Mawlamyine as A Commercial City in Greater Mekong Subregion

Yin Min Paik and Wyityi Win

Abstract— *The efficiency of large cities, as a form of spatial organization of human activity, and the quality of life of urban dwellers, will greatly depend on the development of transport systems. If well developed, transport systems can strengthen the economy, enhance the productivity of human resources and contribute to the social utility of material and cultural assets accumulated in large cities. Mawlamyine is generally considered to be off the main tourist trail for most travellers to Myanmar because the city have a charm of its owned rich history, buildings with colonial style architecture and other factors making it a fascinating place to visit. The transportation network, infrastructure development, urban population density and gross domestic product are increasing in Mawlamyine City. It can become the Regional Growth Centerof Myanmar after completion of East-West Economic Corridor in Greater Mekong Subregion. Urban development of Mawlamyine City such as population densities, social economic factors, social infrastructures, physical infrastructures, city boundary and urban growth patterns, land use classification and urban recreation areas and areas of historical heritage will be studied in this paper. Finally the structure plan of future Mawlamyine City development with needed urban facilities is proposed in this paper.*

Keywords— **East West economic corridor, Greater Mekong Subregion, Mawlamyine city, urban development.**

1. INTRODUCTION

The twentieth century is an age of urban transition taking place in developing countries where it is associated with fast growth in the size and increases in the number of large cities. Cities in developing countries are fast reaching the ranks of the world's largest cities. This trend breaks the historical connection between city size and levels of economic development and political power.

The membership of ASEAN is a clear indication of Myanmar's intention to reform its economy at the pace that is acceptable to both Myanmar and other ASEAN members. The present day settlement system of Capital of Mon State, Mawlamyine is clearly the outcome of the socio-economic processes at work on the basic resource of the regions. It is clear that future pace and pattern of overall economic growth of Mawlamyine City and that of Lower Myanmar as a whole will be directly related to the major socio-economic problems.

Mawlamyine, the capital of the Mon State, was the fourth largest city after Naypyitaw, Yangon and Mandalay. The main transport route is Yangon-Mawlamyine Road which is 180 mile distance, extends to Dawei as the Mawlamyine-Dawei Road. The city of 253,734 is the capital and largest city of Mon State, Myanmar and is one of the main trading center and seaport in southern Myanmar.

Mawlamyine was a busy commercial city in the past based on border trade activities, due to its geographic proximity to the Thailand border and accessibility via the river. Mawlamyine was a bustling port in British colonial times. It was also prosperous during the time of the socialist government from the 1960 to the early 1990s due to the emergence of black market smuggling operations.

At the western end of Mawlamyine, there were preliminary plans for the construction of a deep-sea port. Mawlamyine Port is designated as one of eight coastal ports in Myanmar by the Myanmar Port Authority. But the Myanmar Port Authority has already acknowledged that maritime access to Mawlamyine Port is not deep enough for vessels of more than 4.5 meters in draft. The coastline of Mawlamyine jetty area is 3 kilometres long, and the area is packed with seven small jetties which are suitable for trawlers and ferry boats travelling to nearby places.

According to the natural resources, historical setting, land and people, physical setting, physical infrastructure, social infrastructure and economic base, Mawlamyine City will become regional growth center. Development plan of Mawlamyine City were based on the past and existing condition of the city for the next future year to the 2025 within population projection and economic condition. As this research work aims to give guidelines on proper land use planning and planning procedures for Mawlamyine City.

2. MATERIALS, METHODS AND DATA COLLECTION

Method of Analysis: The basic approach of this study is to undertaken land suitability analysis to seek solution for the identified problems. Visit and study around the city and checklist interviewing was used to collect information regarding users in Mawlamyine city.

Data Collection: Secondary data and statistics on

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population have been collected from the Mon State Government, the Township Development Committee, the Immigration Department, Planning Department, Forest Department, Health Department, Inland Water Transport Department and Archaeology Department. In-depth interviews including those with households members and businessmen were also utilized. Informal group discussions with people from selected occupations such as car driver, trishaw riders, government staff and business men were carried out.

3. BACKGROUND STUDY OF MAWLAMYINE

Before the study of Mawlamyine City development planning, the background study of Mawlamyine Township should be studied. Mawlamyine City was also one of the old Mon cites in Yamanya Region. In this topic, historical background, location, size, climatic condition, relief and drainage and soil types of Mawlamyine City will be expressed in the following.

3.1 Historical Background

Formerly known as Moulmein, it was once a major port and the administrative capital of British Lower Burma. The town's signature landmark is *Kyaikthanlan* pagoda built in 875 AD and became the first capital of *British Burma* between 1827 and 1852 after *Taninthayi* and *Rakhine* were ceded to Britain under the Treaty of *Yandaboo* at the end of the First *Anglo-Burmese* War. [3]

For many centuries, the territory on the *Thaton* east bank of *Thanlwin* River and on the sea-board of *Mon* State was the sites of an old Mon settlement. *Mons* had their capitals in *Thaton* (B.C 600 to A.D 1010), and *Mottama* (A.D 1300 to A.D 1700). Mawlamyine at that time was sparsely populated. The name of Mawlamyine according to the legend comes from *Mot-Mua-Lum*, meaning "one eye destroyed" in Mon Language. During colonial times, Moulmein had a substantial Anglo-Burmese population; an area of the city was known as 'Little England' due to the large *Anglo-Burmese* community. [3]

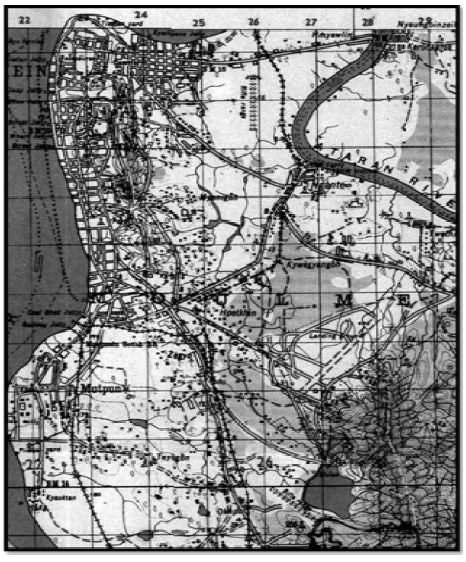

Fig.1. Mawlamyie City Map (1945) [11]

3.2 Location and Size

Mawlamyine is situated at 16.49° North latitude, 97.63° East longitude and 60 feet elevation above the sea level. Mawlamyine is the fourth largest city in Myanmar situated 161 kilometres east of the nation's capital across the Gulf of *Mottama* at the mouth of the *Thanlwin* River. It is the capital of *Mon* State with a population of about 253734 people. Mawlamine Township is the smallest size among the townships of *Mon* State, but for its situation it is the most important in this region. Mawlamyine is the most populated city in *Mon* State and it is situated in the center of *Mon* State. It is bounded on the north by *Paung* and *Hpa-an* Township, on the south by *Mudon* Township, on the east by *Kyaikmaraw* Township and on the west by *Chaungzon* Township and Thanlwin River. [6]

Mawlamyine is in the *Thanlwin* River delta, where the mouth of the Salween is sheltered by *Bilugyun* Island as it enters the Gulf of *Martaban* and the *Andaman* Sea. It is flanked by low hills dotted with ancient pagodas to the east and west. Mawlamyine is the main gateway to south-eastern Myanmar. [6]

The total area of Mawlamyine Township is 54080 acres (84.48 square miles), which is about 1.78% of the *Mon* State of 22 wards and 19 village tracts and 48 villages are included within this township. The shape of this township is elongated with the north-south dimension of 24 miles and east-west dimension of 10 miles. *Yankin* ridge, the central portion of that township divides the major and minor urban areas of the township. [11]

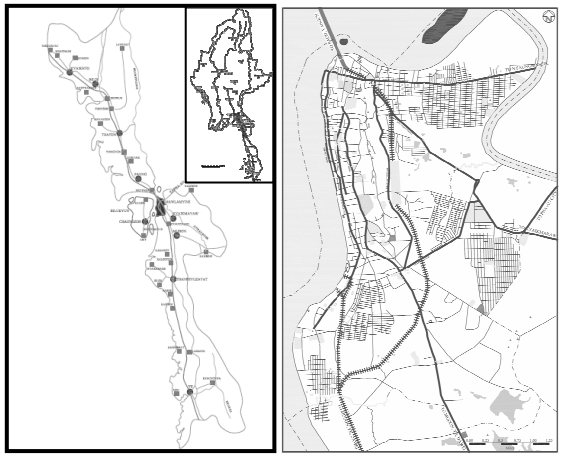

Fig.2. Mon State in Myanmar and Mawlamyie City Map [11]

3.3 Climate

Being located between North latitude 16º 24' and East longitude 97º 24', temperature in Mawlamyine is high throughout the year. Mawlamyine experiences a tropical climate with a lower humidity than in most parts of South East Asia. Its temperature averages between 25.6º C during January, its coolest month to 32.4º C in April, it's hottest month. Mawlamyine township lies in the tropical weather zone yet the climate is comfortable during the monsoon (May through October). In 2014,

the average mean temperature was 27.68º C. The temperature in this region rises gradually from February to April. The highest mean temperature is 30.2 degree centigrade and the lowest is 25.3 degree centigrade. [6]

Evergreen forests can be found since there are, on average, 140 raining days per year and the average rainfall per month is 17.25 inches. At Mawlamyine City rainfalls occur from May to September which is in the southern part of Myanmar receiving abundant rainfall. [6]

Rain is primarily received from the southwest monsoon wind and storms, occurring in the Bay of *Bengal* during pre and post monsoon periods. Abundant rainfall comes from the southwest monsoon from May to September. Therefore, the area enjoys tropical monsoon climate. The rainy season is between June and October although the greatest rainfalls usually occur in July and August. The average annual rainfall in Mawlmayine is 190 inches. Overflowing of rivers and streams happens frequently due to heavy rainfall and roads are flooded. [6]

3.4 Relief and Drainage

Mawlamyine is in the *Thanlwin* River delta, where the mouth of the *Salween* is sheltered by *Bilugyun* Island as it enters the Gulf of *Martaban* and the *Andaman* Sea. *Yankin* ridge lies between river-plain in the west and *Attaran* River in the east. The range near the *Kinmonchone* Reservoir runs northwest to southeast. Geologically there are exposures of quartzite in the middle of *Yankin* range and upward to the top. All the creeks in this area are tidal, and most of them are perennial streams. The land occupied by Mawlamyine is a low tidal flat plain one of the eastern part of the *Thanlwin* River with well a defined which is the northern most part of the *Taungnyo* Range. [11]

According of physical features of Mawlamyine Township can be divided into four regional. They are the Mawlamyine river-plain, the riverine tracts of the *Gyaing* and the *Attaran* rivers, the central mountain range and the southern mountain portion. [11]

3.5 Soil Types of Mawlamyine City

There are three types of soil that supports the settlements of Mawlamyine City. They are lateritic yellow brown forest soil, lateritic soil and meadow gleyey soil. Lateritic yellow brown forest soil occupies transitional area between lateritic soils and yellow brown forest soils. These soils are found on the *Yankin* and *Taungwaing* Hill. Laud use capabilities are the same as those of yellow forest soils, and are classified as garden lands of good fertility. [2]

Lateritic soil is mainly found in the uplands and foothill areas. They are also found in the transitional areas between uplands and the plains. The soil profile is characterized by the presence of iron concretions in a loamy matrix showing different shades of yellow brown colour. The concretions are abundant and their sizes vary. Besides, lateritic soils are so much leached that only a small proportion of plant nutrients are left. Meadow gleyey soil is found along the coastal plains of the city and the *Attaran* River valley. Paddy is the typical plant grown on this soil type. Thus from land use point of view, these soil are very important. The largest content of this soil is clayey alluvium. [2]

4. POPULATION STUDY OF MAWLAMYINE CITY

The population of Mawlamyine Township is comprised of *Mon*, *Burmese* and *Kayin* and several other ethnicities such as *Pa-O*, *Indian* and *Chinese*; but *Burmese* is the largest single ethnic group. [3]

Mawlamyine Township is one of the most densely populated townships within the District. In 2006, the total population of Mawlamyine was 238388 persons and in 2014, the total population was 253734 persons. Mawlamyine was not only an administrative city but also a trading centre. So, population concentration is highest in the urban area that is more accessible to the CBD. The population of Township has always been increasing year by year mostly by natural growth rate and migration. [10]

People are mostly concentrated along the Lower Main Road, whereas the new extensions are sparsely populated. *Aukkyin* and *Shwedaung* wards are the most densely populated wards with of 24456 and 22780 respectively in 2014. The distribution of the population is uneven with heavy concentration in wards of *Hlaing* and *Aukkyin*. The areas with moderate population density are *Mandalay* and *Myinetharyar* ward. The population density is least, particularly in the *Zayarmyine* ward. After Completion of *Thanlwin* Bridge (*Chaungzone*), *Mutpon* Ward will be developed and crowded population in urban area. [10]

Table 1. Population in Mawlamyine Township (2014) [10]

Sr. No	Population	Male	Female	Total
1	Urban Population	122,052	131,682	253,734
2	Rural Population	16,974	18,680	35,654
3	Total Population	139,026	150,362	289,388

4.1 Population Projection

Mawlamyine City has limited population capacity in terms of proper land use; the future increase will be distributed in new extension areas around the city. The population increase in Mawlamyine City should be maintained at 2%, or almost the same level as natural increases based on population, to avoid overcrowding. For population projection of Mawlamyine City, it is forecasted the three scenarios by five years interval from 2020 to the year 2025. [8]

Table 2. Population Projection in Mawlamyine City [8]

No.	Year	Population Sceranio 1	Population Sceranio 2	Population Sceranio 3
1	2020	277,444	283,234	285,746
2	2025	298,886	310,420	315,486

5. URBAN DEVELOPMENT PROCESS IN MAWLAMYINE

In 1826-1949, the area of Mawlamyine City was composed of 13 wards, in 1950-1959 to 16 wards and 17 wards were extended in 1960-1988 then 21 wards were extended in 1990 and 22wards in 2006.

According to its position, Mawlamyine has actually not significant economic resources only natural resources such as agricultural products and fisheries products. It lies on the junction of the Myeik- Kawthaung and Myawaddy routes, so it plays as a distributor. Before 2005, Mawlamyine stood as the break-of–bulk transit to both overland and water transports and its important hinterland areas were Ye, Dewai and Myeik. After opening the Thanlwin Bridge (Mawlamyine), the break-of-bulk function of Mawlamyine has been changed.

During the period 1960s and 1970s, Mawlamyine reached a golden age once from smuggling goods since it lies on the Yangon-Myawaddy border trade route. It is assumed to be efficiently and effectively operated the economic condition particularly in tourist industry because of Mawlamyine possesses a beautiful scenic view that attracts people from all over the country. Famous pagodas, other religious sites and the Setse beach in Thanbyuzayat Township are sets as the attraction sites to the visitors.

6. COMMERCIAL FACILITIES IN MAWLAMYINE

The recent development of industrial sector is an investment of USD 400 million in construction of a cement factory by Pacific Link Cement which is a joint venture between local company and Siam Cement Group. The factory, located in Kyaikmaraw Township is expected to start operation in the middle of 2016. It plans to produce 1.8 million tons of cement per year, employing more than one thousand local workers.

Table 3. The Lists of Hotel in Mawlamyine City [9]

Sr. No	Hotel Name	Room Number
1	Strand Hotel	57
2	Ngwe Moe Hotel	77
3	Attran Hotel	28
4	Cinderella Hotel	22
5	Thanlwin Hotel	16
6	Nathar Phyu Hotel	32
7	Shwe Myint Mo Tun Hotel	31
8	OK Hotel	28
9	Kaung Myat Hotel	26
10	Perl Phyu Hotel	30
11	Sun Shine Hotel	48
12	Sawarde Hotel	24
13	Zabyu Kyaw Hotel	24
14	Yamanya Hotel	48
15	Asia Yatanar Hotel	16
	Total	507

Table 4. The Lists of Market and Shopping Center [9]

Sr. No	Market/ Shopping Center	Location (Ward)	Room Quantity
1	Ocean Super Center		57
2	No. (1) Market	Phat Tan	1359
3	No. (2) Market	Phat Tan	466
4	Myaing Yatanar Market	Phat Tan	1220
5	Thanlwin Market	Bo Gone	1058
6	Daing Wun Kwin Market	Kyaik Pha Ne	207
7	Shwe Myaing Thiri Market	Shwe Myaing Thiri	169
8	Thiri Myaing Market	Thiri Myaing	180
9	Mingalar Market	Sit Ke Gone	125
10	Myaing Tharyar Market	Myaing Tharyar	64
11	Pha Auk Market	Kwat Khame	71

Table 5. The lists of Bank in Mawlamyine City [9]

Sr. No	Bank Name	Location (Ward)	Government/ Private
1	Myanma Economic Bank (1)	Sit Ke Gone	Government
2	Myanma Economic Bank (2)	Sit Ke Gone	Government
3	Myanmar Apex Bank	Phat Tan	Private
4	Myawaddy Bank	Phat Tan	Private
5	AGD Bank	Phat Tan	Private
6	Yoma Bank	Phat Tan	Private
7	Myanma Oriental Bank	Shwe Taung	Private
8	KBZ Bank	Phat Tan	Private
9	KBZ Bank	Kwin Yat	Private
10	Innwa Bank	Zeegyo	Private
11	First Private Bank	Zeegyo	Private
12	Livestock and Fishery Bank	Phat Tan	Private
13	Ayawaddy Bank	Shwe Taung	Private
14	Livestock and Fishery Bank	Zeegyo	Private

The commercial facilities of the city are auto service station, public car parking, public bus transport, taxi service, bus station, train station, airport, corner store, convince grocery store, Delicatessen and bakery, Drug store, Snack bar, Liquor, Beauty parlor, Service station, Bank office, Hardware, Barber shop, Single purpose store, Supermarket, News and periodicals/stationery, Department store, Local shopping center, hotel/motel and regional shopping center., etc. In this research paper, the main commercial facilities such as hotel, shopping center, markets and banks are expressed in the tables. The following tables show the lists of hotels, markets

and shopping centers, banks in the Mawlamyine City.

7. ECONOMY

Mawlamyine's economy depends heavily on agriculture for employment, exports and gross domestic product growth. Mawlamyine, a midway point between the southern coastal cities of Myanmar the city of *Yangon*, used to be an important trading hub. The small docks and jetties located along the city's coastline were used to transport bulk goods along the many rivers and waterways connection Mawlamyine to *Yangon* or into the heartland. Railroads and commercial trucking roads from *Myeik* and *Dawei* pass through Mawlamyine and link up with Yangon as well. The importance of the city is due to the Greater Mekong Subregion program's designation of Mawlamyine as the entry and exit point of the western end of the East-West Economic Corridor. [5]

This crucial trading and commerce corridor links Thailand, Myanmar, Vietnam and Laos. The road linking Myanmar and Thailand via the Friendship Bridge, between Myawaddy and *Moe Sot*, has been used for commerce, which provided a major source of revenue for traders and merchants in Mawlamyine. [5]

Although there is a small industrial zone located a few kilometers from the city, the industrial capacity is insufficient. Recent developments in roads, bridges, and commercial routes have rendered this trading city obsolete and researchers must now consider Yangon as the entry and exit point of the East-West Economic Corridor. [5]

The local economy and markets are more established in Mon State and a variety of industries have advanced in recent years. However, the overall political change in Myanmar still provides significant reason for optimism in Mon State, as most sectors remain underdeveloped and socio-economic indicators suggest there are considerable development needs in the state. [6]

Nonetheless, Mon State is in a comparatively better situation to absorb and benefit from the current rush of investment into the emerging South-East, although a sustainable, responsible and coordinated approach remains pivotal. Overall, the state capital Mawlamyine is well established as the trading and shipping hub for South-East Myanmar. [6]

As elsewhere in South-East Myanmar, the people of Mon State have traditionally relied extensively on agriculture for their livelihoods, with large areas of arable flat land throughout the area. Other major crops in Mon State include corn, groundnut, sunflower, cashew nuts, sugarcane, coconut, palm oil, cocoa and various type of fruit, some of which mangosteen, pomelo are known as the best countrywide. [6]

Fishing along the state's western coast has historically supplemented incomes and diets, both for wholesale markets, as well as the processing of dried fish and algae for production of fish sauce, paste, spices and agar-agar. Mining is also an emerging industry in Mon State, with antimony, granite and gold mined in various places. There are also several state-owned enterprises in Mon State, including rubber and tire factors and a coal power station near Mawlamyine, as well as rubber plantations, although the industry is not as significant in Mon State as elsewhere in the region. [6]

A comparison of per capita income status for Mon State and Mawlamyine Township reveals that, despite growth from K 94,951 in 2005 to K 195,000 in 2014, per capita income in Mawlamyine remains less than that of Mon State as a whole. At the same time, the Consumer Price Index, an indicator of inflation and hence the real purchasing power of households, has been rising.

In Mon State, ten major crops have been planted: paddy, peanuts, sesame, sunflower, the black gram (*Mat Pe*), the green gram (*Pedisein*), pigeon pea (*Pe Sin Ngon*), and sugar cane, maize and long staple cotton. However, monsoon paddy, summer paddy, ground nuts and beans and pulses are major crops for Mawlamyine. Furthermore, the perennial crops such as rubber, oil palm and belleric mymobalan (*Thitsein*) have been planted. In addition, orchard crops such as durian, rambutan and mangosteen are grown on an economic scale.

8. INDUSTRIAL ZONES IN MAWLAMYINE

With the population above 250,000 city in Myanmar, Mawlamyine plans to develop industries by establishing an industrial zone. After the opening of the *Attran* Suspension Bridge on 26 March 1998, the Myanmar Industrial Construction Service, Ministry of Industry, instead chose to prepare land for the industrial zone at *Nyaungbinseik* Village, *Kyaikmayaw* Township on the *Mawlamyine-Hpaan* Road some 1600 feet away from the bridge and five miles from Mawlamyine. This has only 207 companies, of which most are engaged in industrial raw materials such as rubber. [11]

Mawlamyine has several sawmills and rice mills as teak and rice are transported down the *Thanlwin*. It was once a busy shipbuilding center and remains an important port. The city has a solar-powered plant for extracting salt from seawater and a diesel electric plant. [11]

9. TRANSPORTATION NETWORKS OF MAWLAMYINE

Mawlamyine City is also a road hub and the terminus of roads leading to *Yangon*, *Mandalay*, *Naypyitaw*, *Dawei* and also *Thailand*. After completion of Thanlwin Bridge (Mawlmayine), Sky Bridge for railway, new railway station and new highway bus station, the city has become the transportation node of lower Myanmar. East-West Economic Corridor which is included one of economic corridor of GMS is started at Mawlamyine City and end at *Da Nang* Sea Port. So, Mawlamyine city can become one of regional growth center in Myanmar. [10]

High-speed public coastal passenger crafts are available from *Yangon* to *Mawlamyine*, *Dawei*, *Myeik*, and Kawthaung in the south. In addition, cooperative and privately owned schooners carry goods and passengers along the *Yangon*, *Mawlamyine*, *Myeik*, and *Kawthaung* coastal route. [1]

Air transportation service between *Yangon* and Mawlamyine was suspended for a long time due to many

reasons, one of which is that road and railway transports are more convenient and less expensive. Travel by train to Mawlamyine is so much easier now with the inauguration of the new Mawlamyine railway station in 2006.

Now the *Thanlwin* Bridge (*Chaungzone*) is under construction at an estimated cost of US$60 million, the bridge is likely to be finished in about 30 months, according to engineers on the project. When connected the 5203 feet bridge will link *Mupun* jetty in Mawlamyine with *Ka-nyaw* village on *Belu Kyun*, which is in *Chaungzon* Township. After completion of Thanlwin Bridge (*Chaungzon*), the people from *Chaungzon* can easily access to Mawlamyine and they will trade their agricultural products, fishery products, small and medium enterprises products and traditional handicraft products from respective villages in *Chaungzone*.

Generally, traffic congestion is not found in the city except on Strand Road. Large-sized bus is not allowed to operate for short-trip traffic in the city. It is easy to catch small-sized taxi (motorbike or light truck type) everywhere in the city. Zeigyo Truck Terminal is located in the built-up area and the relocation of the terminal might be considered. Traffic congestion is observed during peak hours of cargo handling on Strand Road. Provision of cargo handling space could solve this issue.

Fig.4. National Spatial Framework Conceptual Diagram

10. EWEC AND DEEP SEA PORT

The "corridor town development" approach aims to maximize the economic benefit of increased traffic and trade along the economic corridors by developing corridor towns as competitive growth nodes that link the outlying region and by fostering economic activity clusters. This approach will also contribute to the transformation of transport corridors into economic corridors in the Greater Mekong Subregion (GMS). [5]

The Mawlamyine Port is a river port which cannot be upgraded into a deep sea port due to the water level. The Port Authority and GMS programme seek *Kalagauk* in Ye Township as an alternative but it has not yet materialized. The closest potential site for constructing a deep sea port around this area, according to the Port Authority of Myanmar, is the *Kalagauk* sea port which is about 150 km south of Mawlamyine. Pilot surveys conducted to find a location for a deep sea port resulted in the discovery of a feasible location near *Kalegauk* Island in Ye Township, Mon State which is very close to *Tanintharyi* Division. [5]

Mawlamyine Port is one of the nine costal ports in Myanmar. The total length of the Mawlamyine Jetty Area is 3 km and altogether 7 small jetties suitable for trawlers and ferry boats are situated in this area. [5]

Mawlamyine port had become the largest port in 18th century and then become the second largest port in 19th century in Myanmar. Now, it is still importance port in Myanmar. It is the maritime gateway lower Myanmar and easily road transport than water transport to India, Thailand, Malaysia, Singapore and other Asia Countries. It is considered by the Vietnamese as the beginning and end point of the East West Corridor that will connect the deep sea port of Mawlamyine. Inland water transports are going to *Chaungzone* Township, along *Attaran* and *Gyaing* river region. Many Jetty and cargo handling facilities are still having in the city. [5]

Three options for developing a new deepwater port on the *Andaman* Sea near Mawlamyine have been proposed. The options are: (1) *Kalegok* island, between Mawlamyine and *Ye*, 30 miles south of Mawlamyine (2) 24 km south of Mawlamyine, at *Kadonbaw* Village and (3) the privately proposed the Southern Myanmar [5].

A river port and commercial center, it has teak mills and shipyards; rice, tea, teak wood, and rubber are exported. The port is closed to major infrastructure networks that make it convenient for the sea transport facility for goods and services. It is close to national highway, Mawlamyine airport and the national railway network thus making it an easily convergence for air, land, water and railway systems. Becoming a deep river route around the proposed sea port to the *Adaman* Sea, the sand, solid waste and other sedimentation materials under the water should be removed for easily accessible water transport of ships and cargo. The Mawlamyine port will be able to provide the following services;

1. Cargo handling and storage
2. Supply of tugboats
3. Land and water borne transport business
4. Cargo transport agent
5. Warehouses and yard business
6. Construction and repair of small and medium-size work
7. Amphibious means of transport
8. Cargo transport to other surrounding countries
9. Marine, ship handling service

For the success of the East-West Economic Corridor, the ports at the eastern and western ends of the corridor play important roles. At the eastern end is the *Da Nang* Deep-Sea Port with supportive services provided by *Tien*

Sa Seaport and *Han* River port, and it has a throughput capacity of 4 million metric tons a year.

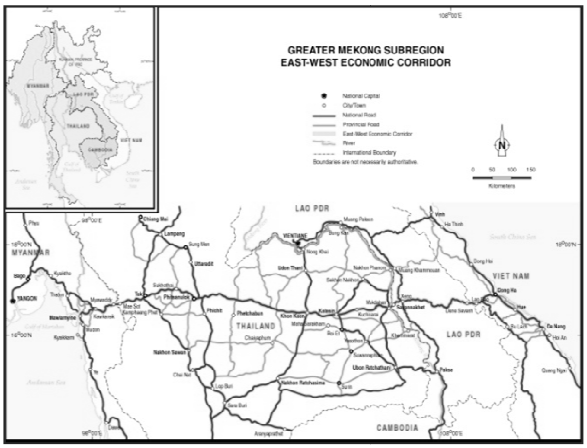

Fig.5. East-West Economic Corridor in GMS [5]

11. LAND SUITABILITY ANALYSIS

Land suitability refers to the ability of a particular type of land to support a specific use, and the process of land suitability classification involves the evaluation and grouping of particular land areas in terms of their suitability for a defined use. Land suitability analysis is thus concerned with evaluation of the fitness of given tract of land for a defined use. [10]

In other words, it is the process to determine whether the land resource is suitable for some specific uses. It is also undertaken to determine whether the land resource is suitable for some specific uses. It is also undertaken to determine the suitability level. In order to determine the most desirable direction for future development, the suitability for various land uses should be carefully examined with the aim of directing growth to the most appropriate sites. [10]

Establishing appropriate suitability factors is the construction of suitability analysis. Initially suitability analysis was developed as a method for planners to connect spatially independent factors within the environment and consequently to provide a more unitary view of their interactions. Suitability analysis techniques integrate three factors of an area, location, development activities, and biophysical/ environmental processes. [10]

Land use suitability analysis aims at identifying the most appropriate spatial pattern for future land uses according to specific requirements, preferences, and predictors of some activity. [10]

Land suitability analysis in general includes the following different steps. The existing land use is a pattern determined by the social and technical development of the part. The land quality at least includes the accessibility to the sites, access roads, current land use situation and soil types, etc. [10]

Land suitability analysis covering the total area of a country or a planning region should be carried out only for the major land use types, such as forests, agriculture or overlaying land use like wildlife protection or recreation. Physical factors for land use capability classification with regard to agricultural and forest usage are climate, topography, soil, wetness and erosion. The potential land suitability would include the suitability after permanent improvements, and also new crops or management methods. [10]

Climate, Soil and Geology, Topography and Slope, Cover and Vegetation, Surface Streams and Lakes, Floodplains and Wetlands are classified in land suitable analysis for future extension of Mawlamyine City. [10]

12. SOIL CLASSIFICATION IN MAWLAMYINE TOWNSHIP

The rocks of *Taungnyo* series generally consist of sandstone, slate and shales at times passing to quartzites. At the extreme end of the *Taungnyo* Ridge is a granite boss. *Thanlwin* and *Attaran* River are the two important sources of draining out the excessive water that flows in from tributaries flowing through the town. The *Gyaing* and the *Attaran* River join the *Thanlwin* in the north of the town and then flows as *Thanlyin* into the sea.

Generally the surface configuration of town has favoured the town with no excessive flood for a long during. But in some wards, such as *Mutpon* and *Shwemyinethiri* wards, the low lying areas are liable to flood, but not serious. The overall situation of the drainage condition of the city is good enough because stagnation is not common even during the peak rainy season.

Specifically soils of the city vary according to topography and parent material. Thus, laterite and lateritic soils with granite and sandstone outcrops are found in *Yankin* Ridge and foothill areas. On the surrounding plains are old alluvium deposited by the *Thanlwin* River and its tributaries. On the coastline are mud and sand that cover the tidal areas. The three types of pedology of city that supports the settlements are lateritic yellow brown forest soil, lateritic soil and meadow gleyey soil.

Mawlamyine has natural protection from tsunami or high rise of sea water triggered by tropical cyclones being sheltered by Bilugyun. Thus Mawlamyine less prone to cyclones or storm surges.

13. ANALYSIS DETAILS DEVELOPMENT OF THE CITY

After studying existing condition of Mawlamyine City, details development of the city should be analysis. In this topic, visual expression of the city such as city characters, landmarks, distinct characteristics, functions and activities and then analysis on the proposed future urban areas in the following.

Before considering urban planning of the city, visual expressions of the city should be respected. Formerly the view seen on approaching Mawlamyine was marred by unsightly backs of houses around *Zegyi* and *Hpettan* Lane. As the Strand Road has in recent years been extended to the north along the riverside, the buildings are faceing the river. The view of Mawlamyine is lovely now as seen from the ferry boats. The visual expressions of Mawlamyine city are city characters, landmarks, distinct characteristics, functions and activities.

The characters of Mawlamyine city are (1) colonial

and administrative city, (2) trade commerce, (3) linear form along *Thanlwin* River, (4) Junction of Thanlwin, *Gyaing* and *Attran* River, (5) Rivers are located around the city and *Yankin* Hill is in the center of the city.

The landmarks of Mawlamyine city are (1) *Yankin* Hill with numerous pagodas, (2) *Kyaikthalan* Pagoda on the *Yankin* Hill, (3) *Thanlwin* Bridge and *Attaran* Bridge, (4) The row of Palmyra plant and *Hinda* roundabout at the entrance from *Kyaikmaraw* town, (5) *Gaungsay* Island and junction of *Thanlwin*, Attaran and *Gyaing* River.

Distinct characteristics Mawlamyine city are (1) three rivers are met at the city and three large bridges are located near the city, (2) *Thanlwin* Bridge, one of the longest road and Rail Bridge in Myanmar, (3) a charm of its own rich historical building with colonial style architecture and (4) its had a better water supply and its harbor was more sheltered in the monsoon.

The functions of Mawlamyine City are (1) administrative and institution, (2) commercial and manufacturing, (3) transportation node, (4) residential and religious and (5) agricultural and other functions. The activities of Mawlamyine City are religious, regional government office, agriculture, education, breeding, commerce and others.

14. URBAN DEVELOPMENT POLICIES

The following table shows development policy of commercial, business and industry in Mawlamyine. In order to execute these policies, the spatial control is common and principle measures to be taken by the local and central government for the realization of urban development policies and projects. These control measures are expected to be executed based on the law, by-laws and other legal frameworks.

Table 4. Development Policy of Commercial, Business and Industry in Mawlamyine [12]

Commercial, Business, and Industry Policy	1	Spatial Improvement of Current Central Area
	2	Relocation and Functional Reform of Logistics Zone of the City
	3	Redevelopment in Former Railway Station site (Sub Center Development)
	4	Promotion of Industrial Investment to Kyank Industrial Zone
	5	Construction of New CBD Area

14.1 Spatial Improvement of Current Central Area

New CBD is expected to be introduced in In order to attract more tourists into the city and to utilize natural, historical and cultural resources for the touristic industry, improvement of urban space and formulation of spatial linkage among these resources need to be executed. For the reform of landscape and urban environment, following matters are considered to be carried out in accordance with spatial plan of the city.

a) Construction of public spaces in the central touristic area (River side area, open spaces in along the major touristic route)
b) Pedestrian way with roadside tree, which forms touristic network
c) Landscape improvement around historical, cultural and religious monuments.
d) Public facilities which correspond new demand of the city (parking, green and park space)

14.2 Relocation and Functional Reform of Logistics Zone of the City

In order to extend current logistic and transport functions of the city and to realize efficient distribution of cargo and products in the region, the new logistic and transport HUB is planned to be relocated and constructed in the south of the central city along the current arterial road. For the determination of its location, following matter and function need to be taken into consideration.

a) Easy accessibility from current and future arterial road to the site
b) Connection of major regional road to all directions
c) Selection of location, which is close to current and future development area
d) Selection of site in outskirt of the city in order to traffic congestion and accident
e) Connectivity of other transport mode

Considering about above mention condition, the plan proposes its site around the intersection of National Road No.8, Kyaikkami street and Taung Wine road.

14.3 Redevelopment in Former Railway Station site

The former railway station site is vacant place now but it is surrounded by commercial buildings, housings and service road, which inherit former urban functions when the station was located there. And the site is situated in the important node, which connects downtowns/new developed area, and the city with Bilu Island by the new constructed bridge. By using these infrastructures and exploiting the potential of the land, the land is expected to
lead the future function and industry of new age of the city of Mawlamyine. Following functions are expected to be introduced into the area by urban redevelopment scheme.

a) Commercial Development
b) Hotels and tourist infrastructure
c) Strong connectivity to strand road

14.4 Promotion of Industrial Investment to Kyauk Tan Industrial Zone

The Kyauk Tan Industrial Zone is one of key drivers of the city, which leads industrial development and economical growth of the city. For better use of investment for the area, following measures for improvement of production environment and enhancement of the occupancy of industrial facilities in the area are essential.

a) Improvement of infrastructure for production
b) Improvement of production environment
c) Establishment of close relation with employment promotion facilities and related industries
d) Improvement of living conditions for staffs and workers of the industrial zone

14.5 Construction of New CBD Area

New CBD is expected to be introduced in order to enhance commercial and business functions of the current urban area of city of Mawlamyine and to boost the economic activity of the city. Creation of a new CBD with offices, hotels, workplaces and malls are expected to be realized in the location, which ensures close relation with current central business areas of the city spatially and functionally. The new station area is considered suitable areas for this development purpose. Following functions are expected to be introduced in the area.

a) Business places, offices and Malls
b) Hotels and tourist infrastructure
c) Cultural and leisure activities for citizens

15. PROPOSED FUTURE URBAN AREAS

In Mawlamyine City, three possible areas should be selected for future extended area forecasting into the 2040 with 298886, 310420 and 315486 persons according to the population projection in three scenerios.

According to the land suitability analysis, the proposal area (1) is located the *Ngantay* Village and *Hlaing* Ward at the east part of the city. It has approximately 1200 acres and soil type is yellow and red brown forest soil and then its topography is (45-50) feet above sea level. The current usage of this area is garden, paddy land and a few low income residential areas. This area is easily accessed to the road way, railway and water way because of near to the *Thanlwin*, *Gyaing* river, railway station and bus terminal. This area should plan the international business center and related facilities for East-West Economic Corridor.

The proposed area (2) is located at the *Kyauktan* village and *Mupon* ward at the south-west of the city. It has approximately 3000 acres and soil type is alluvial and then its topography is 35 feet above sea level. The current usage of this area is garden paddy land and low density residential area. This area is easily accessed to the water way because of at the bench of *Thanlwin* and propose for commercial area of future development plan. This area is easily got water supply from *Kinmonchone* main distribution and electrical supply from *Ngantay* electricity distribution. The area propose the commercial facilities area, treading area and sea port of Mawlamyine City.

The prioritized projects for commercial city are new CBD development, new tourism site development, waterfront (or) strand road improvement and heritage redevelopment project. The vacant land near the railway station is proposed to develop new CBD develpment project and create offices, hotels, workplaces, mall, business center, tourist infrastructure, cultural center and leisure activities to boost the economic activity of the city.

To realize the spatial plan of Mawlamyine for 2025, the development activities by private and public should be guided and promoted properly. This shall also contribute to avoid uncontrollable urban sprawl that Mawlamyine can be compact city.

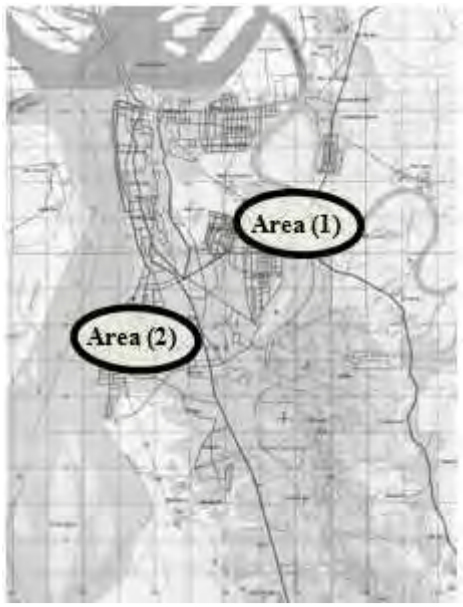

Fig.6. Proposed Future Urban Extension Arae

16. MAWLAMYINE AS A COMMERCIAL CITY

In light of the past trends and considerations of logistics function and some large-scale development projects, the urbanization of Mawlamyine is likely to extend outward, especially southwards and west and east wards in connection with EWEC meaning direction of Hpa-an. By construction of new bridge, connection with Chaungzon Township shall be also accelerating urban development in the future trend.

The CBD, which is the center of Mawlamyine including traditional market and jetty port, has limited potential for future expansion of its central business function due to no surplus land for new development and complicated land ownership. Preservation of beautiful panoramic view from Yankin Hill to Than Lwin River is also considered as the symbol and tourism attraction.

To be a national gateway city, development of new CBD and promotion of tourism destination are necessary which lead business and economic activities of Myanmar as well as Mawlamyine. Development of new CBD in the vicinity of the new railway station is recommendable. All area would be upgraded gradually in its environment, infrastructure, and social service. South area of the city center is likely to be necessary for urban redevelopment. Although existing CBD function must be kept in the future, it is likely more for tourism attracting foreign tourists.

Mawlamyine has less industrial function currently other than the industrial zone located at east side of Attran River. Logistics function is necessary more in the future in linkage with other gateway cities. An area along the Than Lwin River at south shall be improved with proper road system and infrastructure. New CBD is proposed at the central station area, east side of Yankin Hill.

New industrial zone, Kyauk Tan Industrial Zone, is under construction located in south of the city by local developer. Development of new town with an area of

Area (1)

5.6km2 in total is necessary in the future. Several new towns are proposed at vicinity of industrial zone and new CBD, suburbs such as Chaungzon Township.

Since the strand road along the river has good atmosphere and connection of two proposed zones, improvement of the road as tourist place is recommendable as Tourism Axis. Yankin Hill and panoramic view toward west side must be conserved and utilized as urban park for symbol and key tourism destination of the city. Mountain at south-east must be conserved as nature reservation zone of Mawlamyine for water reservation. According to these factors, Mawlamyine will become as a commercial city in Lower Myanmar.

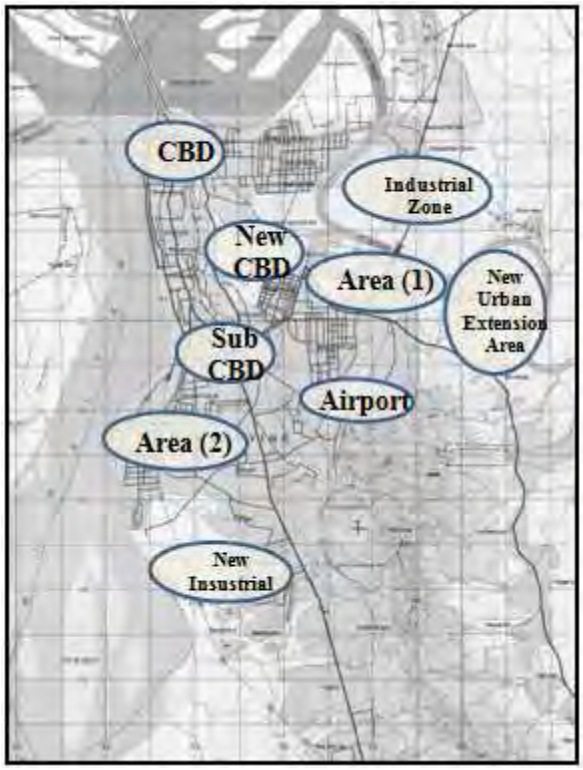

Fig.7. Main Commercial Facilities of Mawlamyine City

17. CONCLUSION

At the current moment, the construction of the remainder of the EWEC on the Myanmar side still remains significantly unfinished. According to our survey, the characteristics of the sample by rurality classes tell us that the industry sector in Mawlamyine is not well developed. The major economic trends seem to be to go and work overseas and to contribute remittances to the household income. It was also found that people in Mawlamyine lack awareness and knowledge of the EWEC since only an average of 15.9% knew of the EWEC project.

Partial synthesis of this is applied in the simple methodologies and techniques to bring out the results within the shortest possible time. As it could be seen as an example of a typical city in Myanmar from the investigations and analysis of the existing conditions of the project, Myanmar is still in its prime stage of settlement planning and design.

After completion of East-West Economic Corridor in Myanmar Section, Mawlamyine can become the following types according to the past and existing condition of the city. They are administrative city, transportation node city, commercial and manufacturing city, tourist attraction city and international business port city. These city types may become in the coming future year for forecasting with urban planning point of view.

Mawlamyine collect agricultural products from the hinterland, rural areas particularly rice and rubber are carried by cargo cumber passenger buses, cargo trucks, bullock cart and so on. In turn, many utility items include construction materials are distributed to its hinterland areas. Hence Mawlamyine functions both as collect and distributing center. Development of an industrial zone designated for export products and foreign investors in Mawlamyine or at sites that have easy direct access to both air and sea ports with passenger and cargo facilities.

The Mawlamyine sea port is closed to major infrastructure networks that make it convenient for the sea transport facilities for goods and services. It is closed to National Highways, the Mawlamyine Airport and the national railway network, thus making it an easy convergence for air, land, and railway systems.

Urbanization in Mawlamyine City is less modernized if compared to other major cities in South East Asia because of unsystematic economic development. Modernization in urban characteristics is largely dependent on the economic development of the city. In conclusion, Mawlamyine City will hold a bright future in urbanization and development of Myanmar economy.

In the study of spatial planning of Mawlamyine City development, many urban planning points of view and development principles are identified. It is envisaged that the attempt to carry out a good record for future planning of Mawlamyine City is the sole objective of this research work. This research partially or fully refers to the future planning, if there is a city planning project concerns in Mawlamyine City. It is believed that the research work would contribute towards the systematic city development of Mon State, which comprise of one of the major cities in the union of Myanmar.

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