	5.3	7.4	5.0	4.4	-5.6	4.6
Myanmar	13.7	13.6	9.6	7.0	6.2	3.2	9.3
Philippines	4.4	4.9	7.3	6.3	6.1	-9.6	4.8
Singapore	8.9	7.5	15.2	2.2	1.3	-5.4	4.6
Thailand	4.5	4.2	7.5	3.1	2.3	-6.1	3.5
Vietnam	6.8	7.5	6.4	6.7	7.0	2.9	6.4
ASEAN	6.0	5.8	7.5	4.9	4.7	-3.3	5.0

Source: ASEAN Secretariat, ASEANstats database and ASEAN Key Figures (2021)

Among ASEAN Member States (AMS), Myanmar, Cambodia, Lao PDR, and Vietnam recorded the highest real GDP growth, with average annual growth of 9.3%, 7.2%, 6.8%, and 6.4%, respectively, between the years 2000 and 2020.

Figure (3.7) Real GDP Growth Rate in ASEAN Countries from 2000 to 2020



	Brunei Darussalam	Cambodia	Indonesia	Lao PDR	Malaysia	Myanmar	Philippines	Singapore	Thailand	Viet Nam	ASEAN
GDP growth rate (%) 2000	2.9	8.4	5.4	5.8	8.9	13.7	4.4	8.9	4.5	6.8	6.0
GDP growth rate (%) 2005	0.4	13.6	5.7	7.3	5.3	13.6	4.9	7.5	4.2	7.5	5.8
GDP growth rate (%) 2010	2.6	6.0	6.2	8.1	7.4	9.6	7.3	15.2	7.5	6.4	7.5
GDP growth rate (%) 2015	0	7.0	4.9	7.3	5.0	7.0	6.3	2.2	3.1	6.7	4.9
GDP growth rate (%) 2019	3.9	7.1	5.0	5.5	4.4	6.2	6.1	1.3	2.3	7.0	4.7
GDP growth rate (%) 2020	1.1	0	0	3.3	0	3.2	0	0	0	2.9	0
Annual average 2000-2020	1.0	7.2	5.0	6.8	4.6	9.3	4.8	4.6	3.5	6.4	5.0

Source: ASEAN Key Figures (2021)

Figure 3.7 describes the economic growth rate of ASEAN countries from 2000 to 2020. The data from figure 3.7 is based on table 3.6. In the annual average, Myanmar is the highest economic growth rate with 9.3% and Cambodia is the second highest with 7.2% in an annual average GDP growth rate from 2000 to 2020.

Table (3.7) Shares of Main Economic Sectors to Myanmar's Real GDP (%)

Sectoral Share in Real GDP	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Agriculture	32.5	30.6	29.5	27.8	26.8	25.5	23	21.3	22.3	22
Industry	31.3	32.4	32.4	34.5	34.5	35	36.7	38	36	36.3
Services	36.2	37	38.1	37.7	38.7	39.5	40.3	40.7	41.7	41.8

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021)

The decomposition of real GDP by its three main sectors, namely agriculture, industry, and services, indicates the economic structure of the country and the contribution of each sector to the economy. The shares of main economic sectors to Myanmar's real GDP can be seen in table 3.7.

During the period 2011-12 to 2020-21, economic structures differ across Myanmar, and services are the leading sector in Myanmar's economy, shown in table 3.7, with the share of the services sector to the total GDP increasing from 36.2% in 2011-12 to 41.8% in 2020-21. On the contrary, the share of the agriculture sector was found to be the smallest in Myanmar, reaching 22% of the country's total GDP over the same period. Manufacturing contributed 36.3% of the total GDP in 2020-21, an increase of 5% from 2011-12. It means that, although the service sector becomes an important role in the economy, the industrial sector is considerably advancing in line with the market-oriented system.

CHAPTER IV

ROAD AND BRIDGE INFRASTRUCTURE DEVELOPMENT AND ECONOMIC GROWTH IN NAY PYI TAW UNION TERRITORY

4.1 Socio-economic Information of Nay Pyi Taw Union Territory

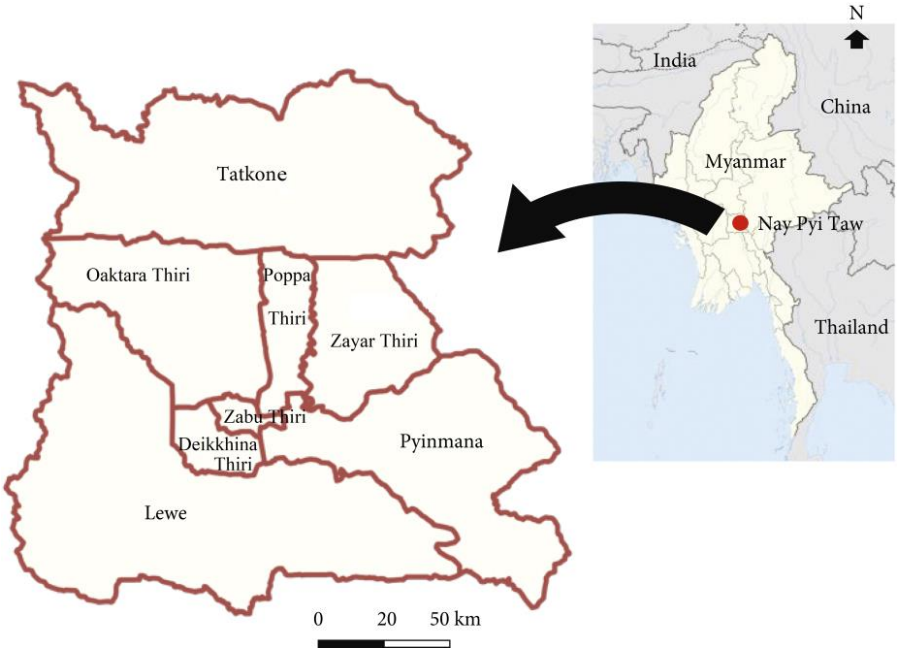
Nay Pyi Taw Union Territory, a new capital city of Myanmar, the most modern city of Myanmar, is also fascinatingly known to be one of the 10 fastest-growing cities in the world (Myanmar National Portal). Nay Pyi Taw (pronounced 'Naypiddaw', meaning 'Abode of Kings', and sometimes abbreviated to NPT) officially replaced Yangon as the administrative capital of Myanmar on 6 November 2005; its official name was revealed to the public on Armed Forces Day, 27 March 2006 (Dulyapak Preecharushh, 2020). According to the reasons of military, security, and administration to protect the country in the future, such a place was strategically located in central Myanmar and, had chosen to establish the new capital city of Myanmar, Nay Pyi Taw Union Territory. Construction of the capital city started in 2002 and was completed by 2012 (Marshall Cavendish Corporation, 2007). Its population size was approximately 1.35 million as of 2021 (Department of Population).

Covering an area of 7,054 km2 (2,724 square miles), Nay Pyi Taw Union Territory is located on the southern edge of the dry zone and in the upper Sittang valley. It is surrounded by the Shan plateau to the east and the Bago Yoma range to the west, giving it unique geographic features. Alison Millington (2017) states Nay Pyi Taw Union Territory is around four and a half times the size of London at 7,054 square kilometers (1,569 square kilometers). Centrally located in Myanmar, Nay Pyi Taw Union Territory has been founded on a green-field site near Pyinmana, about 320 kilometers (200 miles) north of the old capital, Yangon. The topography includes mountainous regions with a wealth of mineral deposits, sloping highlands, and river basins. Therefore, this ideal

geographic setting, which combines river plains with mountains covered in lush woods, provides every benefit of beauty and tranquility.

Additionally, by combining administrative buildings, constructing new roads, roundabouts, and shopping complexes, as well as creating several artificial lakes, the government has artificially changed Nay Pyi Taw Union Territory's scenery into a stunning and wonderful capital. It is constituted of 8 townships namely Zabu Thiri Township, Zayar Thiri Township, Oaktara Thiri Township, Poppa Thiri Township, Deikkhina Thiri Township, Pyinmana Township, Lewe Township, and Tatkone Township, 58 quarters, 187 village tracts, and 796 villages in 4 districts (Fig. 4.1).

Figure (4.1) Nay Pyi Taw Union Territory



Source: Hmoon, M. M., Htun, L. L., et.al. (2021)

It is governed by two separate entities at the state/regional level and as a municipality at the local level. Along with Mandalay and Yangon, Nay Pyi Taw Union Territory is one of only three cities in Myanmar with municipal governance (The Asia Foundation, 2021). Under the direct supervision of the President of Myanmar, Nay Pyi Taw Council (NPTC) is the regional administrative body and Nay Pyi Taw Development Committee (NPTDC) is the local government body of the territory.

Nay Pyi Taw Union Territory's main objective of Smart City Action Plan is to promote itself as a city that provides core infrastructure and high quality of life to its citizens. In addition, it aims to provide a clean and sustainable environment and apply

smart solutions in providing key infrastructures. It is organized into a number of distinct functional zones such as residential zones, ministry zone, military zone, diplomatic zone, hotel zones. As part of the construction of its new capital, Myanmar has been striving to strengthen its transportation connections with Nay Pyi Taw Union Territory in the meantime.

It is a fully constructed large city but with very few inhabitants compared to its size. The uncommon combination of Nay Pyi Taw Union Territory's large size and very low population density makes the city stand out. Moreover, compared to the rest of poverty-stricken Myanmar, Nay Pyi Taw Union Territory seems to have fallen from the sky because it has been built at such a rapid pace and it is full of tall modern buildings, large hotels, and extensive shopping malls including government offices, housings for civil service personnel.

According to the census data of 2014, 68 persons reside in rural regions and 32 persons live in places that General Administration Department (GAD) has designated as urban for the Nay Pyi Taw Union Territory. At the Union level, 28.8% of the total population lives in urban areas while 71.2% lives in rural areas (Inter-censal Survey, 2020). When compared to other States/Regions, Nay Pyi Taw Union Territory's population is the fourth most likely to live in an urban setting, following Yangon 70%, Kachin 36%, and Mandalay 35% (Census Report Volume 3-O (Nay Pyi Taw), 2015). Nearly 2% of Myanmar's adult population, which is roughly 830 thousand adults, lives in Nay Pyi Taw Union Territory. Mandalay 13 % and Yangon 17 % have the highest concentration of adult residents (Nay Pyi Taw Union Territory Dashboard on financial inclusion, 2019). In Nay Pyi Taw, the percentages of Buddhists are 96.8%, Christians are 1.1%, Muslims are 2.1%, and Hindus, Animists, Other Religions, and Atheists are all less than 0.1% respectively (Department of Population, 2017). Its literacy rate for those aged 15 and over is 94.4%, which is higher than the Union's 89.1% rate (The 2019 Inter-censal Survey, 2020). The literacy percentage for female is 91.4%, but it is 98.0% for males (Department of Population, 2017). Yangon, Mandalay, and Nay Pyi Taw Union Territory have literacy and numeracy rates of over 92%, making up the highest rates in Myanmar (Inter-censal Survey, 2020).

Nay Pyi Taw Union Territory offers potential for the development of hydroelectric energy and possesses mineral deposits, which naturally provide the city the capacity for self-sufficiency (Dulyapak, 2009). It is deeply linked to hinterland nation-

building initiatives, especially the growth of agricultural plantations, hydropower networks, transportation infrastructure, and border development. It has a lot of irrigated areas that have not been developed, and self-sufficient community projects can open up. Therefore, Nay Pyi Taw Union Territory will eventually develop into an agricultural and self-sufficient strategic city. Moreover, Nay Pyi Taw Union Territory has a high quality of life and functions efficiently in terms of urban efficiency, unlike most of the congested and crowded capitals of Southeast Asia.

4.2 Descriptive Analysis of Road and Bridge Infrastructure Development and Economic Growth in Nay Pyi Taw Union Territory

In this section, the data, variables and descriptive analysis method used in this study are described.

4.2.1 Data Profile

All of the data and variables were secondary data gathered from a variety of sources, including the Ministry of Construction (MOC), Department of Rural Road Development (DRRD), General Administration Department (GAD), Planning Department, Nay Pyi Taw Development Committee (NPTDC), Myanmar Statistical Yearbooks (2010-2021) and ASEAN Statistical Yearbooks. The study uses time series data from 2011 to 2020, in particular, annual observations on gross domestic products at 2010-11 and 2015-16 constant prices.

The study utilizes ten years of annual data (from 2011-12 to 2020-21) for the variables, such as (i) the real gross domestic product (GDP), (ii) the per capita GDP, (iii) the growth rate of the real GDP, (iv) the government expenditure on road and bridge infrastructure development, (v) the total road length, and (vi) the total number of bridges in Nay Pyi Taw Union Territory. The real gross domestic product (GDP), the per capita GDP, and the growth rate of the real GDP are used to describe the economic growth of Nay Pyi Taw Union Territory. The government expenditure on road and bridge infrastructure development, the total road length, and the total number of bridges are used to describe the development of road and bridge infrastructure in Nay Pyi Taw Union Territory. The period of data collection is determined by the availability of the data.

4.2.2 Description of Variables

The following is an explanation of the variables used in this study to measure how road and bridge infrastructure development contributes to economic growth. The description of variables and data sources is given in table 4.1.

Table (4.1) Description of Variables and Data Sources

Variable	Definition	Data Sources
Road and Bridge Infrastructure Development		
Government Expenditure on Road and Bridge Infrastructure Department	Government expenditure on road and bridge infrastructure department is defined as the annual budget used for road and bridge infrastructure implementation across ministries.	MOC, DRRD, NPTDC, Myanmar Statistical Yearbooks (2010~2021)
Total Road Length	Total road length is the total mile length of the various types of road networks paved in a given year.	MOC, DRRD, NPTDC, Myanmar Statistical Yearbooks (2010~2021)
Total Number of Bridges	The total number of bridges is the sum of the number of all bridge types in the country constructed in a given year.	MOC, DRRD, NPTDC, Myanmar Statistical Yearbooks (2010~2021)
Economic Growth		
Real Gross Domestic Product (GDP)	Real GDP is calculated by (2010-11 and 2015-16) constant prices.	Planning Department
Per Capita GDP	Per Capita GDP is computed by the real GDP of an economy divided by its total population.	Planning Department
Growth Rate of Real GDP	The growth rate of real GDP is the percentage rate at which a nation's real GDP changes/grows from one year to another.	Planning Department

Source: Own compilation based on data collected from departments

4.3 Road and Bridge Infrastructure Development in Nay Pyi Taw Union Territory

Nay Pyi Taw Union Territory is a city specially planned, designed, and built to be a capital. In accordance with the characteristics of the capital, many urban infrastructures such as hospitals, schools, road networks, markets, gardens and playgrounds, and water supply are being built, upgraded, and renovated within the Nay Pyi Taw area. The four-lane, 323.2 km (200.8 miles) Yangon-Naypyidaw highway links Nay Pyi Taw with Yangon directly and is part of the 563 km (350 miles) long Yangon-Nay Pyi Taw-Mandalay Expressway. Including a 20-lane boulevard, Nay Pyi Taw has four-lane roads and multilevel, flower-covered roundabouts (traffic circles).

Most of the roads and bridges in the townships of Nay Pyi Taw have been transformed into higher-level conditions by Nay Pyi Taw Capital City. All roads have been upgraded to asphalt concrete (AC) roads from earth roads in accordance with budgets permitted by relevant fiscal years. The roads and bridges of Nay Pyi Taw Union Territory are mainly constructed by the Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC). And then the three government agencies in Nay Pyi Taw continue to upgrade the roads and bridges to all parts of the Nay Pyi Taw Union Territory so that they are accessible in any season. Moreover, recently, the government has been spending more generously on infrastructure, focusing on key priorities like the construction of roads and bridges. The development of all economic sectors can be facilitated by better road and bridge infrastructure, which should be planned in consideration of the current and future requirements of other sectors.

Since 2011-12, the government has boosted its overall investment annually from a six-digit figure to a seven-digit number, generally allocating 20% to 40% of its budget expenditure to infrastructure development. Moreover, the private sector is primarily given a significant role in the development of road and bridge infrastructure and this involvement encourages an increase in infrastructure investment. Therefore, investments in economic infrastructures, such as roads and bridges, have generally increased and the government expenditure on road and bridge infrastructure of Nay Pyi Taw Union Territory can be seen in table 4.2.

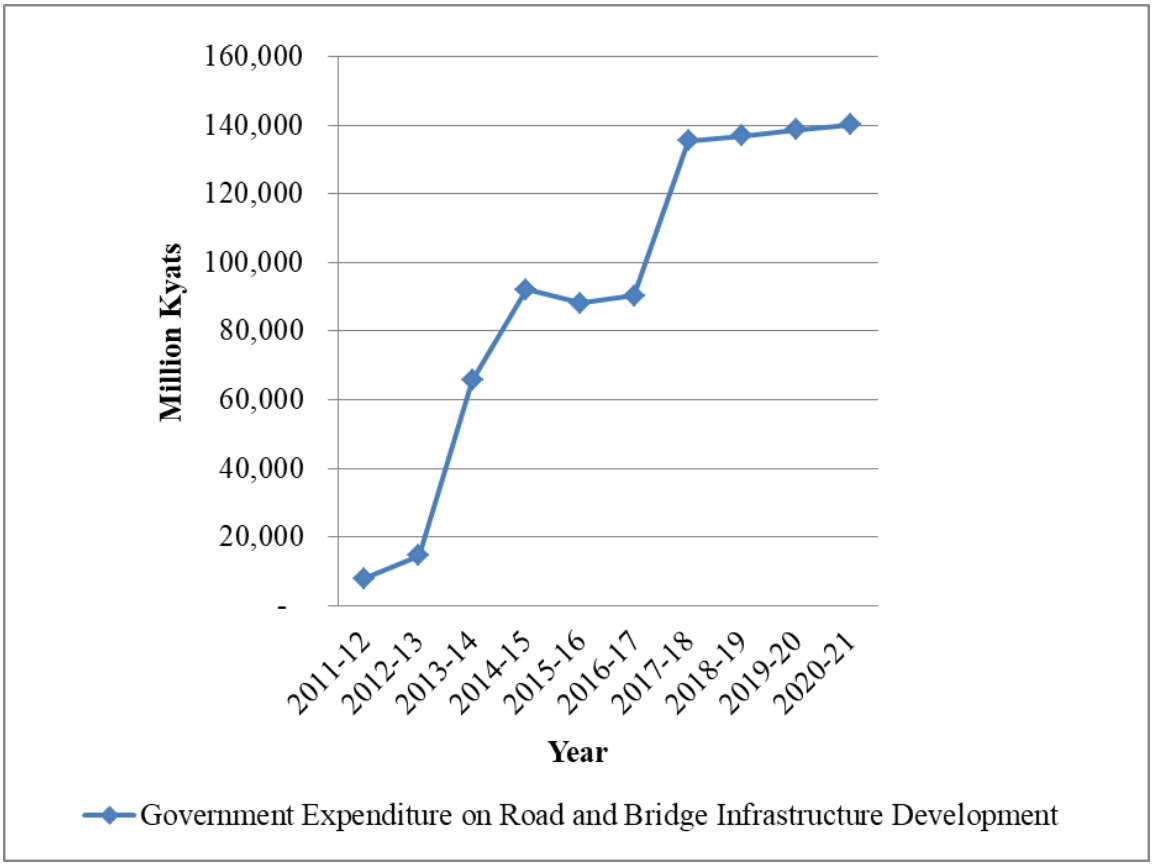
Table (4.2) Government Expenditure on Road and Bridge Infrastructure in Nay Pyi Taw Union Territory

Year	Government Expenditure on Road and Bridge Infrastructure	Growth Rate of Government Expenditure on Road and Bridge Infrastructure
	(Million Kyats)	(%)
2011-12	7,795	
2012-13	14,491	86
2013-14	65,616	353
2014-15	92,134	40
2015-16	88,121	-4
2016-17	90,369	3
2017-18	135,554	50
2018-19	136,909	1
2019-20	138,703	1.3
2020-21	140,090	1

Source: Ministry of Construction (MOC), Department of Rural Road Development (DRRD), Nay Pyi Taw Development Committee (NPTDC) and Plannig Department

The information in table 4.2 is obtained according to the Ministry of Construction (MOC), the Department of Rural Road Development (DRRD), the Nay Pyi Taw Development Committee (NPTDC), and the Planning Department. It shows that the government expenditure on road and bridge infrastructure in Nay Pyi Taw Union Territory achieves the most significant expansion, with an average annual growth of 54.13% in the period of 2011-12 to 2020-21, from 7,795 million kyats to 140,090 million kyats.

Figure (4.2) Government Expenditure Conditions for Road and Bridge Infrastructure Development in Nay Pyi Taw Union Territory



Source: Ministry of Construction (MOC), Department of Rural Road Development (DRRD), Nay Pyi Taw Development Committee (NPTDC) and Plannig Department

The conditions for government spending on the construction of road and bridge infrastructure in Nay Pyi Taw Union Territory can be seen in figure 4.2. The data in figure 4.2 is based on table 4.2. It illustrates that the government expenditure on road and bridge infrastructure development increases the highest in Nay Pyi Taw Union Territory, during the period from 2011-12 to 2020-21. From 2011-12 through 2012-13 and from 2017-18 through 2020-21, government spending slightly increased. However, the government spending on road and bridge infrastructure is gradually reducing, from 2014-15 to 2016-17.

Overall, the trend of government expenditure on road and bridge infrastructure development is dramatically upward during the study period, except for 2015-16 and 2016-17. It is because one of the main facts is to consistently invest in various types of

infrastructure, especially in road and bridge infrastructures in Nay Pyi Taw Union Territory, according to its Smart City Plan. In addition, realizing the importance of the basic infrastructure sector, the government is implementing new basic infrastructure policies along with the democratic political transition. This is so that whenever there are extra funds per fiscal year, these funds are mostly reallocated to the basic infrastructure sector in Nay Pyi Taw Union Territory.

A greater variety of roads of all types and sizes are constructed and maintained throughout Nay Pyi Taw Union Territory over the study period, including bituminous roads, metalled roads, surface roads, earth roads, mule roads, concrete roads, and asphalt concrete roads. Most of the roads in urban areas are constructed by the Nay Pyi Taw Development Committee (NPTDC), and roads in rural areas are mostly constructed by the Department of Rural Road Development (DRRD). Highways are mainly undertaken by the Ministry of Construction (MOC). The data for road transport facilities from 2011-12 to 2020-21 in Nay Pyi Taw Union Territory is shown in table 4.3.

Table (4.3) Road Transport Facilities in Nay Pyi Taw Union Territory (in Miles)

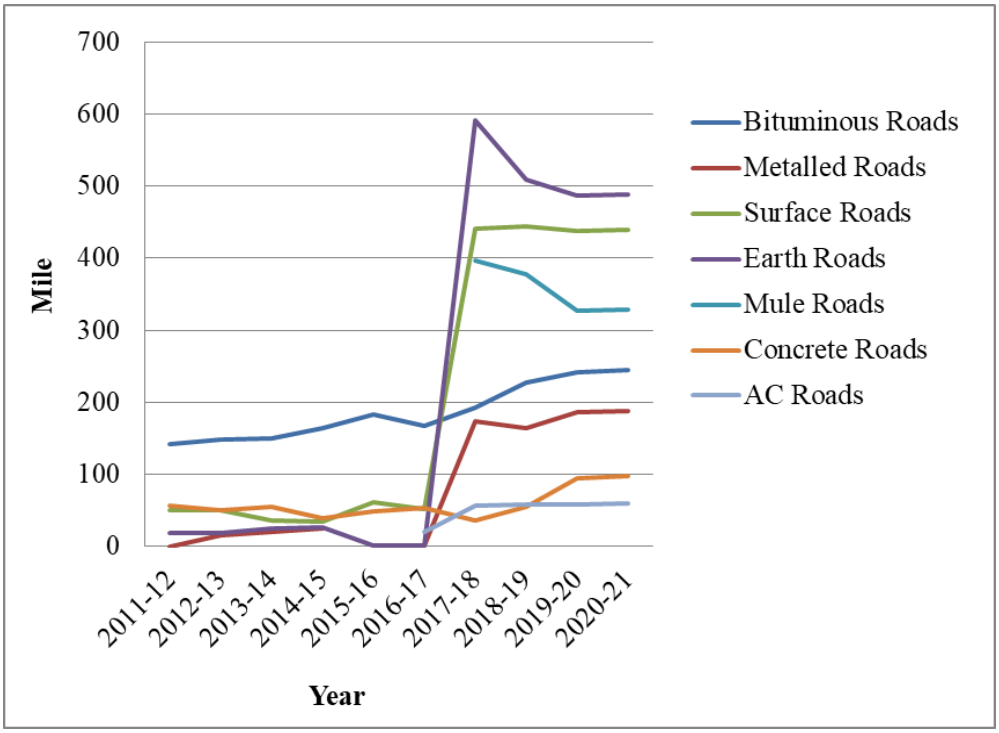
Road Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Length of Roads	280	283	286	290	295	298	1,888	1,836	1,834	1848
1.Bituminous	142	148	150	165	183	168	193	227	242	245
2.Metalled	13	15	20	25	-	2	174	165	187	188
3.Surface	50	51	36	34	62	52	441	444	438	440
4.Earth	18	19	25	26	1	2	591	509	487	488
5.Mule	-	-	-	-	-	-	396	378	327	329
6.Concrete	57	50	55	40	49	54	36	55	95	98
7.AC	-	-	-	-	-	20	57	58	58	60

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Note: '-' not available at the time of publication

The data in table 4.3 is based on the Myanmar statistical yearbooks, the Ministry of Construction, the Department of Rural Road Development, and the Nay Pyi Taw Development Committee. The length of all types of roads increases in accordance with the capital city of Myanmar. In 2011-12, there are 142 miles of bituminous roads; in 2020-21, there are 245 miles, or more than 1.7 times as much as there are in 2011-12. The metalled roads are 13 miles long in 2011-12 and 188 miles long in 2020-21, and their quantity increases by more than approximately 14 times in 2020-21. Surface road length increases by approximately nine times in 2020-21, from 50 miles in 2011-12 to 440 miles in 2020-21. The length of the earth roads expanded from 18 miles in 2011-12 to 488 miles in 2020-21, and their number increased by more than 27 times. The mule roads are 396 miles long in 2017-18 and 329 miles long in 2020-21. The length of the concrete roads increased by more than one and a half times in 2020-21, from 57 miles in length in 2011-12 to 98 miles in 2020-21. The length of the asphalt concrete roads increased from 20 miles in 2016-17 to 60 miles in 2020-21, a factor of three times. In general, the length of bituminous roads and asphalt concrete roads increases yearly, and other types of roads likewise fluctuate during the study period.

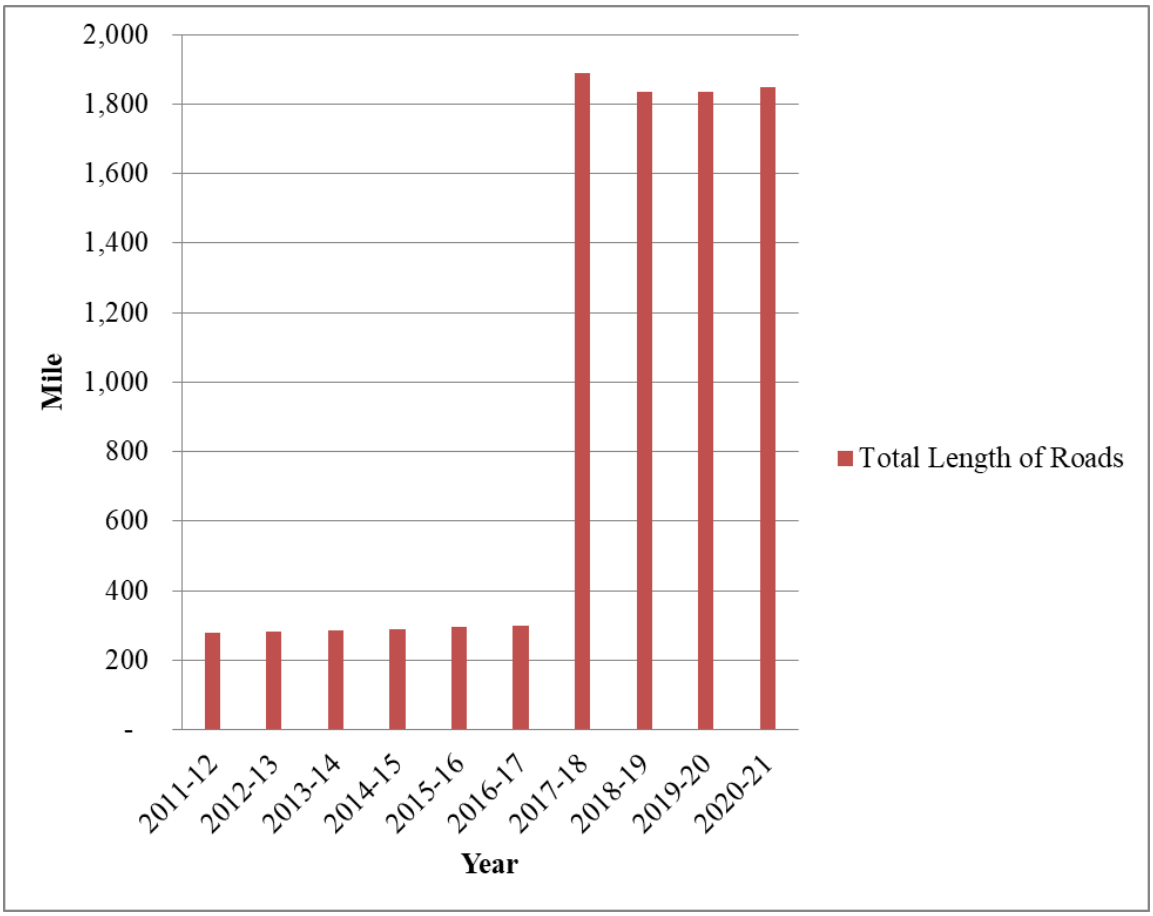
Figure (4.3) Changes in Road Infrastructure by Types of Road in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), MOC, DRRD and NPTDC

Figure 4.3 indicates the changes in road infrastructure by type of road in Nay Pyi Taw Union Territory from 2011-12 to 2020-21. There are seven types of roads in Nay Pyi Taw Union Territory, such as bituminous roads, metalled roads, surface roads, earth roads, mule roads, concrete roads, and asphalt concrete roads. The bituminous roads are significantly higher from 2011-12 to 2020-21, except for 2016-2017. The asphalt concrete roads also gradually increase from 2016-17 to 2020-21, but other types of roads, such as metalled roads, surface roads, earth roads, mule roads and concrete roads, tend to fluctuate in number during the same period of 2011-12 to 2020-21.

Figure (4.4) Total Length of Roads in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

The conditions for the total length of roads in Nay Pyi Taw Union Territory can be seen in figure 4.4. The information in figure 4.4 is based on table 4.3. It illustrates that the total length of roads in miles increases to its maximum in Nay Pyi Taw Union Territory, during the period from 2011-12 to 2020-21. From 2011-12 through 2016-17,

the total length of roads slightly increased. Moreover, the total length of roads significantly increases from 2016-17 to 2017-18. However, the total road length is gradually reducing, from 2017-18 to 2019-20, and gradually rising in 2020-21.

Ultimately, the trend of the total length of roads in Nay Pyi Taw Union Territory is significantly higher from 2016-17 to 2017-18, and the total road length gradually increases in other fiscal years. This is because one of the key factors is that since Nay Pyi Taw is the main administrative capital of Myanmar, it is to prioritize the implementation of basic infrastructure to match the features of the city. Additionally, in accordance with the provisions of the new democratic government, relevant government ministries are regularly improving and upgrading road infrastructure during the study period from 2011-12 to 2020-2021.

Throughout the study period, an increasing number of bridges are constructed and maintained in Nay Pyi Taw Union Territory. This study divides bridges into four categories based on their lengths, such as bridges that are less than 50 feet long, between 50 and 100 feet long, between 100 and 180 feet long, and greater than and equal to 180 feet long. In Nay Pyi Taw Union Territory, under and equal 50 ft long bridges and under 100 ft long bridges are mostly constructed by the Department of Rural Road Development (DRRD) and Nay Pyi Taw Development Committee (NPTDC). Others longer bridges are mainly undertaken by the Ministry of Construction (MOC).

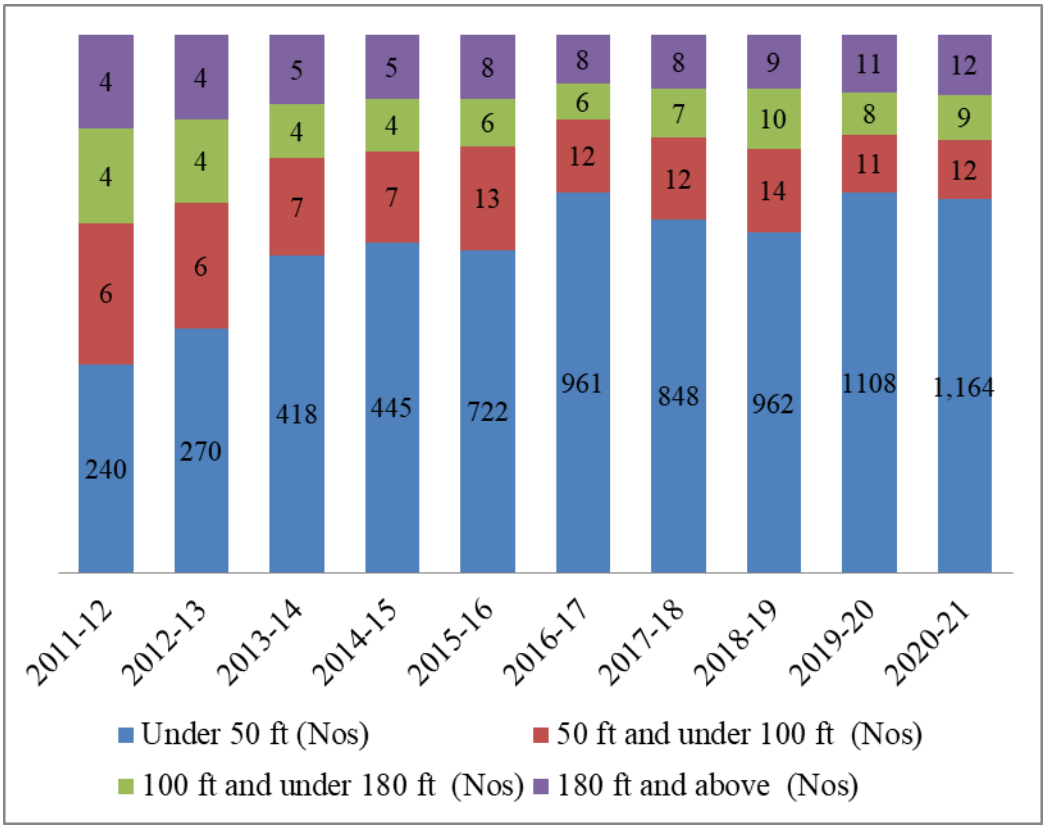
Table 4.4 provides information about how many bridges are built in Nay Pyi Taw Union Territory between 2011-12 and 2020-21. The data in table 4.4 is based on the Myanmar statistical yearbooks, the Ministry of Construction (MOC), the Department of Rural Road Development (DRRD), and the Nay Pyi Taw Development Committee (NPTDC). According to the table 4.4, in 2020-21, there is 12 bridges that are 180 feet or higher, 1,164 bridges that are under 50 feet, 12 bridges that are 50 feet or under 100 feet, and 9 bridges that are 100 feet or under 180 feet. Therefore, in 2020-21, the number of developed bridges in Nay Pyi Taw amounted to approximately 941, which slightly increase compared to the previous fiscal year, 2011-12. There were 935 small and 8 large developed bridges in 2020-21. It means that the total number of bridges reached 1,197 in 2020-21, as compared to 2011-12 at 254, and more than approximately five times its quantity in 2011-12.

Table (4.4) Bridge Transport Facilities in Nay Pyi Taw Union Territory (in Numbers)

Bridge Infrastructure	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Total Number of Bridges	254	284	434	461	749	987	875	995	1,138	1,197
1. Under 50 ft	240	270	418	445	722	961	848	962	1,108	1,164
2. 50 ft and under 100 ft	6	6	7	7	13	12	12	14	11	12
3. 100 ft and under 180 ft	4	4	4	4	6	6	7	10	8	9
4. 180 ft and above	4	4	5	5	8	8	8	9	11	12

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

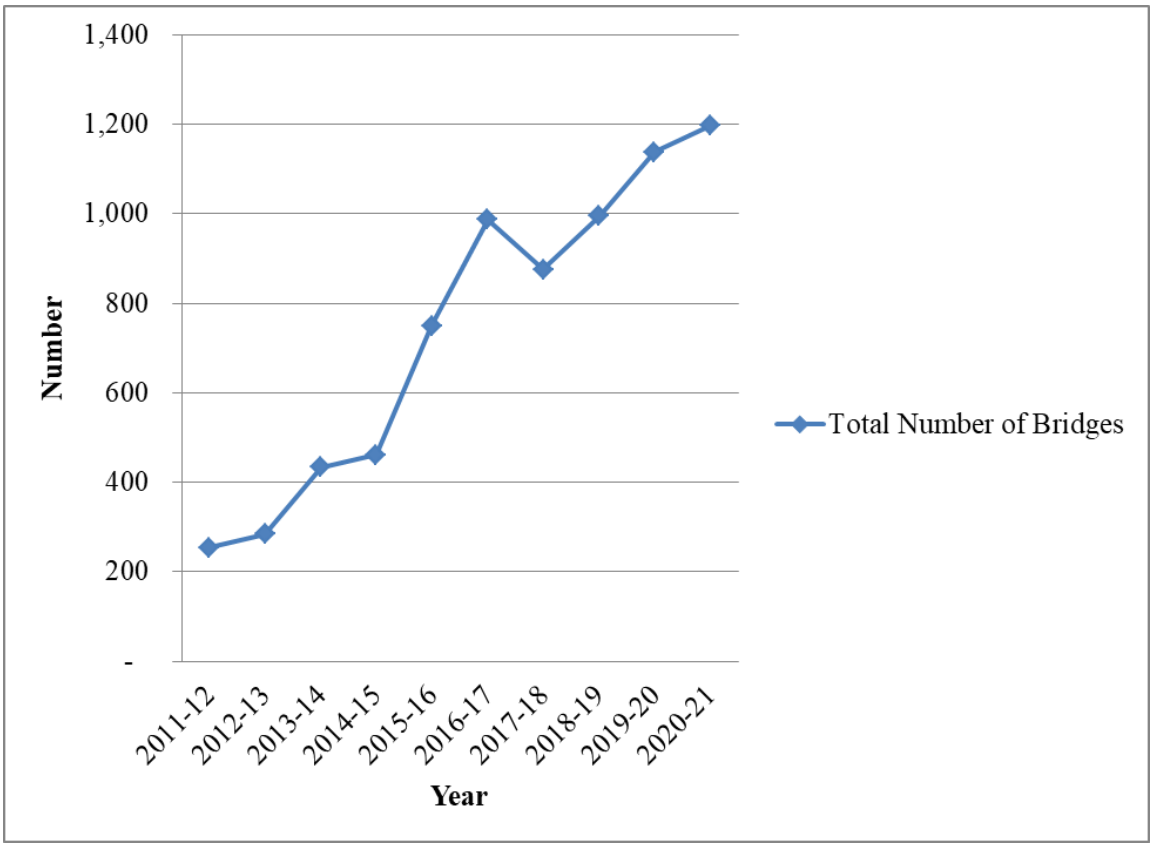
Figure (4.5) Changes in Bridge Infrastructure by Length of Bridges in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

Figure 4.5 details the development of Nay Pyi Taw's bridge infrastructure from 2011-12 to 2020-21. According to their lengths, there are four types of bridges in Nay Pyi Taw Union Territory. With the exception of 2017-18, all bridges under 50 feet are dramatically higher from 2011-12 to 2020-21. The bridges that are greater than and equal to 180 feet long gradually increase during the study period, but other types of bridges that are between 50 and 100 feet long, between 100 and 180 feet long, fluctuate in number during the same period of 2011-12 to 2020-21.

Figure (4.6) Total Number of Bridges in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Ministry of Construction (MOC), Department of Rural Road Development (DRRD), and Nay Pyi Taw Development Committee (NPTDC)

The conditions for the total number of bridges in Nay Pyi Taw Union Territory can be seen in figure 4.6. The information in figure 4.6 is based on table 4.4. It illustrates that the total number of bridges increases to its maximum in Nay Pyi Taw Union Territory, during the study period from 2011-12 to 2020-21. Nay Pyi Taw Union Territory's bridge infrastructure is a large increase from 2011-12 to 2016-17, a little decrease in 2017-18, but a more significant increase from 2018-19 to 2020-21. It means that the total number of bridges significantly increased from 2011-12 through 2016-17, moreover, the total number of bridges slightly decreases from 2016-17 to 2017-18. However, the total number of bridges is gradually rising, from 2017-18 to 2020-21.

In general, the trend of the total number of bridges in Nay Pyi Taw Union Territory is substantially increased from 2011-12 to 2020-21, except for 2017-18. It highlights that, during the study period from 2011-12 to 2020-2021, relevant government ministries routinely upgraded and maintained the nation's road and bridge infrastructure

in compliance with the new democratic government's regulations. Moreover, Nay Pyi Taw's infrastructure construction sectors have not been prohibited during the Covid-19 pandemic, and they are still operating for their construction works in accordance with the Covid-19 rules that are specially regulated for construction works. Therefore, the allocation and investment of funds in the basic infrastructure sectors of Nay Pyi Taw have been expanded year by year.

Therefore, in order to address the policies to promote physical and economic linkages between regions, get balanced development, and narrow down the socio-economic development gap between rural and urban areas of Nay Pyi Taw Union Territory, a large expenditure in infrastructure development, such as roads and bridges, is needed to be invested more significantly than now. For the Nay Pyi Taw Union Territory's economy to be linked with the development of the country's economies, adequate infrastructure in the form of an effective road and bridge transportation system is also required. Therefore, more road and bridge infrastructure investments are needed to build, upgrade and maintain there. If so, the production and movement of rural commodities in the Nay Pyi Taw Union Territory will automatically expand, and socio-economic life will unavoidably progress quickly.

4.4 Economic Growth Status in Nay Pyi Taw Union Territory

After being announced by the army as the capital of Myanmar in 2005, Nay Pyi Taw Union Territory replaced Yangon and became the nation's capital. Nay Pyi Taw Union Territory is strategically located between the Bago Yoma Mountain and the Shan Yoma Mountains, in central Myanmar, and is the key region for communication and transportation. Along with those regions, it shares boundaries with Mandalay Region, Magway Region, Bago Region, Shan State, Kayah State, and Kayin State. And then, it is a strategic location from which each part of the country can be more easily controlled.

Despite having a geographic area of 4,800 square kilometers and having all the facilities required to function as capital, including broad highways, upgraded government buildings, five-star hotels, and enormous shopping centers, the first condition of the new capital city of Nay Pyi Taw was lacking population. That is because the Myanmar Government built Naypyidaw in secrecy in the early 2000s and it was formally declared as the country's new capital on November 6th, 2005. Due to the relocation of all

government offices and ministries, government workers must be transferred to Nay Pyi Taw and were given two months' notice that they would need to leave Yangon. At that time, Nay Pyi Taw Union Territory had little more than one million populations.

Table (4.5) Population Status of Nay Pyi Taw Union Terrirory

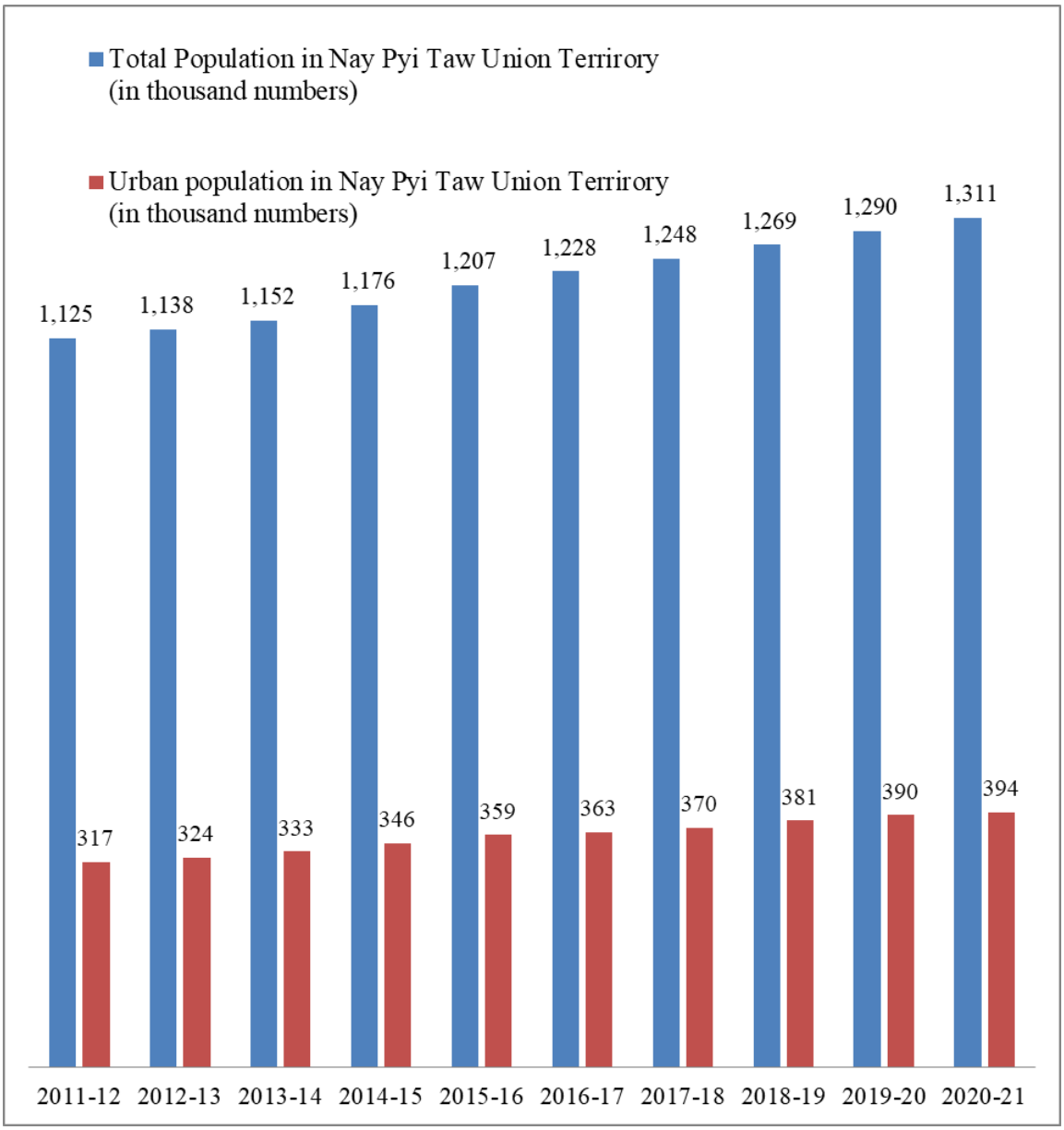
Fiscal Year	Total Population in Nay Pyi Taw (in thousand numbers)	Urban population in Nay Pyi Taw (in thousand numbers)	Ratio of Urban Population to Total Population in Nay Pyi Taw
2011-12	1,125	317	0.2818
2012-13	1,138	324	0.2847
2013-14	1,152	333	0.2891
2014-15	1,176	346	0.2942
2015-16	1,207	359	0.2974
2016-17	1,228	363	0.2956
2017-18	1,248	370	0.2965
2018-19	1,269	381	0.3002
2019-20	1,290	390	0.3023
2020-21	1,311	394	0.3005

Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Planning Department, General Administration Department (GAD), Nay Pyi Taw Union Territory

Table 4.5 displays the conditions for the total population and urban population of Nay Pyi Taw Union Territory from 2011-12 to 2020-21. The overall population of the Nay Pyi Taw Union Territory rises from 1,125 thousand in 2011-12 to 1,311 thousand in 2020-21. From 317 thousand in 2011-12 to 394 thousand in 2020-21, more people live in urban areas. On the other hand, it means that, from 317,000 in 2011-12 to 394,000 in 2020-21, there is a 25% increase in the number of people living in urban areas between 2011-12 and 2020-21. However, the proportion of the people living in urban areas in

Nay Pyi Taw Union Territory is steadily rising from 28.18% in 2011-12 to 30.05% in 2020-21, with the exception of 29.56% in 2016-17 and 29.65% in 2017-18.

Figure (4.7) Total Population and Urban Population in Nay Pyi Taw Union Territory



Source: Central Statistical Organization: Myanmar Statistical Yearbooks (2010~2021), Planning Department, General Administration Department (GAD), Nay Pyi Taw Union Territory

Figure 4.7 shows the total population and urban population of Nay Pyi Taw Union Territory from 2011-12 to 2020-21, respectively. It states a slight annual increase in the total population and urban population of Nay Pyi Taw Union Territory during the

study period. Moreover, it also shows that around one-third of the residents of Nay Pyi Taw Union Territory live in urban areas.

The decomposition of GDP by three main sectors of Nay Pyi Taw Union Territory, namely production/industry, services, and trade indicates its economic structure and the contribution of each sector to the economy. The shares of main economic sectors to Nay Pyi Taw Union Territory's real GDP can be seen in table 4.6. From 2011-12 to 2020-21, economic structures differ across Nay Pyi Taw Union Territory, and services are the dominant sector in the Nay Pyi Taw Union Territory's economy during the study period, as shown in table 4.6.

Table (4.6) Shares of Economic Sectors to Nay Pyi Taw Union Territory's Real GDP (Million Kyats)

Sectoral Share in GDP	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Production	261,876	327,345	433,050	492,257	467,423	460,667	488,797	603,883	604,027	345,851
Services	114,694	143,367	230,471	598,500	654,301	727,138	787,747	1,151,981	1,148,065	617,300
Trade	63,517	64,191	70,187	71,767	75,300	90,706	96,067	138,257	138,257	87,835

Source: General Administration Department (GAD), Nay Pyi Taw Union Territory

The service sector's contribution to total GDP increased from 114,694 million kyats in 2011-12 to 617,300 million kyats in 2020-21. On the other hand, the Nay Pyi Taw Union Territory's trade sector's contribution to the overall GDP for the same period is the smallest, at 87,835 million kyats. Production contributed 345,851 million kyats of the total GDP in 2020-21, approximately an increase of 6% from 2011-12. It indicates that while the service sector is playing a bigger role in the economy, the industrial sector is still making significant strides toward a system that is more geared toward the market.

Opportunities are also plentiful in Nay Pyi Taw Union Territory. Moreover, the roads and bridges of all rural and urban areas in the Nay Pyi Taw Union Territory are being strived to make accessible in all seasons. There are quite a lot of attractions and things to do in Nay Pyi Taw Union Territory to trade, connect markets, enhance mobility, and boost productivity. The economic condition in Nay Pyi Taw Union Territory from 2011-12 to 2020-21 is described in table 4.7.

Table (4.7) Economic Condition in Nay Pyi Taw Union Territory

Fiscal Year	Real GDP (Million Kyats)	Growth Rate of Real GDP (%)	Per Capita GDP (Kyats)
2011-12	725,257	19.60	644,673
2012-13	831,050	14.59	730,273
2013-14	1,109,549	33.51	963,150
2014-15	1,215,411	9.54	1,033,513
2015-16	1,477,397	21.56	1,224,024
2016-17	1,612,997	9.18	1,313,515
2017-18	1,745,590	8.22	1,398,710
2018-19	1,890,348	8.29	1,489,636
2019-20	2,034,811	7.64	1,577,373
2020-21	1,925,492	5.37	1,468,720

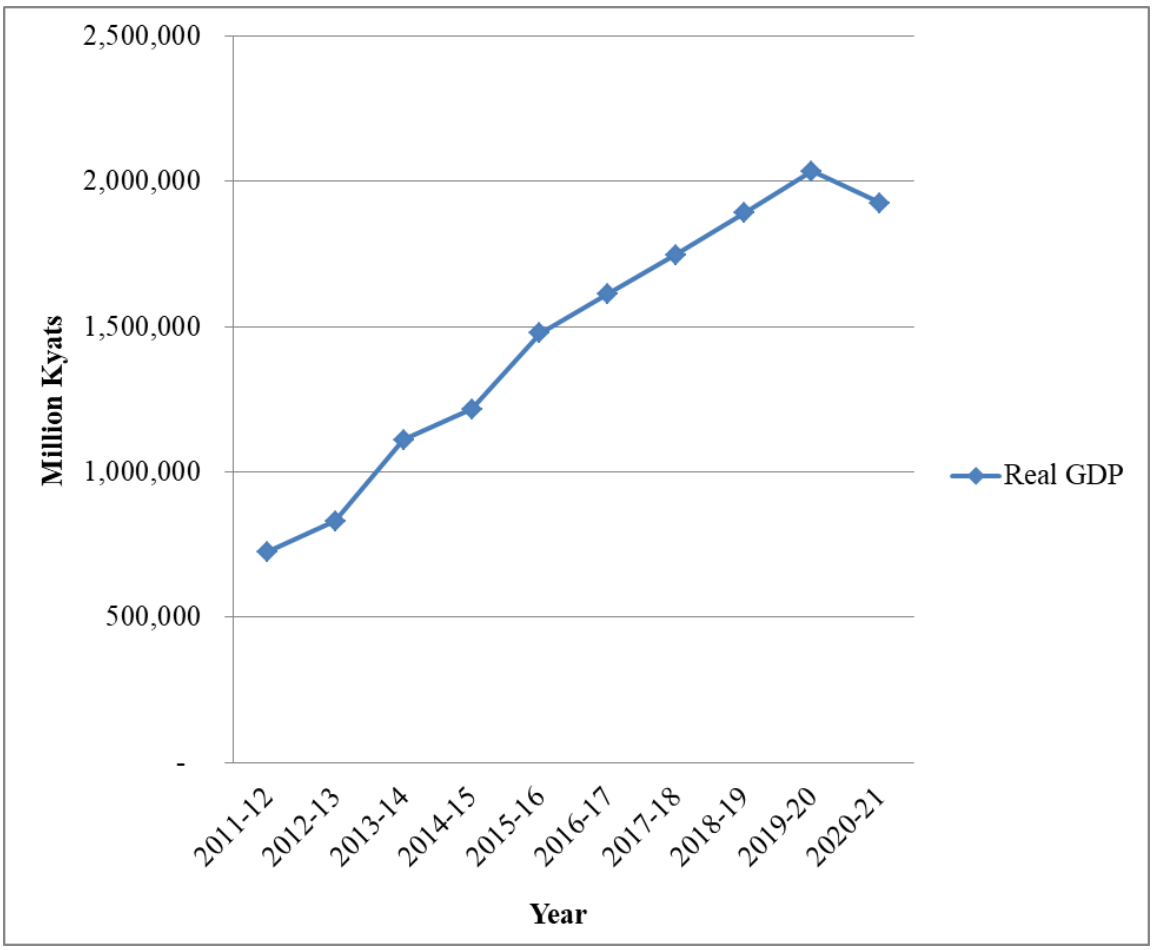
Note: GDP is calculated based on constant prices at 2010-2011 and 2015-16.

Source: Planning Department

The economic growth in Nay Pyi Taw Union Territory is directly related to the real GDP of this region. The real GDP is calculated by (2010-11 and 2015-16) constant

prices. The real GDP increased significantly from 725,257 million kyats in 2011-12 to 2,034,811 million kyats in 2019-20 except for 2020-21. The real GDP growth rate of the Nay Pyi Taw Union Territory is the highest amount of 33.51% at 2013-14 and the lowest amount of 5.37% at 2020-21. The per capita GDP increased about 3 times, from 644,673 kyats in 2011-12 up to 1,468,720 kyats in 2020-21.

Figure (4.8) Real Gross Domestic Product (Real GDP) of Nay Pyi Taw Union Territory

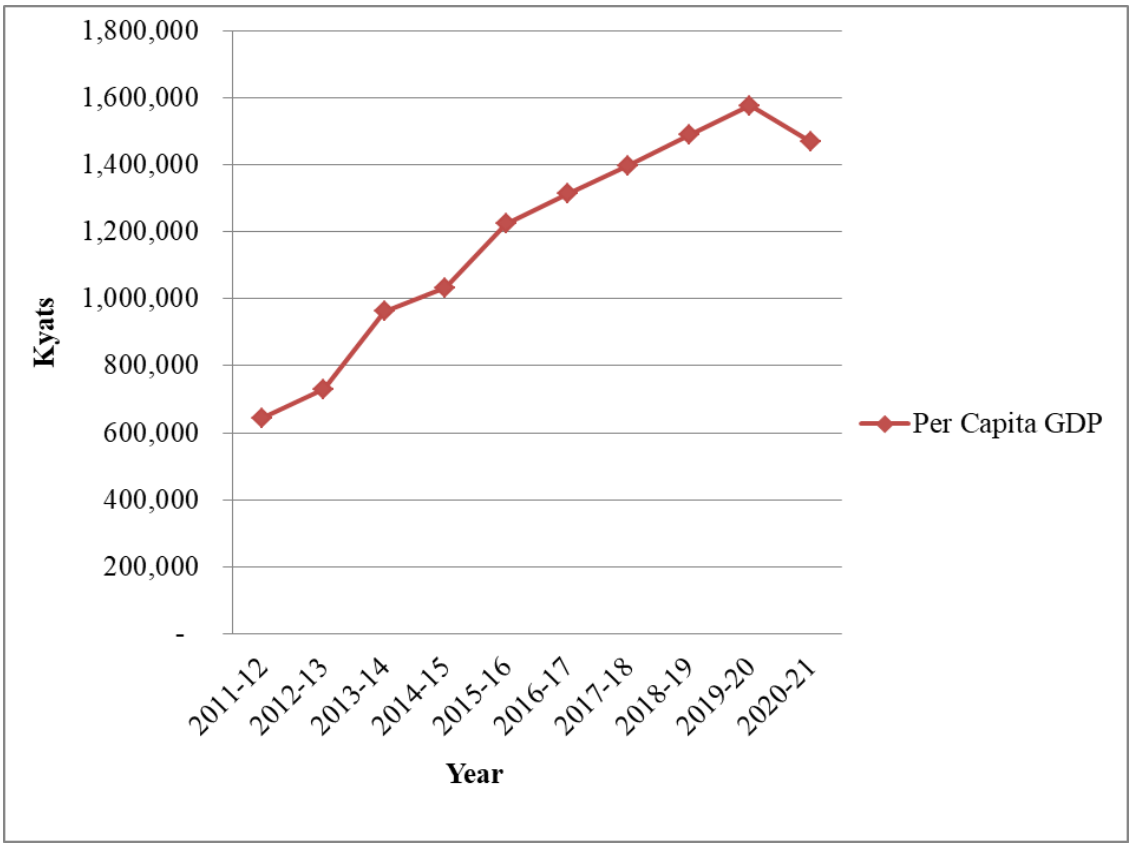


Source: Planning Department

Figure 4.8 shows how much Nay Pyi Taw Union Territory's economic growth situation developed steadily between 2011-12 and 2020-21. The information in figure 4.8 is based on table 4.7. It illustrates that Nay Pyi Taw Union Territory's real GDP is a large increase from 2011-12 to 2019-20, a little decrease in 2020-21. Therefore, the real GDP significantly increases from 2011-12 to 2019-20. However, the real GDP is gradually reducing, from 2019-20 to 2020-21.

Generally, the trend of the real GDP in Nay Pyi Taw Union Territory is dramatically upward from 2011-12 to 2019-20, except for 2020-21. It indicates that Nay Pyi Taw Union Territory's economy is growing except for 2020-21. The study period from 2011-12 to 2020-21 is a period of Myanmar's political transition and its economic policies established and implemented for its comprehensive development. In addition, the comprehensive development of Nay Pyi Taw Union Territory is one of the main goals of the country. As Nay Pyi Taw City's infrastructure improves, residents of Nay Pyi Taw Union Territory have better transportation, and employment opportunities, and their GDP increases year by year. In addition, the main events of the country, such as the Sea Games and the ASEAN summit, were held in Nay Pyi Taw Union Territory, so the service sectors of Nay Pyi Taw Union Territory are further developed, employment opportunities are increasing, and the economy is growing. However, when the COVID-19 virus reached Myanmar on March 23, 2020, with different impacts of COVID-19 restrictions on Myanmar's various economic sectors, the local economy in Nay Pyi Taw Union Territory declined slightly, and its real GDP decreased.

Figure (4.9) Per Capita GDP of Nay Pyi Taw Union Territory

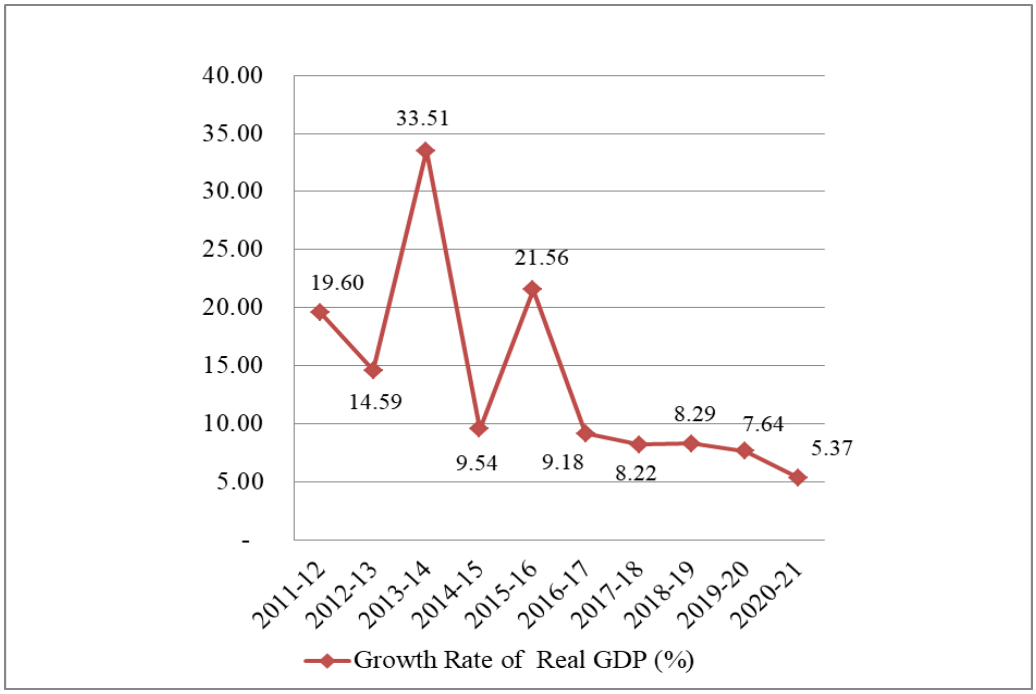


Source: Planning Department

From 2011-12 to 2020-21, Nay Pyi Taw Union Territory's per capita GDP is depicted in figure 4.9. The data in figure 4.9 is based on table 4.7. It shows that the per capita GDP of Nay Pyi Taw Union Territory gradually increased from 2011-12 to 2019-20. With the exception of 2020-21, the per capita GDP of the Nay Pyi Taw Union Territory is rising steadily. In other words, the per capita GDP increased to its maximum in Nay Pyi Taw Union Territory, during the period from 2011-12 to 2019-20, except for 2020-21.

During the study period, Nay Pyi Taw's service industries had expanded, there were more job prospects, and the city's economy was expanding as a result of the hosting of major national events like the ASEAN summit and the Sea Games there. In addition, Nay Pyi Taw Union Territory, in addition to increasing government spending, being the center of Myanmar, the local goods flow is better, and the production sector and commercial trade sectors are increasing, and the economy is growing. The fact that the Nay Pyi Taw Union Territory's infrastructure is always being improved ensures that residents benefit from better road connections, employment opportunities, and an increase in their per capita GDP. However, due to the COVID-19 pandemic arriving in Myanmar in 2020, the per capita GDP of Nay Pyi Taw Union Territory in 2020-21 remained the lowest.

Figure (4.10) Growth Rate of Real GDP of Nay Pyi Taw Union Territory



Source: Planning Department

From 2011-12 to 2020-21, Nay Pyi Taw Union Territory's growth rate of real GDP is depicted in figure 4.10. The data in figure 4.10 is based on table 4.7. It highlights that the rate of growth of real GDP of Nay Pyi Taw Union Territory fluctuated from 2011-12 to 2020-21. The rate of growth of real GDP of the Nay Pyi Taw Union Territory is the highest amount of 33.51% at 2013-14 and the lowest amount of 5.37% at 2020-21. The real GDP growth rate of 2020-21 remains the lowest in Nay Pyi Taw Union Territory because of the effect of the COVID-19 pandemic by hitting the economy hard.

According to the above figures, Nay Pyi Taw Union Territory has a lot of potential for economic growth. Because of the better location of Nay Pyi Taw Union Territory, the people can earn money easily by trading goods and services across the country. Since Nay Pyi Taw Union Territory mostly serves as the seat of Myanmar all people can stay and do business safely with the several restrictions of government and political activities. Therefore, Nay Pyi Taw Union Territory has huge economic growth potential and then the city is anticipated to develop further and acquire the features of a city in the next decade.

CHAPTER V
CONCLUSION

This chapter describes a summary of findings from the interpretation of the descriptive results with support from both the theoretical and empirical literature. This study uses descriptive analysis to shape the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory during the study period from 2011-12 to 2020-21.

5.1 Findings

The main objective of this study is adjusted to identify the relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory with the descriptive analysis method.

Along the years, Myanmar's government has also expanded overall road and bridge infrastructure across the country. The total road length in Myanmar and Nay Pyi Taw Union Territory increases significantly from 2011-12 to 2020-21, respectively. In general, Nay Pyi Taw Union Territory is achieving positive trends in its road infrastructure sector, similarly to the national level of Myanmar, due to the government's emphasis on road construction as community development in recent years.

Moreover, the total number of bridges in Myanmar and Nay Pyi Taw Union Territory has also significantly increased from 2011-12 to 2020-21. The total number of all types of bridges built reached its highest level in 2018-19 in Myanmar and 2020-21 in Nay Pyi Taw Union Territory. In sum, except for the decrease in bridge infrastructure of 2019-20 and 2020-21 in Myanmar and the decrease in bridge infrastructure of 2017-18 in Nay Pyi Taw Union Territory, the sector of bridge infrastructure is generally indicating positive trends in both Myanmar and Nay Pyi Taw Union Territory. In addition, with the exception of 2015-16 and 2016-17, the trend of government expenditure on road and bridge infrastructure development in Nay Pyi Taw Union Territory is dramatically increasing during the study period.

On the other hand, the economic condition in Nay Pyi Taw Union Territory, its real GDP growth rate slightly fluctuates between 2011-12 and 2020-21, just like the

national level of Myanmar. Myanmar's real GDP growth rate gradually fluctuates from 5.6% in 2011-12 to 3.2% in 2020-21 while that of Nay Pyi Taw Union Territory, 5.37% in 2020-21, compared to 19.6% in 2011-12, shows dramatically decreased because 2011-12 is an extraordinary situation that happened with democratization.

Therefore, Myanmar's economy is bombing as a consequence of relief sanctions and greater investment. Myanmar's per capita GDP, from 2011-12 to 2020-21, rises about 1.5 times. The per capita GDP of Nay Pyi Taw Union Territory increases about 2.5 times, from 2011-12 up to 2019-20 except for 2020-21. Real GDP in Myanmar increased significantly from 2011-12 to 2020-21, while Nay Pyi Taw Union Territory's real GDP increased substantially from 2011-12 to 2019-20 and decreased slightly in 2020-21. Therefore, except for 2020-21, Nay Pyi Taw's economy is expanding slightly along with Myanmar as a whole. It is certain that for the economy to be linked with the development of the country's economies, adequate infrastructure in the form of an effective road and bridge transportation system is also required.

In summary, this analysis shows that a large number of road miles and bridges were built in the Nay Pyi Taw Union Territory. Futhermore, the expanded government expenditure on infrastructure development proves how the infrastructure has been developed, moreover, Nay Pyi Taw Union Territory's economy had significant growth from 2011-12 to 2019-20, followed by a slight decline in 2020-21. Therefore, the main finding of this study indicates that there are positive trends on both road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory during the research period.

5.2 Suggestions

This study meets the overall requirements of objectives. Therefore, all of the findings will be a remarkable contribution to public policy-making in Myanmar, particularly in infrastructure contexts. This study found that a large number of bridges and roads have been constructed in Nay Pyi Taw Union Territory over a period of 10 years. According to the findings, since infrastructure development is well improved in recent years by increasing the number of roads and bridges, the economy is growing slightly in Nay Pyi Taw Union Territory. Therefore, this study reveals there is a positive, relationship between road and bridge infrastructure development and economic growth in Nay Pyi Taw Union Territory since they two have the same upward trend by

descriptive result. However, to be sure whether there is actual causal relation or not is, this study has to conduct the regression analysis.

It is observed that there are a number of benefits such as travel times, cost and distance due to the improvement of roads and bridges. Roads and bridges reduced travel time and provided better access to markets, facilitates domestic market integration, lowers cost of production and transportation, it also helps to access better services and opportunities. Nay Pyi Taw Union Territory to promote the well-being of residents is essential. Therefore, in order to reduce the development gap between the rural and urban parts of Nay Pyi Taw Union Territory and to ensure sustainable economic growth, greater support for road and bridge infrastructure should be provided.

Moreover, further research papers are also advised to explore the relationship between other types of infrastructure and economic growth and consider poverty as well. In addition, a more comprehensive analysis of the other socioeconomic factors affecting the country's economic growth by conducting empirical analysis should be examined in further studies. Finally, the policymakers should also adopt an appropriate strategic policy to develop the infrastructure sector considering hand-in-hand with other socioeconomic and urban development policies to achieve sustainable economic growth.

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APPENDIX - A

Findings from Previous Studies

Sr. No	Title	Author(s)/Year	Independent Variable(s) (X)	Dependent Variable(s) (Y)	Finding(s)
1.	Infrastructure Development and Economic Growth Nexus in Nigeria	Owolabi-Merus, O (2015)	Infrastructural Development (Gross Fixed Capital Formation, GFCF)	Economic Growth (Gross Domestic Product, GDP)	Infrastructural development has a positive and statistically significant impact on Nigeria's economic growth. However, there is no mutual correlation between both variables in Nigeria in the period under review.
2.	The Impact of Road Transportation Infrastructure on Economic Growth in	Siyan Peter, Eremionkhale Rita, Makwe Edith (2015)	The amount of road transportation in GDP (ROT), capital utilization (CUR), government expenditure on road	Economic Growth (Gross Domestic Product, GDP)	The road transport sector positive impact on the economic growth in Nigeria. Economic growth in Nigeria depended on the level of good and accessible road transportation and

	Nigeria		transportation (GENOT), and exchange rate (EXCHR)		facilitates business activities.
3.	The Causal Relationship Between Road Transport Infrastructure Development And Economic Growth In Namibia	Louis Mungendje (2018)	Information and communication and technology (ICT), government expenditure on road transportation (GERT), and foreign direct investment [Exchange] (FDI) values	Economic Growth (Gross Domestic Product, GDP)	Government spending on road transport infrastructure development has a significant and positive impact on economic growth in Namibia although there is no directional causality flow between government expenditure on road transport infrastructure development and economic growth in Namibia. The nexus between information communication technology and economic growth also have a similar relationship. Contrary to that, a negative relationship between foreign direct investment and economic growth does exist slightly, though not

					significant.
4.	Road infrastructure development and economic growth	C P Ng, T H Law, F M Jakarni and S Kulanthayan (2019)	Road Infrastructure Development (road length per thousand population, roadpp) and (ratio of urban population to total population (urb), physical capital stock per worker (kpw), per capita government expenditure on education (edu), per capita export of goods and services (exp))	Economic Growth (purchasing power parity converted gross domestic products per capita, rgdpch)	The growth in road length per thousand population, per capita export, per capita education expenditure and physical capital stock per worker contributed positively to economic growth. There is an inverted Ushaped dependency relationship between urbanization and economic growth. That is, the economic growth increases at low urbanization levels but decreases once urbanization exceeds a threshold level. Moreover, the growth in road length per thousand populations would facilitate export growth.
5.	Development of Road and Bridge Infrastructure	Fandy Latuni (2019)	Road Infrastructure (X) (road infrastructure, bridge infrastructure,	Economic Growth of Coastal Communities (Y) (Real National Income, Real Per	Under the result of research, the development of infrastructure walke and bridge of Boulevard 2 has a relation 98.5 % with the make-up of coastal area

	to Enhance Economic Growth in the Coastal Communities of Tuminting District in Manado City		transportation facilities)	capita Income, Population Welfare, Labor)	society economics of district of Tuminting town of Manado.

Source: Own compilation based on previous research studies