

**YANGON UNIVERSITY OF ECONOMICS**  
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**A STUDY ON CIRCULAR RAILWAY TRANSPORTATION IN**  
**YANGON CITY**

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**A STUDY ON CIRCULAR RAILWAY TRANSPORTATION IN  
YANGON CITY  
(2012/2013 to 2016/2017)**

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Degree of Master of Economics (Economics)

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This is to certify that this thesis entitled “**A STUDY ON CIRCULAR RAILWAY TRANSPORTATION IN YANGON CITY**” submitted as partial fulfillment towards the requirements for the Degree of Master of Economics (Economics) has been accepted by the Board of Examiners.

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## **ABSTRACT**

Transportation is important sector of economy in Myanmar. As population density is higher, Yangon is facing the number of problems with the transportation system; parking difficult, time consuming and traffic jam. Rail is the most environmentally efficient, safe and secure mode of transportation. Accordingly, Yangon circular rail line has been expended. The main objective of this paper is to examine the rail-based public transportation and circular trains in Yangon. The study covers the period of 5 years from 2012/2013 to 2016/2017 and only focus on Yangon Circular Railway. The method of the study is descriptive based on secondary data. These data are available from Myanma Railways and various study. The 221 circular trains are run in 38 stations daily. The volume and total income are increased while the changes of fare system. The locomotives, coaches and seat are need to be provided. The existing system should be implemented and transformed to a speedier, smoother, systematic and modern transit system.

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## TABLE OF CONTENTS

		<b>Page</b>
<b>ABSTRACT</b>		i
<b>ACKNOWLEDGEMENTS</b>		ii
<b>TABLE OF CONTENTS</b>		iii
<b>LIST OF ABBREVIATIONS</b>		v
<b>LIST OF TABLES</b>		vi
<b>CHAPTER I</b>	<b>INTRODUCTION</b>	1
	1.1 Rationale of the Study	1
	1.2 Objectives of the Study	3
	1.3 Scope and limitations of the Study	3
	1.4 Method of Study	3
	1.5 Organization of the Study	3
<b>CHAPTER II</b>	<b>LITERATURE REVIEW</b>	4
	2.1 Urban Transport and The Significance of Transportation	4
	2.2 The Importance of Transportation in Economic Development	7
	2.3 Railway Transportation and Economic Development	10
	2.4 Advent of Rail Transportation	11
<b>CHAPTER III</b>	<b>HISTORICAL BACKGROUND OF MYANMA RAILWAY</b>	15
	3.1 Pre Railways Era in Myanmar	15
	3.2 Early Days of Myanmar Railway	17
	3.3 Background of Myanmar Railways and Yangon Circular Railway	19
	3.4 History of Yangon Central Railway Station	20

<b>CHAPTER IV</b>	<b>THE SITUATION OF YANGON CIRCULAR RAILWAY</b>	22
	4.1 The Profile of YCR	22
	4.2 Stations	24
	4.3 Locomotives	27
	4.4 Train Services	28
	4.5 Operation of Yangon Circular Railway	29
	4.6 Fare System	33
	4.7 Passenger Volumes of Yangon Circular Railway	34
	4.8 Income Receipts from Yangon Circular Railway	34
	4.9 Fuel Usage in Yangon Circular Railway	38
	4.10 Monthly Accident Cases	39
<b>CHAPTER V</b>	<b>CONCLUSION</b>	41
	5.1 Findings	41
	5.2 Suggestion	42
<b>REFERENCES</b>		44
<b>APPENDIX</b>		46

## LIST OF TABLES

Table No.	Title	Page
Table 4.1	Number of locomotives in Yangon circular trains in 2015/2016 to in 2016/2017	28
Table 4.2	Number of trains per day 2016/2017	29
Table 4.3	Number of Trip Routes and Schedule of Trains Daily in 2017	32
Table 4.4	Ticket fare for Yangon Circular and Suburban Train in 2017	33
Table 4.5	Monthly Paid Ticket for Circular Train in 2017	33
Table 4.6	Passenger Volumes of Yangon Circular Railway in 2012/2013 to 2016/2017	34
Table 4.7	Comparison of Income from different circular railway services in 2012/2013 to 2016/2017 (in thousand kyat)	35
Table 4.8	Total income of different circular railway services in 2012/2013 to 2016/2017	37
Table 4.9	Fuel Usage of Circular Railway in 2015/2016 to 2016/2017	38
Table 4.10	Comparison of frequency in Accident Cases	39
Table 4.11	Comparison of injured and died by accident cases in monthly	40

## LIST OF ABBREVIATIONS

OECE	Oversea Economics Cooperation Fund
EXIM Bank	Export-Import Bank
MR	Myanma Railways
YBS	Yangon Bus Service
RBE	Rail Bus Engine
YCR	Yangon Circular Railway
JICA	Japan International Cooperation Agency

# Chapter I

## Introduction

### 1.1 Rationale of the Study

Transportation may be defined as a service or facility which creates time and place utility through the physical transfer of person and goods from one location to another, while production creates from one location to another, while production creates from utility through changes in the physical characteristics of goods. Modes of transport include air, land (rail and road), water, cable, water, pipeline and space etc..; Transportation is a non- separable part of society. It exhibits a very close relationship to the style of life, the range of location and goods and services which will be available for consumption. Advances in transportation has made possible changes in the way of living, the way in which societies are organized and therefore have a great influence in the development of civilization.

The transport sector is an important component of the economy and a common tool used for development. There is even so in global economy where economic opportunities have been increasingly related to the mobility of goods, people and information. A relationship between quantity and quality of transport infrastructure and the level of economic development is apparent. High density transport infrastructures and highly connected networks are commonly associated with the high levels of development.

Transportation is one part of the production. The product commodities need to be transported to the required destinations within the specified period. The delays occur will affect the production. It is imported that the raw materials are to be transported to the required destination within required time. Transport from one place to another will occur as value to products. The system will affect the price and easy transport will benefit the spreading of market.

Transport system will affect the price and easy transport will cause a saving on the market price and also have an effect on the low cost of transport will minimize the production cost and because of the low transport cost the commodities are going to the consumer directly and the consumer's price is reasonable and it will result in

consumer's price falling at market. Determination of price stability and economic development depends on transportation.

Compared to road transportation, railway transportation is extensively subsidized by the government of the Union of Myanmar, especially for lower income people. It is important to know the efficiency and effectiveness of the Myanma Railways, and based on that knowledge, it is necessary to study how to develop the industry in order that it can facilitate the development of country.

Another factor to carry out the study is that railway transportation is an environmentally sustainable transport system. If it is managed well, rail t transportation could avoid public health and ecosystem hazards. It is planned efficiently together with other modes of transport; it can reduce traffic congestion which is the most common phenomenon of the developing countries. Out of the four major transportation modes: rail, road, air, river and coastal shipping, only railway transportation is operated by the government although all other modes of transport were run by the private as well as public sector. In Myanmar, railway transportation is under the sole control of the Ministry of Rail Transportation.

In Myanmar, largest portion of transport service is obtained from railway transport the Myanma Railway Corporation according to the report of the Pyithuhlutaw in 1989. As a developing country, Myanmar has to implement or invest in many infrastructure projects such as electricity, transportation building etc., in order to serve 60 million of its population. In Myanmar, railway transportation is broadly utilized and serves half of its population. Myanma Railways is the stated owned agency that operates 18 freight trains and 379 passenger trains, transporting over 100,000 passengers daily. MR also operates the Yangon Circular Rail way line, Yangon's commuter rail network.

As population density is higher, vehicles used in Yangon increase in accordance with population and economic growth. Yangon is facing the number of problems with the transportation system make commuting and parking difficult, time consuming and one of the biggest problems, traffic jam. Except for Public Holidays, the residents of commercial hub suffer from traffic congestion on a daily basis.

Urban productivity is highly dependent on the efficiency of its transport system to move labor between multiple origins and destinations. Thus sustainable transport is one of the most highlighting issues in the world. Sustainable is a subject which needs to be considered. Rail is the most environmentally efficient, safe and secure mode of transportation. The government of the Union of Myanmar has recognized that transportation is responsible for the development of urbanization. Accordingly, Yangon circular rail line has been expended.

## **1.2 Objectives of the Study**

The main objective of this paper is to examine the rail-based public transportation and circular railway in Yangon.

## **1.3 Scope and Limitations of the Study**

The study covers the period of 5 years from 2012 to 2017 and only focus on Yangon Circular Railway.

## **1.4 Method of Study**

The method of the study is descriptive based on secondary data. These data are available from No.7 Region, Yangon of Myanma Railways. Other sources are received from the documents from libraries, organization and ministries concerned as well as from internet websites.

## **1.5 Organization of the Study**

This study is divided into six chapters. The chapter one is an introduction to the rationale of the study, objective, scope and limitation, method and organization of the study. The chapter two is the literature review on urban transport and the importance of transportation and economic development. The chapter three is the study on historical background that is concerned with railway transportation. The chapter four contains the situation of Yangon circular railway. The chapter five is conclusion with findings and suggestion.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Urban Transport and the Significance of Transportation

Areas of human settlements are broadly classified as (i) Rural areas and (ii) Urban areas. Rural areas are those which are predominantly agricultural, whereas urban areas are those which are predominantly non-agricultural. An urban area is the region surrounding a city. Urban areas are very developed, meaning there is a density of human structures such as houses, commercial buildings, roads, bridges and railways. An urban area is also defined as an area with a relatively high population density. For example, suppose that the average population density of a particular country is 20 people per square mile. If a certain area of the country contains 50,000 people in a 50-square – mile area (i.e., the average population density is 1,000 people per square mile), it would be considered an urban area because its population density is relatively high. Public transport system includes all transport system in which the passengers do not travel in their own vehicles. These terms generally include bus service, commuter train services and wider definition might also include ferries and taxi services.

Urbanization has been one of the dominant contemporary processes as a growing share of the global population lives in cities. Considering this trend, urban transportation issues are of foremost importance to support the passengers and freight mobility requirements of large urban agglomerations. Traditionally, the focus of urban transportation has been on passengers as cities were viewed as locations of utmost human interactions with intricate traffic patterns linked to commuting commercial transactions and leisure / cultural activities. At the urban level, demographic and mobility growth have been shaped by the capacity and requirements of urban infrastructures which are roads, railroads, and transport system.

Urban transportation is organized in three broad categories of collective, individual and freight provide publicly accessible mobility over specific parts of numbers of people and achieving economies of scale. It includes modes such as buses, trains and ferry boats. Individual Transportation includes any mode where mobility is the outcome of personal choice and mode where mobility is the outcome of personal

choice and means cities are dominant centers of production and motorcycle. As cities are dominant centers of production and consumption, urban are accompanied by large movements of freight .These movements are mostly characterized by delivery trucks moving between industries, distribution centers and retail activities as from major terminals such as ports, rail yards, distribution centers and airports.

The evolution of transportation is generally led to change in urban form. The more radical as the changes in transport technology, the more the urban form has been altered. In many cities, the Central Business District (CBD), once the primary destinations of commuters and serviced by public transportation has been changed by new manufacturing, retailing and management practices.

In developed countries, people in urban areas have to rely on public transportation because it gives benefits. A well-designed and utilized public transport system brings a range of economic, environmental and social benefits. People have to move from one place to another. Thus well-designed public transport system can benefits for people. And also, it can benefit for commercial to mobile the commodity. Compared to developed countries, the condition of local public transportation in developing countries is different.

And also focus on the role of access to the railway network in urban transportation. We find that if the number of train stations is limited, the degree of urbanization is higher around train stations, but the effect of railway travel on road congestion is small. By contrast, if train stations are omnipresent there is little effect on urban spatial structure, but a considerable decrease in congestion. With regard to the supply of train stations, these findings suggest that there is an important policy trade-off between congestion and urbanization. To understand the impact of railroads on urban spatial structure it is important to highlight two aspects of railway travel that differ from travel via roads. First, supply of railway services is discrete by nature. That is access to the railway network goes through a train station while access to the road network is nearly continuous. Second, the capacity of the railway network is usually to be extremely high: although trains can be crowded, there is virtually no congestion. The two features of railway travel that result in a different spatial urban economic pattern than if there is only travel by roads.(Yi, 2015)

The daily journeys to and from work, shopping centers, of university class rooms involve transportation. Every product has been transported, usually several times, before it gets to us. Even the services would be impossible without transportation of tools, repair parts, or other means of producing services.

In a more general way, transportation is an important part of our culture and heritage. It played a pivotal role in the discovery, settlement, and development of our nation. The freedom and mobility of our people, literally a nation on wheels and a people ever curious to see new places and ever anxious undertake new tasks, is based upon efficient transportation.

There are many significance of transportation. Transport contributes in growth of industries whose product requires quick marketing. Perishable articles like fish and green vegetables are carried to various consumers quickly even in distant markets through transport. Transport helps in increase in the demand for goods. Through transport newer customers in newer places can be easily contacted and products can be introduced to them.

Transport creates place utility. Geographical and climatic factors force industries to be located in particular places far away from the markets and places where there may not be any demand for the products. Transport bridges the gap between production and consumption centers. Transportation also creates time utility of late transport has started creating the time utility also. It has been made possible by virtue of the improvements in the speed of transport. It helps the product to be distributed in the minimum possible time.

Transport helps in stabilization of price. Transport exerts considerable influence upon the stabilization of the prices of several commodities by moving commodities from surplus to deficit areas. This equalizes the supply and demand factors and makes the price of commodities stable as well as equal. Transport ensures even flow of commodities into the consumption.

Transport enables the consumers to enjoy the benefits of goods not produced locally. This increases the standard of living, an essential factor for further development of marketing and economy. Transport identifies competition, which in

turn, reduces price. Prices are also reduced because of the facilities. Advantage of large-scale production is possible only due to transport.

Transport increases mobility of labor and capital. It makes people of one place migrate to another place in search of jobs. Even capital, machineries and equipments are imported from foreign countries through transport alone. And transport brings countries closer. That is, no country in the world is self-sufficient. They have to depend on one another to fulfill their requirements. Transportation has brought the countries closer. It not only provides the need of mobility but also provides comfort and convenience, and so on.(Aung, 2012)

## **2.2 The Importance of Transportation in Economic Development**

Development can be defined as improving the welfare of a society through appropriate social, political and economic conditions. The expected outcomes are quantitative and qualitative improvements in human capital (e.g. income and education levels) as well as physical capital such infrastructures (transport and telecommunications).

The development of transportation systems is embedded within the scale and context they take place; from local to the global and from environmental historical, technological and economic perspectives. While in the previous decades, development policies, and strategies tended to focus on physical capital, recent years has seen a better balance by including human capital issues. Irrespective of the relative importance of physical versus human capital, development cannot occur without both interacting as infrastructures could not remain effective without proper operations and maintenance while economic activities cannot take place without an infrastructure base. The highly transactional and service oriented functions of many transport activities underline the complex relationship between its human and physical capital needs.

Because of its intensive use of infrastructures, the transport sector is an important component of the economy and a common tool used for development. This is even more in a global economy where economic opportunities have been increasingly related to the mobility of people, goods and information. A relation between the quantity and quality of transport infrastructure and the level of economic

development is apparent. High density transport infrastructure and highly connected networks are commonly associated with high levels of development. When transport systems are efficient, they provide economic and social opportunities and benefits that result in positive multiplier effects such as better accessibility to markets, employment and additional investments. When transport systems are deficient in terms of capacity or reliability, they can have an economic cost such as reduced or missed opportunities and lower quality of life.

At the aggregate level, efficient transportation reduces costs in many economic sectors, while inefficient transportation increases these costs. In addition, the impacts of transportation are not always intended and can have unforeseen or unintended consequence in the provision of free or low cost transport infrastructure have difficulties keeping up with the rising mobility demands. Transport carries an important social and environmental load, which cannot be neglected. Assessing the economic importance of transportation requires a categorization of the types of impacts it conveys. These involve core (the physical characteristics of transportation), operational and geographical dimensions:

Core- The most fundamental impacts of transportation relate to the physical capacity to convey passengers and goods and the associated costs to support this mobility. This involves the setting of routes enabling new or existing interactions between economic entities.

Operational- Improvement in the time performance, in terms of reliability, as well as reduced loss or damage. This implies a better utilization level of existing transportation assets benefiting its users as passengers and freight are conveyed more rapidly and less delays.

Geographical- Access to a wider market base where economies of scale in production, distribution and consumption can be improved. Increases in productivity from the access to a larger and more diverse base of inputs (raw materials, parts, energy, labor) and broader markets for diverse outputs (intermediate and finished goods. Another important geographical impacts concerns the influence of transport on the location of activities and its impacts on land values.

The economic importance of the transportation industry can be accessed from a macroeconomic and microeconomic perspective.

At the macroeconomic level (the importance of transportation for a whole economy), transportation and the mobility it confers are linked to a level of output, employment and income within a national economy. In many developed countries, transportation accounts between 6% and 12% of the GDP. Looking at a more comprehensive level to include logistics costs, such costs can account between 6% and 25% of the GDP.

At the microeconomic level (the importance of transportation for specific parts of the economy) transportation is linked to producer, consumer and production costs. The importance of specific transport activities and infrastructure can be assessed for each sector of the economy.

Usually higher income levels are associated with a greater share of transportation in consumption expenses.

Direct impact –The outcome of improved capacity and efficiency where transport provides employment, added value, larger markets as well as time and costs improvements. The overall demand of an economy is increasing.

Indirect impact- The outcome of improved accessibility and economies of scale. Indirect value added and jobs are the result of local purchases by companies directly dependent upon transport activity. Transport activities are responsible for a wide range of indirect value-added and employment effects through the linkages of transport with other economic sector (e.g. office supply firms, equipments and parts supplies, maintenance and repair services, insurance companies, consulting other business services.

Transportation which consists of the movement of goods or persons, from one place to another, is classified as a service among the economic activities associated with production. The importance of transportation in economic activity is to be found its effect on both human wants or demand for goods and the satisfaction of human wants through production and distribution or supply of goods. Transportation therefore, affects the value of goods both in demand and supply. One important function of transportation in economic activity is its services in the production of

economic goods and other services, or the creation of “utility”, the added usefulness of material and non-material things after some form of economic activity has occurred, such as many result from changes in form, place, time and place utility and thereby effects the demand for goods and value of goods. Several basis elements are necessary for substantial economic growth. There of these are adequate transportation system of communication, and a flexible source of energy or power. Our primary concern is with adequate transportation.

The transportation system is an integral part of production and distribution. Both large-scale production and mass distribution are necessary for economic development. Neither is possible without efficient and cheap transportation. Transportation is the very foundation of economic development.(Zaw, 2009)

### **2.3 Railway Transportation and Economic Development**

Railway system plays as a significant role in the development and overall growth of any economy. It is often regarded as the wheels of economic activity because of the crucial role it plays in production and distribution. It opens up regions, hinterlands and rural areas. Rail transport is seen as the mainframe around which an integrated national transport system. Its capacity which is farther accentuated by its safety and security factors, coupled with its ability to travel distance with ease and lower unit cost, places it in good stead to serve as the hub of a transport system.

With environmental and monetary costs of automobile transportation accruing, urban populations increasing, and cities attempting to reinvent their urban cores and business areas, it is no wonder that many municipalities and transit authorities are locking toward rail transport to accommodate current and future growth. Proponents of mass transport contend that such transportation reduces pollution via emission and surface reductions, eases auto congestion, save costs and assist elderly and low-income groups with access to work and amenities. Advocates also argue that mass transportation in the form of rail can act as a catalyst to economic development.

When posing the question of whether or not rail transport in an urban environment is cost effective and beneficial to economic development, the short answer is yes. The use of transit as an economic development tool lies in transit’s ability to provide higher densities and to create activity centers. Essentially transit

lines provide an alternative to the automobile, allowing more people in specified areas without increasing demand for roadways and parking. This allows more activity to occur in close proximity of a transit node such as rail or subway station. Furthermore, an effective transit system not only allows for ore housing, business and recreation activity to occur such locations, but it also encourages such dense development by providing a base of commuters and a common destination. Essentially, a transit center provides a scarce source of land that accommodates dense and mix-use development.

As such, the provision of a scarce land commodity often leads to further development which leads to densification that provides a vibrant economic and activity center. This, in turn, leads to even more market demand for such a location. This development can be played put in new and redeveloping urban areas.

Concerning the tangible effects of a transit network, experience indicates that transit lines and nodes create jobs, increase property values and efficiently link labor and business. It is also felt that an efficient transit network provides an additional economic boost to impoverished communities by connecting immobile populations to job and activity centers.

For instance, the first emergence of rail transport was initiated by James Watt in 1794 inventing the steam engine which spurred ideas for mobile steam locomotive that could haul trains on tracks. Steam locomotive require large pools of labor to clean, load, maintain and run. In the mid-nineteenth century, railways appeared on the global horizon. As a result, the life became speedier and the socio-economic growth started taking unprecedented strides. The island dwelling exploded into big cities and metropolises. The movement of men and material from one place to other gained tremendous proportion through the media of the railways. According to this, railways can provide socio-economic growth for people obviously.(Win, 2011)

#### **2.4 Advent of Rail Transportation**

The industrial revolution of the eighteenth century was brought mainly due to the invention of steam power generation. Prior to the discovery of steam engine, the power to turn various sectors of economy such us industry, agriculture, and transport depend upon the animals and men power. Caramels, horses and elephants and other species were utilized turn the wheels of industry, plugging of fields and extraction of

water from the underground resources and haulage of men and materials across national and international frontiers.

During 1845, the beginning of first commercial steam engine driven railway trains in United Kingdom laid the solid foundation of the railway revolution throughout the world. In Europe, the French, German and Russian nations started constructing their national railways in a big way even crossing over the national frontiers. In Asia, the colonial power such as British Raj in India, Myanmar, Sri Lanka, Middle East and Malaysia started constructing in a massive way ostensibly on the plea of military and defenses logistics to support their conquest of faraway lands and to manage properly the occupied territories.

The First World War (1914-18), the earlier part of the twentieth century, however, brought about phenomenon development in Road and Air sectors as a spin-off, high building and aircraft construction technologies which were developed at a rapid pace. Air transport and high transport started making inroads into the supremacy of modern buses and cars gave practically a dead blow to railways. Railways having began stagnant in their outlook, being the monopolists in transport sector at that pointy of time, ignored the vital aspects of research and innovation to carter for higher and more mobility. The road sector having the inherent quality of door to door service became the biggest rival to the railway. Thus, towards the end of Second World War and later on, the railways started losing its ascendancy and preference in the global market of transport. The major reason of this flop of railways is attributed to the very conservative attitude of railway construction, manufactures of its various equipment operators and managers towards, research, innovation and higher speeds in the railway operations.

The beginning of twentieth century witnessed the quality improvement in railway transport, the major being the realm of speed increases and comfort advancement. French national railways have performed fully fledged activities to upgrade their railway system with a view to achieve higher speed on their existing infrastructure of railway track, signaling system and equipments including locomotive rolling stock and fraction. The result was, by 1955 the achieved the breakthrough of attaining a speed of 331 km per hour on existing track. The world record of a commercial train was attained between Paris and Lyon (nickname TGV: Tress Grand-

Vitesse very high speed) on the newly constructed railway line during February 6, 1981. The speed record achieved was 380 km per hour.

In the east, Japanese national railways had also embarked on copying the French Railway's "Model of TGV". The Japanese national railway instead of upgrading speed on their existing lines went on a big way to build new lines with sophisticated technology based on rails embedded in pre stressed concrete girders on slabs erected on concrete pillars. The Tokaido line was commissioned in 1964 and SANYO line in 1975 with speed of 200km per hour and 250km per hour respectively. Since the Japanese national railways have nicknamed their high speed line as Shinkansen railways.

During World War II, Japanese invaded to southern Taninthayi and control over entire Southeast Asia and they use railways as their major support of logistic and military equipment transportation. After World War II, dramatically increased the labor costs in developed countries, made steam an increasingly costly of motive power. At the same time, the war had forced improvements in internal combustion engine technology that made diesel locomotive cheaper and more powerful. This cause many railway companies to initiate programs to convert from steam to diesel engines. Rail transport has experienced becoming less popular in the world economy following the large scale construction of motorways after the war. However, the 1973 oil crisis led to a change of mind set to prefer mass-transport of rail system that had survived again and remained today global economy.

At the same time, freight trains became more competitive and participate on freight transport. During 1970, the introduction to the automated rapid transit system allowed cheaper operation. The 1990 saw an increase focus on accessibility and low-floor trains. Many railways have been upgraded to light rail and many cities which closed their old ways have reopened new light rail systems. In the worst case, rail ceased to be a serious option for transport passengers of goods, as cars and tracks look over in the last few decade. Even in the best instances, government failed to sustain adequate investment in rail network, forcing some lines to close and others to reduce the frequency of trains.

But today congested highway, worsening smog and shortage of land for new roads are reviving official interest in railroads. The global rail revival is repelling by a

crisis, not a sudden disaster but a steady- worsening of air quality and traffic congestions. The planners have noticed that if one was to dream up a clean, efficient, safe transport a system for societies over the world, they would be hard pressed to produce a better idea than rail. It will be a long haul for countries that have neglected this important link in their transport system but many are beginning to renew their commitment to rail.(Zaw, 2009)

## CHAPTER III

### HISTORICAL BACKGROUND OF MYANMAR RAILWAY

#### 3.1 Pre Railways Era in Myanmar

In 1852, by the end of Anglo-Myanmar (Burmese) War, when British annexed Lower Myanmar (Burma), Ayeyarwaddy and Bago divisions became British colonies. These annexed divisions were widely produced regions. After the occupation of lower Myanmar the local product area like paddy, teak, tuber and other natural resources were widely exported to abroad and imported general cargoes in turn from their country. By this way the best efforts have been done for their maximum profits by the British. Myanmar Kings prohibited to export profitable goods especially rice sale while the British were extending paddy production areas and promoting rice exports. According the annexation of lower Myanmar in 1850-51m, paddy rice for (100 baskets) was Rs. 15 only and after annexation the price rose to Rs. 35 in 1855-56. However, the area was sparsely populated and due to poor transportation system, poor growing acreage did not increase as the British authorities had expected.

The one of communications were rivers and other water channels, bridle paths and car tracks across the field after the crops had been reaped. The road communication was very limited during the pre-railways period. Due to such inferior land routes if use to take about 12 days for travelling to Thetyetmyo (about 200 miles from Yangon) and 15 to 20 days to Taungoo (about 300 miles from Yangon by river routes. Therefore transportation charges were normally high and no drastic increase paddy production was seen. In 1874, for example while the price of paddy in Yangon was Rs. 95 per 100 baskets, the pricing ruling in Taungoo and the upper parts of Sittaung was from Rs.35 to 40 such that the price of paddy at Taungoo was just over one third of Yangon price. The steamer service along the coasts of Myanmar and between the parts of Myanmar and India were developed during the pre-railway period, although overseas steamer services with Europe were not yet well established.

The direct trunk steamer line between England and Myanmar was established soon after the opening of Suez Cannel. In 1871, the Myanmar was, for the first time, visited by three steamers which brought cargoes to Myanmar from England and took back Myanmar rice. In the following years, these steamers visited Yangon to Glasgow

approximately once a month by 1875 they had established regular monthly services. In this way, rice trading became much flourished and farmers tried to grow paddy more. Many Indian from India, Chinese from China and from upper Myanmar were attracted to settle and become engaged in paddy cultivation. While the same way timber, raw cotton and other products were exported an extensive scale and textile, coal, sugar were imported on a commercial scale. While the export trading was progressing for the smooth flow of commodities, good transportation system was needed emergently. But the progress in road construction was on slow that by 1870 there were only 709 miles of roads within British Burma gave the road mileage as 815. Therefore railway construction was essentially given priority by the British Government with various considerations.

From the economic point of view, the government believes that the construction of railway would leads to the expansion of cultivation and trade resulting in improvement of economic well-being of the people, their textile capacity and financial situation of the state. The constructions of railway were expected to encourage immigration from upper Myanmar and Shan State, as well as from India and China. The government intends to induce immigration and settlement, first along the railway line then further way, by means of railway construction. Therefore, most of railway lines of Myanmar were designed to open up virgin's territories by providing new means of transport for cultivation and settlement. British government believed that the railway construction would enhance the welfare of people not only by quickening the pace of this development, but also encouraging a wide of development of the resources of the country.

Therefore, the British Government decided to construct the early new rail lines leading to the border of Upper Myanmar, Pyay and Taungoo. They do believes that the construction of new railway lines would be equal to the addition of several regiments to the garrison f Myanmar, since troops and military stores could be sent quickly and at a smaller expense from Yangon to the frontier. Moreover, for the respective internal administrative control of British government needed the better means of communities. The railway played on important part in specifying the country and consolidating British power. Therefore, perhaps the railways were constructed mainly from military motives followed closely by economic motives.(Win, 2011)

### 3.2 Early Days of Myanma Railways

Early railway project in Myanmar were all connected with the idea of tapping the markets of Western China by mean of a Sino-Myanmar Railway line. But all these projects would involve high cost of construction through sparsely populated mountainous regions, with only remote prospects of an adequate return on investment. The idea of an Indo-Myanmar Railway connection also received attention to time to time. But since there were no prospects of any of the lines to be commercially successful and no matter of urgency, there were not implemented.

The Myanma Railways has gone through considerable succession of under the name of “The Rangoon and Irrawaddy Valley State Railways”. Myanmar became the 53<sup>rd</sup> country in the world to have the railway line. The Irrawaddy Valley Railways have a branch line which was from Letpandan, about half-way between Yangon and Pyay, to Tarwa, on the left bank of the Ayeyarwaddy River. The river was crossed by steamer ferry and there from Hezada. In new line, was opened in 1903 which proceeded to a south-westerly direction to Pathein which was 82 miles from Hezada and 108 miles from Letpandan. Other lines from Hezada proceeding northwards to Kyangin (about 66 miles from Hezada) was opened in 1908.

Extension of railways from Yangon to Taungoo about 66 miles was first opposed in 1874 by a private British firm, the Burma Company Limited. Railways were laid on the partially finished Bago. Taungoo trunk road for about 117 miles and the line was opened in 1855, under the title of “Rangoon and Sittaung Valley State Railway”. The second stage of the southern section of main line from Taungoo to Mandalay (220 miles) was sanctioned by the India Government shortly annexation of Upper Burma; the entire length was opened in 1889, under the title “Taungoo Mandalay Extension”.

“Mu Valley Railways” began in 1889 and the whole distance of 331 miles from Sagaing to Myitkyina was completed only in 1898. The section has two branch lines. The first was opened in 1895m was a feeder line of 15 mile connecting Naba on the Mu Valley Line (about 199 miles from Sagaing), with Katha on the Ayeyarwaddy. The other, running westwards from Sagaing to along the Chindwin River (70 miles) was opened in 1900.

The southern section of the main line has four branches lines. The first was opened in 1903, leaves Myohaung (3 miles south of Mandalay) and runs up the Shan plateau as far as Larshio (177 miles). A noticeable feature of this branch line is a steel viaduct across the Gokteik gorge, which constructed by an American firm at the cost of Rs. 1.7 million; it 2260 feet long and track is 300 feet above the lower water level. Two branch lines started from Tharzi about 80 miles south of Mandalay. One rail section running westwards for 70 miles to Myingyan on the Ayeyarwaddy, was constructed in two stages. The first stage from Tharzi to Meikhtila (13 miles) was sanctioned in 1893 as “famine relief measure” when a great portion of the dry zone area was confronted with scarcity due to drought, it was opened in 1893. Meikhtila-Myingyan extension was opened in 1899. The other branch lines from Tharzi are running eastward to the Southern Shan State. In 1916, a completed section of the railway line (to Aungban 70 miles from Tharzi) was handed over to Burma Railways Company for operation. The fourth line that branches out from Yangon-Mandalay portion of the main line, leaves Bago and run eastwards to Mottama on the Thanlwin, crossing the Sittaung river by a bridge. It was opened in 1907.

From opening of the first railway line in Myanmar to the annexation of Upper Myanmar (i.e., 1877-1886), 331 miles of railways were constructed. During the following period (1887-1898), when Myitkyina, the northern most towns, was connected with Yangon by railways, another 604 miles were opened. A further 662 miles of railways in Myanmar of which 119 miles were double track. In 1941-42, Myanma Railways had 2058 route miles of railway.

There was, however, a set-back of the war was that out of 2058 route miles,, only 674 remained in operation. Out of 4383 bridges included the major ones such as Gokteik, the Ava, Sittaung, Dage, Ngawan, Myitnge, Meza and Ngamoeyeik bridges. About 51 percent of the investments on the railway assets of Myanma railways were destroyed by the Second World War.

From 1<sup>st</sup> May 1877, the starting date of Myanma Railways, 2058 route miles (2852 track miles) of rail lines were constructed up to 1948, the year of Independence of Myanmar. But 284 miles of rail lines were dismantled by Japanese Army to construct the famous Dead Railways line from Thanphyuzayat at (Myanmar) to Thailand. Therefore there were 1771 route miles (2567.98) track miles of railways,

5084 bridges, 385 stations and 3 workshops in 1948. During the period from 1948 to 1988 (40 years) only 205.4 miles, including 29.5 miles of circular rail line, of new construction of railway lines had been recorded.(Win, 2011)

### **3.3 Background of Myanma Railways and Yangon Circular**

#### **Railway**

The first railway line in Myanmar, between Yangon and Pyay, 161 miles apart, was opened on the 1<sup>st</sup> of May 1877, by the Irrawaddy State Railway. But in 1896, Irrawaddy State Railway gave way to Burma Railway Co. Ltd. Operating on a commercial basis and when the company's lease was ended on the 31<sup>st</sup> December 1928, Burma Railways was placed under the Indian Railway Board.

Myanmar and India were separated in 1937 and the Government of Myanmar formed the Burma Railway Board to look after the affairs of the Myanma Railways. In 1942, the British Governor took over the powers and functions of the Burma Railway Board and relegated these powers to a body of persons with the Chief Railway Commissioner as ex-officio president. This Railway Board continued to function until the 31<sup>st</sup> December 1947.

On the 4<sup>th</sup> of January 1948, Myanmar gained independence and a new Railway Board was instituted with Financial Commissioner, Lands and Rural Development as Chairman. On the 1<sup>st</sup> of December 1951, the Union of Burma Railway Board Act was enacted under which a full-time permanent Chairman was appointed, who was also to be the Chief Executive Officer.

The Union of Burma Railways was again recognized in 1972 and the power and the functions of the Union of the Burma Railway Board were entrusted into the hands of the management of committee, the Chief Executives as Chairman and the name, Union of Burma Railways was changed to the Burma Railways Corporation.

The State Law and Order Restoration Council tool over state power on 18<sup>th</sup> September 1988 and following the change of the Socialist Republic of the Union of Burma to Union of Myanmar. The name Burma Railways Corporation was changed to Myanma Railways on 1<sup>st</sup> April, 1989 (hereinafter referred to as "MR").(wikipedia, 2018)

Yangon Circular Railway was built during colonial times by the British. The double track railway was built in 1954. In July 2011, the Ministry of Rail Transportation announced that it intended to privatize the Yangon Circular Railway, since the government-run system operates at a loss for the government, with monthly operating costs about 260 million kyats (U.S\$ 325,000) and monthly revenues about 42 million kyats (U.S\$ 52,500). Ticket prices have been kept low because of ministry subsidies.

In December 2012, Japan International Cooperation Agency began its collaboration with Yangon City Development Committee to develop a master plan for the Greater Yangon Region, including the issue of public transport. In 2015, air conditioned coaches were introduced with a slightly higher ticket cost, but these did not last long, and mid 2016 air conditioning was no longer available.

Myanma Railways has plans for a major upgraded for the Circle line since 2012. It is to be funded in large part by a \$212 million loan from Japan's development agency. The hope is for all the coaches and engines to be replaced by 2012, along with automation of the signaling systems and replacement of aging tracks. The frequency of trains would be increased from the current two per hour.(wikipedia, 2018)

### **3.4 History of Yangon Central Railway Station**

Yangon Central Railway Station is located in downtown Yangon. It is the largest railway station in Myanmar. Yangon Central railway station was first built in 1877 by the British to support Burma's first railway line from Yangon to Pyay. The station was located on the southern side of the railway compound on the upper block of Phayre Street (now Pansoedan Street) in the downtown area. The building was designed in the British Victorian Style and the access roads were bordered by grassy lawns. The beauty of this properly prompted locals to praise the new structure as the Fairy Station.

The station became a favorite target for Japanese bombers during World War II. In 1943, it was destroyed by British forces retreating to India. The station was rebuilt the following the war according to the design drawn by the engineer HlaThwin and based on Burmese traditional architectural styles. The new structure was 5110

square meters (55,000 sqft) in size. To the north were grass lawns, gardens and wide access lanes. The new design was approved by Railway Authority on 7 May 1946. Construction was started in January 1947 by engineer Sithu U Tin and completed in May 1954 at a total cost of Kyat 4.75 million. The opening ceremony of the new Yangon Central Station was held on 5 June 1954. Yangon Central Railway Station has been designated a landmark building in 1996. In December 2007, the Yangon government announced a master plan that will relocate Yangon Central to a satellite town, East Dagon, 32 kilometers (20 mile) from downtown at an unspecified date. (Yangon Central railway station, 2017)

## CHAPTER IV

### THE SITUATION OF YANGON CIRCULAR RAILWAY

#### 4.1 The Profile of YCR

Yangon, the former capital of Myanmar, is so evergreen and cool with lush tropical trees, shady parks and beautiful lakes, it is earned the name of the Garden city of the East and though with atmosphere of a typical Asian city. It stands out in contrast as it is not get overwhelmed with the global trends of modes unity and is making its own progress at its own pace, in its own calm, civic culture. Being the main entrance to the country and principle seaport, it is the hub of business activities and government offices as well as non-government organizations

Yangon was the center of major anti-government designated Naypyitaw, 200 miles (322km) north of Yangon as the new administrative capital and subsequently moved of the government to the newly developed city. At any rate Yangon remains the largest city and the most commercial center of Myanmar.

The population of Yangon city in 1973 was only 2 million, but in 2000 it reaches 5.56 million, in 2010 it was over 6million and now in 2018 it was 7.4 million. When the population of Yangon city became over crowded, new townships are extended and established.

As the population is increased year by year, Yangon is facing the problem of traffic jam. To ease the traffic jam, more and more people are taking Yangon circular trains. According to the motor.com.mm's report which surveyed about 500 commuters in the commercial capital between late 2014 and early 2015, more than 33 percent of Yangon commuters who take buses spend four hours travelling to and from work every day. (Chang, 2017)

Currently, statistics show 3.7 million or 79 percent, of Yangon resident uses buses and for their daily commute, 7 percent catching ferries, 4 percent riding circular trains and 2 percent taking circular trains and taking taxi.

The transport sector in Myanmar consists of four major modes namely rail, road, river and air. In railway transportation, Yangon Central Railway Station is a major hub of the 5068 kilometer (314 mile) Myanmar Railways system.

For the satisfaction of passenger, it was to be better and smooth transportation. And then the tosh of transport facilitation has been priority for the development and modernization of the town and villages throughout the country.

Railroad infrastructure provision including railroad, railway stations, bridges and tunnels are to be built by mainly Civil Engineering Department of Myanmar Railways likewise, repair and maintenance of locomotive as well as passenger coaches and freight wagons are treated by Mechanical and Electrical Department. Rail transport operation is carried by Operating Department.

Myanma Railways are separated 11 regions for railway

No.1 Region, Myitkyina

No.2 Region, Ywataung

No.3 Region, Mandalay

No.4 Region, Kalaw

No.5 Region, Taungoo

No.6 Region, Yangon (Pyay)

No.7 Region, Yangon (Insein)

No.8 Region, Mawlamyine

No.9 Region, Hinthada

No.10 Region, Pakokku

No.11 Region, Bagan

The first railway in Myanmar started its service on May 1, 1877 with the 161 mile meter guage line from Yangon to Pyay. In 1889, Yangon-Mandalay railway line has been completed by connecting four segments namely Yangon- Nyaunglaybinin 1884, Nyaunglaybin-Taungoo was developed in 1855, Taungoo-Yamethin in 1888 and Yamethin-Mandalay in 1889, respectively. Since 1890, as soon as the completion of those railway lines, local trains namely Yangon-Thingangyun-Toegyaunggalaytrainon Yangon-Pyay railroad and Yangon-Kyimyindaine-Insein

train along Yangon-Pyay railroad has been operated for people who live in suburban area.

Before the Second World War, Myanmar Railways had planned to connect the Yangon city and suburban areas with loop circular railway. But the Second World War was suddenly happened in the South East Asia. Also Myanmar had met the Second World War and the plan of circular train was not started.

After the Myanmar Independence under the Caretaker are Government era, General Nay Win developed the former plan of circular train in Yangon.

The earth work for construction of circular line began on December 10, 1958 and construction of railroad was completed on March 19, 1959. In fact, the construction of circular line means the connection of pre-existing two main railways lines. Yangon-Pyay and Yangon-Mandalay which extends nearly north directions. By linking between Mahlwagon Station on Yangon-Mandalay railroad and Danyingon Station on Yangon-Pyay Railroad with double track.

In 1997, Danyingon-Hlwaga line 5.22 miles was started and completed in 1998. It joined at Hlawga and University of Computer Studies. Myanma Railways extended Toegyaunggalae to Okkphosu for 8.81 miles, starting in 1972 and completed in 1973. Also Okkphosu-Thilawa Deep Sea Port 9.25 mile line started in 2003 and opened in 2003 November. It wa expanded to East University 3.9 miles in 2006. As a result, circular trains of Yangon have been extended University of Computer Studies from Danyingon in the North, from Toegyaunggalae to Thilawa as well as East University in the South and up to Dagon University of Economics in Ywathargyi in the East. But in 2018, the trains run from Yangon to University of Computer Studies are stopped. But arrangement has been made to service commuters with the YBS 78 bus line.

## **4.2 Stations**

Yangon Circular Railway is the local commuter rail network that serves the Yangon metropolitan areas. Operated by Myanma Railways, the 45.9 kilometers (25.5 miles), 38 station loop systems connects satellite towns and suburban area to the city. Circa 2008-2010, railway had about 200 coaches and had 20 daily runs and sold 100,000 to 150,000 tickets daily. This loop which about three hours to complete, is a

way to see a cross section of life in Yangon. The railway is heavily utilized by low-income commuters, as it is along with buses, the cheapest method of transportation in Yangon.

The hours of service have been consistent over the year, from 3:45 am to 10:15 pm daily. In 2011, the cost of the tickets for a distance for 15 miles was two hundred kyats (~18 U.S cents) and that or over 15 miles for four hundred kyats (~37 U.S cents). In the new currency (introduced in 2012) long distance tickets are 200 kyats (~20U.S cent).

The stations covered by the circular trains are as follow:

1. Yangon Central Railway Station
2. Pagoda Road
3. Lanmadaw
4. Pyay Road
5. Shan Road
6. Ahlone Road
7. Panhlaing Road
8. Kyimyindaing
9. Hantharwaddy
10. Hledan
11. Kamaryut
12. ThiriMyaing
13. Okkyin
14. Thamaing
15. ThamaingMyothit
16. Gyogon
17. Insein
18. Ywama
19. Phawkan
20. Aung San Myo
21. Danyingon
22. Golf course
23. Kyaikkalae

24. MingalardonBazzar
25. Mingalardon
26. Waibage
27. Okkalapa
28. Paywetseikkon
29. Kyaukyedwin
30. Tantarkalay
31. Yegu
32. Parami
33. Kanbe
34. Baukhtaw
35. Tarmwe
36. Myitanyunt
37. Maglwakone
38. Pazuntaung

Trains depart Yangon Central railway Station approximately every 45 to 60 minutes. These trains are run as a snail's pace.

There are 38 stations on the circular line and 17, stations (including 3 stations in jointly used which the circular line) on the suburban line. These stations are generally classified into two types: Block station having a station master and clerk and pick-up station having only station clerks. There are 17 stations (including Yangon, Kyimyindine, Insein, etc.) of the former type and remaining 31 stations are of the latter type.

Since the circular line was constructed parallel to the geographical structure of the city, it was seen as a long and thin loop stretching in north- south direction. As a result, it covers most part of the city, including inner urban areas and also outer urban areas. Moreover, circular line crosses many townships and connects Central Business District (CBD) to Dagon, Alone, Kyimyindaing, Sanchaung, Kamayut, Hlaing, Insein, Mingalardon, North Okkalapa, South Okkalapa, Mayangone, Yankin, Tarmwe, Thingayun and MingalarTaungnyunt etc. Some bus stops are arranged close to the centers of the CBD and residential areas, the stations are located slightly away from the center. For example, stations such as Yangon Railway Station, Pagoda Road

Station and Lanmadaw Stations lie at the northern end of the CBD and Okkalapa Station and Paywetsaikkon are at the west end of North Okkalapa Township and Kanbe Station and Baukhtaw Station are at the west end of South Okkalapa Township.

Some station have well-developed shopping centers nearby such as Yegu, Hledan and Pyay Road. Access roads are not well constructed and there are only narrow paths in Wailbargi and Golf Course. Some stations such as Kyeikkale, Tadagale, Pazundaung, Danyingon, Kyaukyedwin, Pyay Road, Hlendan and Mingladon are located not far away from bus route and some stations such as Mingladon Bazaar, Waibargi, Yegu, Kanbe and Baukhtaw are located quite far away from Bus routes. Therefore, it is not convenient for passengers who want to transfer one mode to another to reach their destination. Some station are located bazaar nearby such as Mingalardon Bazaar, Paywetsaikkon, Hledan and Kanbe. Therefore, it is convenient for passengers who want to reach bazaar.

Among 38 stations, numbers of passenger in 8 stations are much fewer than other 30 stations. Those 8 stations are Ahlone, Hanthawaddy, and Golf courses, Mingalardon Bazaar, Waibargi, Okkalapa, Yegu and Bauktaw.

### **4.3 Locomotives**

A locomotive is a large vehicle that pulls a railway train. And then locomotive engine also called a self-propelled engine driven by steam, electricity or diesel power and use for drawing trains along railway track. There are many locomotives in Myanma Railways. They are steam locomotive, diesel locomotive, and RBE (rail bus engine).

A steam locomotive is a railway locomotive in which consisting of a steam engine. These locomotive are field by burning combustible material usually coal, wood or oil to produce steam in a boiler.

A diesel locomotive is a type of railway locomotive in which the prime mover is a diesel engine. Several type of diesel locomotive have been developed differing mainly in the means by which mechanical power is conveyed to the driving wheels. Some of the diesel locomotives

are diesel locomotive or diesel electric locomotive and diesel hydraulic locomotive. Horse power train engine is a type of diesel electric locomotive.

Rail bus engine is the engine that is a lightweight passenger rail vehicle that shares many aspects of its construction with a bus, typically having a bus body and four wheels on a fixed base, instead of bogies.

Myanma Railways established Insein Locomotives Workshop (for Diesel Electric Locomotives) in 1958. It has the assets of rolling stocks in 2015/2016 to 2016/2017 as mentioned below.

Table (4.1) Number of locomotives in Yangon circular trains in 2015/2016 to 2016/2017

Type	Horse Power Engine(HP)	2015/2016	2016/2017
Diesel Electric Locomotive	900 HP	5 No.	5 No.
	1200HP	5 No.	5 No.
RBE	250HP	22 No.	22 No.
	300HP	30 No.	30 No.
Total		62 No.	62 No.

Source: Mechanical Department of No.7 Region, Yangon (MR)

Comparatively, from 2015/2016 to 2017/2018 there is no change the number of locomotive that runs in Yangon circular railway line. In 2016/2017, therefore, Myanma Railways owns a fleet of 62 locomotives in Yangon circular railway line that consists the numbers of diesel electric locomotive 900HP is 5, 1200HP is 5 and the numbers of RBE locomotive 250HP is 22 and RBE 300 HP is 30. It means that more types of locomotives required for various kinds of spread parts.

#### 4.4 Train Services

Myanma Railway operates an average of 13 big trains and 12 RBE trains operate daily in Yangon circular and suburban line. The numbers of trains by type are as follows.

Table (4.2) Number of trains per day 2016/2017

Train Types	No. of Passenger Coaches	No. of Running Round	Total coaches	No. of Trains
Big Train	6	7	42	7
	5	5	25	5
	3	1	3	1
RBE	5	2	10	2
	4	9	36	9
	2	1	2	1
Total coaches			118	

Source: Mechanical Department of No.7 Region, Yangon (MR)

Table shows that there are two types of train; big train and RBE train. Big trains are composed of diesel electric locomotives and various coaches which are six, five and three coaches. Rail bus also has various coaches which are five, four and two coaches. In big train types, 6 passenger coaches run 7 round per day, 5 passenger coaches run 5 round per day and 3 passenger coaches run 1 round per day. In RBE train type, 5 passenger coaches run 2 round per day, 4 passenger coaches 9 rounds per day and 2 passenger coaches 1 round per day. The seating capacity for a coach is set at 64 persons with standing space for 36 so that total capacity of a unit train is 600. On office days at peak hours circular trains are overcrowded and at slack hour passengers are light. The passengers in open season are relatively much more than in the rainy season.

#### 4.5 Operation of Yangon Circular Railway

The Circular Line and Suburban Line are operated separately but they are overlapped in some trip routes. On the Circular Line, there are both loop and shuttle operations such as Yangon-Insein/ Insein-Yangon (Shuttle), Yangon-Mingalardon/ Mingalardon-Yangon (Loop), while suburban lines have shuttle operations such as Yangon-Ywathargyi/ Ywathargyi-Yangon(Shutte) and Yangon-Toegyaunggalay/ Toegyaunggalay- Yangon (Shuttle). At the present, 26 trip routes, 200 scheduled trains daily run from 3:45 am to 10:15 pm. The following table (4.2) shows number of trip routes and schedule trains run daily.

Myanma Railways provides 131 trains on Circular Line while two trip routes are operated on suburban line (Hlawga-Insein/ Insein-Hlawga) with 27 trains.

However, there are 12 trip routes which run between CBD of Yangon and Suburban areas with 68 trains using both circular rail road and suburban rail road. Those trip routes for example, Yangon-Insein-Hlawga, Yangon-Toegyauunggalay and Yangon-Thilawa.

A round trip on the Circular Line takes about 3 hours including stopping time in each station is about 20 seconds as the current available speed is 20 km/h. This railway is recognized one of the most important infrastructure of Yangon.

It is obvious that existing circular trains system is not satisfactory mainly due to lack of punctuality. In order to supply punctual train service, it is essential to make the daily maintenance work on rolling stocks. Although the age (service life) of the locomotives is limited for 30 years, the age of the coaches is limited for 30 years, most the running rolling stocks are over aged. Some 50 years old locomotives are still running, some over aged coaches are underutilization that leads to unsatisfactory service quality of circular train. The genuine spare parts availability of is most because of the obsolescence of its rolling stock. Spare parts problem of locomotives is a major problem for Myanmar Railways Circular Train Service.

In comparison with the city bus service with Yangon City Development Project areas, it was found that number of passenger of circular trains was only 3% of total. However, it is foreseen that the circular train system will be developed and will be becoming a major public transport system. To this, JICA is planning to implement projects by two stages for subway and sky train system.

According to Myanmar Railway Region No. (7), a huge a huge investment was made one the upgrading of Yangon Circular Train System starting from august 2012 although Japan has agreed to provide assistance on these improvement.

From these improvements, it was planned to spend kyat 284 million at the first stage for some activities such as maintaining 38 railway stations for Circular Trains, replacing the PC sleepers instead of wood sleepers and improving the railway lines. At the second stage more than Kyat 1000 million and the third stage more than Kyat 800 million are planned to spend to carry out fixing walls along railways lines, fencing and constructing over-head bridges.

It was also noted from Myanmar Railways that replacing of fiber plastic seats instead of wooden seats on the over 50 coaches and maintaining the old rolling stock, filling of ballast. In order to operate better controlling system, Myanmar Railways has plan to apply GPS in Yangon Circular Rail line in the end of 2012.

Myanmar Railways has planned to maintain the railway of Insein-Kyimyindine , Kyimindine-Yangon (Pagoda Road), Danyingone-Paywetsaikkon, Paywetsaikkon-Yangon (Pazuntaung) in 1<sup>st</sup> December, 2019. And its plan is predicted to complete in 31 March, 2020.

Although tenders are invited for privatizing on Yangon Circular Train because it was not making any profit, no single private company was interested to bids. The main reason was that the monthly net income was far behind from the expenses put on the circular trains and it was not possible in long-term situation.

Therefore, Yangon Circular Train are being managed under the Myanmar Railways with the assistance from overseas and later on it would be again considered to transfer to the private sector.

Table (4.3) Number of Trip Routes and Schedule of Trains Daily in 2017

No.	Trip Route	Train	Remark
1	Yangon-Mingalardon-Danyingon	2	Circular
2	Danyingon-Mingalardon-Yangon	2	Circular
3	Insein-Yangon (Anticlockwise)	34	Circular
4	Yangon-Insein(Clockwise)	38	Circular
5	Yangon-Mingalardon-Insein-Yangon	7	Circular
6	Yangon-Insein-Mingalardon-Yangon	7	Circular
7	Insein-Hlawga	11	Suburban
8	Hlawga-Insein	11	Suburban
9	Yangon-Mingalardon	16	Circular
10	Mingalardon-Yangon	16	Circular
11	Insein-Mingalardon-Yangon	4	Circular
12	Yangon-Mingalardon-Insein	3	Circular
13	Yangon-Paywetseikkon	1	Circular
14	Paywetseikkon-Yangon	1	Circular
15	Yangon-Toegyaunggalay	8	Circular/Suburban
16	Toegyaunggalay-Yangon	8	Circular/Suburban
17	Yangon-Ywathargyi	8	Circular/Suburban
18	Ywathargyi-Yangon	8	Circular/Suburban
19	Yangon-Okkphosu	2	Circular/Suburban
20	Okkphosu-Yangon	2	Circular/Suburban
21	Yangon-Thilawa	2	Circular/Suburban
22	Thilawa-Yangon	2	Circular/Suburban
23	Yangon-Dagon University	9	Circular/Suburban
24	Dagon University-Yangon	9	Circular/Suburban
25	Yangon-East Yangon University	5	Circular/Suburban
26	East Yangon University-Yangon	5	Circular/Suburban
	Total	221	

Source: Mechanical Department of No.7 Region, Yangon (MR)

#### 4.6 Fare System

Ticket fare calculation is based on the rates of per person-mile. Myanmar Railways reduced the Yangon circular and suburban train tickets in 1<sup>st</sup> July 2016. Ticket fares are shown in table.

Table (4.4) Ticket fare for Yangon Circular and Suburban Train in 2017

Mile	Ticket fare (Kyat)
Absolutely 15 miles	100
Above 15 miles	200
The whole circular line	200

Source: No. 7 Region, Yangon, (Myanma Railways)

In 1st July 2016, ticket fare are changed from 200 kyats into 100 kyats for 15 miles trip and from 400 kyats into 200 kyats for above 15 miles trip. And the passengers can ride the whole circular line with 200 kyats.

Table (4.5) Monthly Paid Ticket for Circular Train in 2017

No	Type of Ticket		Ticket Fare
1	Absolutely 15 miles	Ordinary	2250
		Student	3350
2	Above 15 miles	Ordinary	4450
		Student	6700

Source: Financial Department of No. 7 Region, Yangon, (MR)

Monthly paid tickets are categorized into two groups. They are for ordinary and for student. For 15 miles trip, the ordinary commuter costs 2250 kyat for the whole month while it only costs 3350 kyats for a student. For above 15 miles trip, the ordinary commuter costs 4450 kyats for the whole month while it costs 6700 kyats for a student and these passengers can ride the whole circular line.

#### 4.7 Passenger Volumes of Yangon Circular Railway

The volume of passengers is received from Circular trains of No.7 Region, Yangon (fiscal year from 2013-2014 to 2017-2018) is shown below. From 2012/2013 to 2015/2016, the volumes of passenger from circular trains are decreased because there were also weaknesses in train that are limitation and take time for shuttle.

Table (4.6) Passenger Volumes of Yangon Circular Railway in 2012/2013 to 2016/2017

No.	Passenger Fiscal year	Yearly Average	Daily Average
1	2012/2013	30,577,000	83,772
2	2013/2014	31,754,000	86,997
3	2014/2015	28,267,000	77,443
4	2015/2016	25,342,000	69,430
5	2016/2017	28,029,000	76,791

Source: Financial Department of No. 7 Region, Yangon, (MR)

According to the table, the average daily passenger who ride circular train are about 83,772 in 2012/13 and it decreased to 69,430 in 2015/2016. The short trip of Inn time, HlayHlaw Inn was temporary cancel and the number of shuttle train was increased. In 2016/2017, the average daily passengers are increased because of the ticket fares are changed in 1<sup>st</sup> July 2016.

#### 4.8 Income Receipts from Yangon Circular Railway

Circular rail line income can be classified into passenger and other income. Table (4.4) shows income of different services in Yangon Circular Railway in 2012/2013 to 2016/2017. All the data are received from No.7 Region, Yangon of Myanmar Railways.



Total income of circular railway consists of two sources of income: Passenger income and other income. Among these sources, the share of passenger income is highest, an average of 80% contribution in the total income received. Other income was an average of 20%.



According to the Table (4.7), the total income in the fiscal year of 2015/2016 is the highest within five years. It is seemed that the change of ticket fare in 1<sup>st</sup> July 2016.

#### 4.9 Fuel Usage in Yangon Circular Railway

The comparison of fuel usage to run the circular trains is received from No.7 Region, Yangon (fiscal year from 2015/2016 to 2016/2017).

Table (4.9) Fuel Usage of Circular Railway in 2015/2016 to 2016/2017

Year Month	2015/2016 (fuel usage)				2016/2017(fuel usage)			
	Per gallon	Total gallon	Fuel Cost (in Million Kyats)	%	Per gallon	Total gallon	Fuel Cost (in Million Kyats)	%
April	2250	71854	161.672	3.13	3300	73359	230.823	4.50
May	2250	81105	182.486	2.77	3300	853968	281.813	0.38
Jun	2250	76594	173.147	2.93	3300	82830	273.339	4.00
July	2250	81997	209.092	2.74	3100	85258	264.3	3.63
Aug	2250	83005	211.663	2.71	3000	84891	263.162	3.53
Sep	2250	81071	206.731	2.77	3150	82827	260.905	3.80
Oct	2250	82499	210.372	2.72	3200	83254	266.413	3.84
Nov	2250	79651	203.11	2.82	3300	80043	264.142	4.12
Dec	2600	82546	214.62	3.15	3500	82128	287.448	4.26
Jan	2650	85027	225.322	3.12	3500	84275	294.963	4.15
Feb	2800	79271	221.959	7.13	3600	78442	282.391	4.59
Mar	3100	86728	268.857	3.57	3700	88769	328.445	4.17
Total	31400	1052453	2671.517	39.56	39950	1760044	3298.144	44.97

Source: Financial Department of No. 7 Region, Yangon, (MR)

According to the table, the fuel usage in circular trains was 1025453 gallons (39.56%) in 2015/2016. It was increased 1760044 gallons (44.97%) in 2016/2017. The fuel usage was increased about 5.41% in circular train. It is seemed that the passenger volumes are increased and the number of trains needs to be more run in Yangon circular railway. The total fuel cost are about 2671.517 in 2015/2016 and it increased to 3298.144 in 2016/2017. It is seemed that the effect of fuel price is rising in 2016/2017.

#### 4.10 Monthly Accident Cases

The accident cases includes train crash, almost crash, crash with cars/ vehicle in gates, cut off coach, skid accident on the way, skid in the station area and the people are injured and died by accident cases in monthly (fiscal year 2016/2017 and 2017/2018) in Yangon are also show as below.

Table (4.10) Comparison of frequency in Accident Cases

No.	Cases	2015/2016	2016/2017
1	Train Crash	1	-
2	Almost Crash	-	-
3	Crash with cars\vehicles in gates	15	19
4	Cut off coach	1	-
5	Skid accident on the way	15	22
6	Skid in the station area	18	17
	Total	50	58

Source: No.7 Region, Yangon (MR)

Comparison of frequency in accident cases, the accident cases are more occurred in 2015/2016. In 2016/2017, the most accident case is skid in the station area. In 2016/2017, the most of accident case is skid accident on the way.

Table (4.11) Comparison of injured and died by accident cases in monthly

Months	2015/2016		2016/2017	
	No. of injured	No. of died	No. of injured	No. of died
April	3	1	4	-
May	2	2	1	2
Jun	3	1	2	2
July	4	1	3	1
Aug	3	5	3	-
Sep	3	2	3	2
Oct	3	1	-	-
Nov	3	4	7	-
Dec	2	1	-	1
Jan	3	-	6	2
Feb	5	-	4	2
Mar	1	3	2	-
Total	35	21	35	12

Source: No.7 Region, Yangon (MR)

In 2015/2016, the people who are injured by accident cases are 35 and total people who are died is 21. In 2016/2017, total injured people are 35 and total died people by accident cases is 12.

## CHAPTER V

### CONCLUSION

#### 5.1 Findings

Transportation has become a part of daily life in the cities. Economic activities of towns located in remote areas are supported by transport system. Nowadays, cities face a range of traffic congestion that undermines the quality of life in area but also lets to deteriorating environmental, social and economic condition.

The present population is about 7.4 million in Yangon. The population density will be increased year by year. So vehicles used in Yangon will continuously increase in accordance with population and economic growth. A number of problems with the transportation system in Yangon make commuting and parking difficult and time consuming that means longer commuting time between the residence and workplace. So the rail is the environmentally efficient, safe and secure mode of transportation absolutely.

The 221 circular trains are run in 38 stations daily. The average daily passengers who ride circular trains are about 83,772 in 2012/2013 and it decreased to 69,430 in 2015/2016. It is seemed that there were also weaknesses in train that are limitation and take time for shuttle. In 2016/2017, the average daily passengers are increased because of the changes of fare system.

In 1<sup>st</sup> July 2016, ticket fares are changed from 200 kyats to 100 kyats for 15 miles trip and from 400 kyats to 200 kyats for above 15 miles trip. And the passenger can ride the whole the whole circular line with 200 kyats. Monthly paid tickets are classified into two groups: ordinary and students. For 15 miles trip, the ordinary commuters cost 2250 kyats and students cost 3350 kyats for a whole month. For above 15 miles trip, the ordinary commuters cost 4450 kyats and students cost 6700 kyats for a whole month.

The total income in the fiscal year 2012/2013 is 2877387 kyats (in thousands). The total income in 2015/2016 is 5706713 kyats (in thousands). It was increased about 289320 kyats (in thousands) because of the change of fare system. The total income consists of passenger income and other income. The passenger income is an

average 80% contribution in total income received and other income was an average of 20%.

The fuel usage in circular trains was about 1052453 gallons in 2015/2016. It was increased into 1760044 gallons in 2016/2017. It is seemed that the passenger volumes who ride in circular trains are increased and so the number of trains needs to be more run in circular railway in 2016/2017.

The comparison of frequency in the accident cases, the accident cases are more occurred in 2016/2017. In 2015/2016, the people who are injured by accident cases are 35 and total people who are died is 21. In 2016/2017, total injured people are 35 and total died people by accident cases is 12.

## **5.2 Suggestion**

In Myanmar, the government are heavily subsidized the rail transportation compared to road transportation. The improvement in availability and capacity of components in railway transportation could not catch of with the increasing infrastructure and population growth due to the scarcity of investment. To get more investment, the rail transport service would be improved the segmentation of the market, improvement of the basic services, adjustment of train schedules and the maintenance of existing infrastructures.

Although circular railway plays an important role in Yangon City Transport by facilitating movement of people and resources, it is found that the existing system is not satisfactory. Yangon Circular Railway will need to be upgraded to an international standard with fast, accurate and frequent trains to serve its population.

Myanma Railways should be produced more locomotives to run the Circular trains. Better communication system in all station needs to be provided to reduce waiting time, to provide the more air conditioning trains, seat and other facilities are also needed in every Circular train coaches. And the staffs are needed to be train to serve the passengers more serviceability. Train tickets should sell 20 minutes before the train departs. And the officer should supervised vendors who sell on the train systematically.

The expansion of circular rail line should be provided to catch not only new satellite town but also all over the city. Electrification of circular rail line should be started as soon as possible to meet the transport demand of the city. In the future, sky train or subway system should be implemented to share the burden of ever increasing market. Yangon Circular Railway should be restructured as a company on the basis on public private partnership.

## REFERENCE

- July Win. (2011). *A Study on Consumer Behavior on Performance of Myanma Railways*. Yangon Institute of Economics.
- Kyi Aye. (2005). *A Study on Railway Transportation in Myanmar(1998-2014)*. Institute of Economics Yangon.
- Mi Cho Mar. (2000). *A Study on Passenger Transportation in Yangon City (A case study on Shwe Eh The Bus Line)*. Yangon Institute of Economics.
- Min Zaw. (2009). *Analysis on Railway Transportaion Services in Myanmar*. Yangon Institute of Economics.
- Ohmar Lwin. (2013). *A study on service quality of circular train in Yangon city transport*. Yangon Institute of Economics.
- Phyu Phyu Thein. (1992). *Economic point of view on Myanma Railway Corporation*. Institute of Economics, Yangon.
- Thet Aung. (2012). *The Study on Public Transport System (A Case Study of Road Transportation in Yangon City)*. Yangon Institute of Economics.
- Thet Nay Yi. (2015). *A Study on Public Transport System in Yangon City*. Yangon Institute of Economics.
- Tin Maung Tun. (2017). *Public Transportation in Yangon City*. Yangon University of Economics.
- Win Zaw Htoon. (2017). *Transportation Development in Myanmar with Special Reference to Road and Rail Sectors*. Yangon University of Economics.

## Website Link

<http://en.wikipedia.org/wiki/Yangoncentralrailwaystation>, Accessed Date (11.11.2017)

<http://en.wikipedia./wiki/Yangon>, Accessed Date (9.6.2018)

<http://en.wikipedia.org/wiki/MyanmaRailways>, Accessed Date (30.7.2018)

<http://en.wikipedia.org/wiki/YangonCircularRailway>, Accessed Date (9.4.2018)

<http://en.wikipedia.org/wiki/railbusengine>, Accessed Date (19.5.2018)

<http://en.ikipedia.org/wiki/railtransport-in-myanmar>, Accessed Date (14.1.2018)

<http://en.wikipedia./wiki/railnetworkofYangoncircularrailway>, Accessed Date (9.4.2018)



Table (4.7) Comparison of Income from different circular railway services in 2012/2013 to 2016/2017 (in thousand kyat)

Months	2012-2013					2013-2014					2014-2015					2015-2016					2016-2017				
	Circular	%	Other income	%	Total	Circular	%	Other income	%	Total	Circular	%	Other income	%	Total	Circular	%	Other income	%	Total	Circular	%	Other income	%	Total
April	113621	84.30	21159	15.70	134780	116552	97.63	2818	2.37	119370	184315	45.32	222353	54.68	406668	225118	94.51	13054	5.49	238172	243651	86.7	37360	13.3	281011
May	129506	55.55	103613	44.45	233119	138682	46.17	161559	53.83	300241	218644	47.7	239365	52.3	458009	273791	71.01	264760	28.99	538551	273296	40.37	403624	59.63	676920
Jun	118339	76.46	36440	23.54	154779	137898	83.79	26666	16.21	164564	204492	70.96	83680	2404	288172	262350	71.58	105528	28.42	367878	264891	62.15	161254	37.85	426145
July	117546	85.89	19315	23.54	136861	143123	96.96	4482	3.04	147605	210652	68.03	98883	31.45	309535	287644	92.53	23215	7.47	310859	224037	88.70	28525	11.3	252562
Aug	121162	47.60	133382	17.11	254554	150251	47.65	165032	52.35	315283	225568	55.80	178638	44.20	404206	289790	54.33	243534	45.67	533324	231574	39.35	356819	60.65	588393
Sep	119030	73.83	42193	52.40	161223	146329	77.59	42245	22.41	188574	246374	63.73	140216	36.27	386590	314542	69.88	135558	30.12	450100	224160	60.43	146739	39.57	370899
Oct	122647	97.15	3603	26.17	126250	174027	91.41	20061	8.59	194088	265773	90.89	26622	9.11	292395	332243	94.37	19807	5.63	352050	243990	56.30	189361	43.7	433351
Nov	117245	46.40	135458	2.85	252703	180703	56.81	137337	43.19	318040	227737	48.83	238607	51.17	466344	293142	52.22	268188	47.78	561330	226610	32.04	480559	67.96	707169
Dec	123801	77.50	35933	53.6	159734	180688	75.98	57098	24.02	237786	251205	73.60	90104	26.4	341309	312891	97.49	345911	52.51	658802	242105	52.22	221448	47.78	463553
Jan	123996	91.92	10903	25.50	134899	187747	56.53	81300	43.47	332062	262889	68.53	120709	31.47	383598	294843	84.15	55523	15.85	350366	262612	84.06	49783	15.94	312395
Feb	114071	17.31	545005	8.08	659076	175086	52.72	156976	47.18	332062	239070	98.48	3676	1.52	242746	275272	41.33	390699	58.67	665971	251728	86.74	38472	13.26	290200
Mar	126625	29.45	303330	70.55	429955	206666	82.71	43173	17.29	249839	266635	66.16	136332	33.84	402967	302480	45.09	368293	54.91	670773	273253	41.35	387483	58.65	660736
Total	1447989		1390334		2837923	1937752		898747		2836499	2803354		1579185		4382539	3464106		2234070		5698176	2961907		2501427		5463334

Source: Financial Department of No.7 Region, Yangon (MR)

Table (4.8) Total income of different circular railway services in 2012/2013 to 2016/2017

No.	Fiscal Year		2012/13	%	2013/14	%	2014/15	%	2015/16	%	2016/17	%
	Items											
1	Passenger Income (Kyat in Thousands)		1447589	50.31	1937752	67.80	2803354	63.80	3464106	60.70	2961907	54.14
2	Other Income (Kyat in Thousands)		1390334	49.64	898747	32.20	1579185	36.20	2234070	39.30	2501427	45.86
	Total Income		2877387		2858068		4393933		5706713		5471168	

Source: Financial Department of No. 7 Region, Yangon, (MR)

# APPENDIX

