

Chapter 3

Overview of Mawlamyine's General Condition and Sample Selection

3.1 Introduction

This chapter presents an overview of the study site, Mawlamyine, and its great importance within the Myanmar road network, the East West Economic Corridor (EWEC), and the Asia Highway. We will then present and justify the methods of sample selection and data collection used in the survey that generated the data for the regression and social accounting matrix analyses of subsequent chapters. Special attention will be given to the survey procedures and types of data collected.

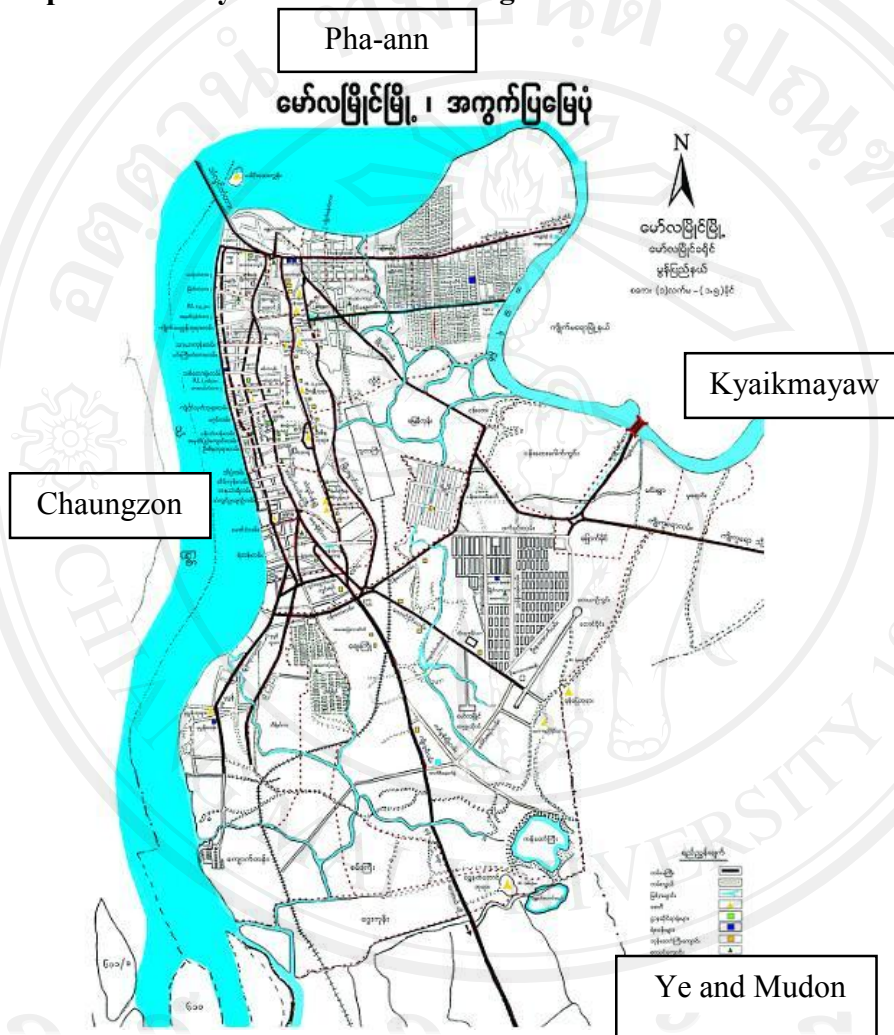
General Condition of Mawlayine

3.2 Features of Mawlamyine Township

Mon State is composed of mountain ranges and flat land. Bago Division is to the north at the mouth of the Sittaung River, Kayin State is to the east, Thailand and Taninthayi Division are to the south and the Andaman Sea and the Gulf of Mottama are to the West. Mon State is situated between latitudes $14^{\circ}52'$ north and $17^{\circ}32'$ north and east longitudes $96^{\circ} 51'$ east and $98^{\circ} 13'$ east. Mawlamyine Township is the administrative and commercial capital of Mon State and is the third largest city in

Myanmar after Yangon and Mandalay. It was planned in an organized fashion and the roads and buildings are constructed in straight lines throughout the city.

Map 3.1 Mawlamyine town and its neighbours



The land area of the township is 54080 acres (84.48 sq miles), with the widest area from east to west of seven miles and from north to south 17 miles. Mawlamyine is bordered by Kyaikmayaw township in the east, Chaungzone township in the west, Mudon and Ye townships in the south and Pha-ann in the north (See map 3.1). It is made up of 22 wards, 19 village tracts and 48 villages.

3.3 Mawlamyine Population

The population of Mawlamyine Township is comprised of Mon, Bamar and Kayin and several other ethnicities such as Pa-O, Indian and Chinese; but Bamar is the largest single ethnic group. The majority of Indians are third and fourth generation in Myanmar, the descendents of Indians brought to Mawlamyine under the British Raj. They are now fully assimilated into the Myanmar culture, having long forgotten their mother tongue; however, many still hold strongly to their cuisine, religious customs and beliefs. Over 83% of the population is Buddhist, followed by Muslims and Christians (Table 3.1).

Table 3.1 Mawlamyine population statistics, March 2008

Total	Persons	Share
		463857
by Religious affiliation		
Buddhist	387,300	83.50%
Islam	44,718	9.64%
Hindu	22,323	4.81%
Christian	9,106	1.96%
Animist/ others	410	0.09%
by Economic activity		
Working age (19-60)	319,603	68.90%
<i>minus</i> those in migration (Kha Yee Lun)	105,689	22.78%
<i>minus</i> Monks and nuns	4,293	0.93%
<i>minus</i> institutionalized (prisoners, handicapped, mentally ill)	517	0.11%
Total potential labour force	209,104	45.08%
Dependents under 19 and over 60	144,254	31.10%
Dependents in working age population		45.14%
Dependents in potential workforce		68.99%

Source: Mon State Facts and Figures (2010)

The total working age population (men and women between 19 and 60) is estimated, in 2008 March, at 209,000 out of the total population of about 464,000.

The share of dependents (under 19 and over 60) from the total Mawlamyine population is only 31.1%. However, when we calculate the total dependency ratio¹⁶ as a function of the population of working age (19 through 60) people, this share rises to 45.1%. Even more dramatically, given the high percentage of migrants, monks, nuns and the institutionalized in Myanmar society, the actual dependency ratio is a full 69%, or more than two-thirds of the number of local income earners.

Table 3.2a Mawlamyine population by rurality, March 2008

	Houses	Households	Population	Share	Persons/hh
Total	62,616.00	69807	463857	100.00%	6.65
Rural	12,412.00	13221	103646	22.34%	7.84
Urban	50,204.00	56586	360211	77.66%	6.37

Source : Mawlamyine Township Development Gazetteer, 2007

If one separates the population into rural and urban population categories, the ratio of urban population to rural population is around 3.4:1 across 22 wards and 19 village groups. This yields a population distribution of about 78% rural. Average household sizes in rural and urban areas are 7.8 and 6.4 members, respectively.

Since Mawlamyine's land area is 84.48 sq miles with a population of 464,000 (2008), the population density is 2162 persons/km², more than three times that of the other end point of the EWEC, Da Nang City, Vietnam (638/km²) and nearly double that of Mawlamyine in 1980 (Table 3.2b).

¹⁶. Calculated by: (Number of dependents/Population 15-64) * 100%. According to the calculation by the standard formula, dependents are defined as 14 or younger and over 64 (World Bank, 2011). In contrast, our available data are for workers aged 19-60. The dependency ratio for Mawlamyine may therefore be overestimated compared with the standard formula calculation used in other countries.

Table 3.2b Population density in Mon State.

	Total Area	Density /square mile			
		1980	1990	2000	2008
Mon State	4747.8	333.0	420.6	536.6	644.4
Mawlamyine Distict	2572.2	373.7	472.1	602.4	723.4
MawlamyineTownship	84.5	2889.8	3657.4	4666.9	5604.4
		Density / square kilometer			
Mon State	12154.3	128.5	162.2	207.0	248.6
Mawlamyine Distict	6584.9	144.2	182.1	232.4	279.1
Mawlamyine Township	216.3	1114.8	1411.0	1800.4	2162.1

Source: Calculated from Mon State Facts and Figures (2010)

These figures are nonetheless well below population densities in other Asian cities such as Ho Chi Minh City, Vietnam. At the district level, Mawlamyine district's population density is 279/ km², substantially greater than that of another point along the EWEC, Savannakhet Province, Laos (41/km²).¹⁷

3.4 Weather in Mawlamyine

Mon State has a monsoonal, tropical climate with great seasonal fluctuation in rainfall (Table 3.3).

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright © by Chiang Mai University
All rights reserved

¹⁷ . Laos Statistics Bureau (2005) and Nolintha (2011).

Table 3.3 Rainfall in Mon State

Month	Normal (mm)	2008	2009
TOTAL	4988.1	> 5245.6	> 5145.3
January	4.3	n.a.	n.a.
February	9.4	10.9	0.3
March	30.7	36.3	12.2
April	75.7	216.7	192.8
May	632.5	859.0	373.6
June	1019.6	811.3	1114.6
July	1112.3	1185.7	1451.6
August	1166.4	1006.4	857.0
September	725.4	731.5	823.5
October	160.8	260.9	309.6
November	48.0	127.0	10.2
December	3.0	n.a.	n.a.

Source: Myanmar Data CD Rom 2007 and Mawlamyine Township Development Gazetteer, 2007

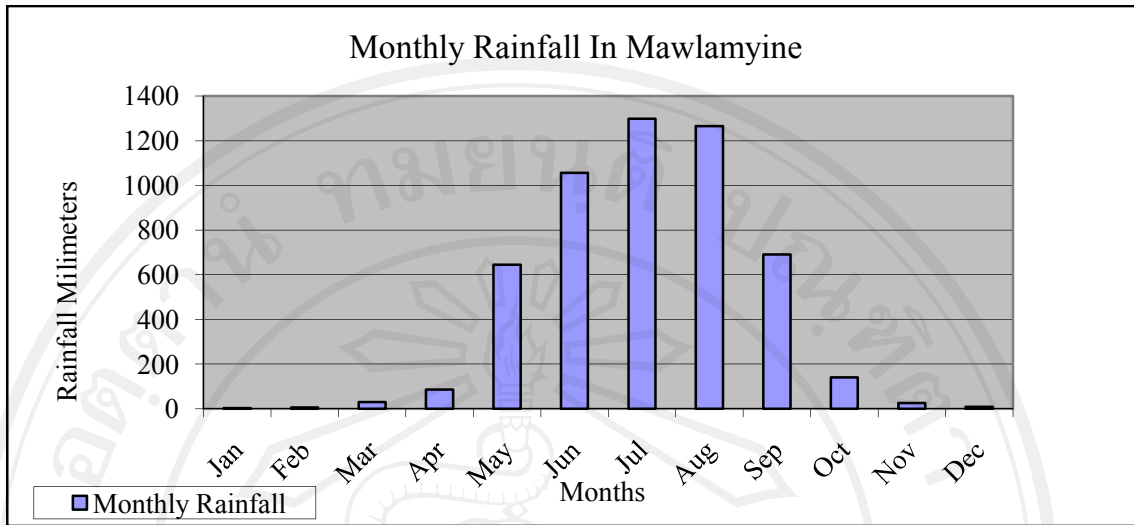
Since Mon State registers one of the highest rainfall rates of all the states and divisions, these data have implications for the tolerance of certain narrow or less well-paved sections of the road for heavy traffic.

Table 3.4 Monthly Rainfall in Mawlamyine (1997-2006 average millimeters)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mawlamyine	3	6	30	86	645	1056	1298	1266	691	140	26	9

Source: Myanmar Data CD Rom, 2007

Mawlamyine township lies in the tropical weather zone yet the climate is comfortable during the monsoon (May through October). Evergreen forests can be found since there are, on average, 140 raining days per year and the average rainfall per month is 438 millimeters.

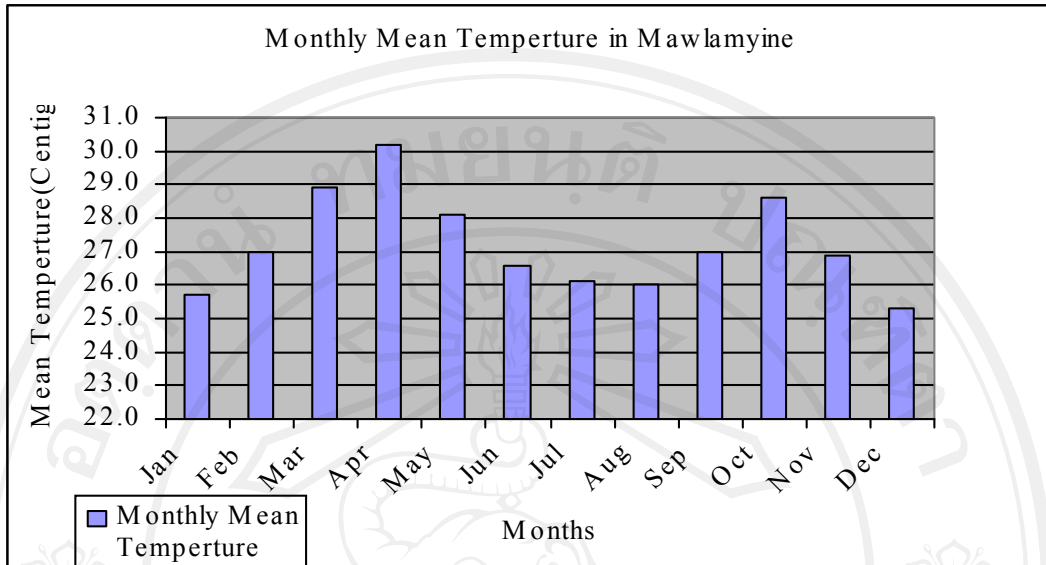
Figure 3.1 Rainfall In Mawlamyine

The monthly mean temperature of Mawlamyine has presented in Table 3.5 .

Table 3.5 Monthly Mean temperature in Mawlamyine (1997-2006 Average Degree in Centigrade)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mawlamyine	25.7	27.0	28.9	30.2	28.1	26.6	26.1	26.0	27.0	28.6	26.9	25.3

Source: Myanmar Data CD Rom 2007

Figure 3.2 Monthly Mean Temperature in Mawlamyine

The highest mean temperature is 30.2 degree centigrade and the lowest is 25.3 degree centigrade.

3.5 Income and Consumer Price Index in Mawlamyine

A comparison of per capita income status for Mon State and Mawlamyine Township (Table 3.6) reveals that, despite growth from K 32,542 in 2001-02 to K 317,154 in 2009-10, per capita income in Mawlamyine remains less than that of Mon State as a whole.

Table 3.6 Per Capita Income (in Kyat)

State / Town	20001-02	2004-05	2008-09	2009-10 (provisional)
Mon State	43,764	107,906	366,279	436,123
Mawlamyine Township	32,542	56,730	293,412	317,154

Source : Mon State Facts and Figures (2010)

At the same time, the Consumer Price Index, an indicator of inflation and hence the real purchasing power of households, has been rising. The general trend and details by commodity of CPI change in Mon State are given in table (3.7).

Table 3.7 General CPI in Mon State compared to the base year 2002-03

	2002-03	2003-04	2004-05	2005-06	2006-07
General Consumer Price Index	1.00	1.00	1.31	1.40	1.78
Food	1.00	1.27	1.23	1.31	1.70
(1) Rice	1.00	1.29	1.02	1.43	1.78
(2) Oil	1.00	0.86	0.86	0.96	1.09
(3) Fish, Meat & Eggs	1.00	1.40	1.45	1.59	1.87
(4) Others	1.00	1.26	1.36	1.19	1.73
Non-Food	1.00	1.41	1.54	1.65	2.01
(1) Clothing and apparel	1.00	1.31	1.36	1.36	1.66
(2) House rent and repairs	1.00	1.49	1.57	2.19	2.54
(3) Fuel and light	1.00	1.42	1.63	1.86	2.37
(4) Miscellaneous Composite	1.00	1.46	1.59	1.63	1.95
(a) Education	1.00	1.04	1.27	1.36	1.59
(b) Medicine	1.00	1.47	1.57	1.43	2.00
(c) Conveyance	1.00	2.25	2.29	2.17	5.84
(d) Cleansing and Toilet	1.00	1.49	1.62	1.75	1.53
(e) Others	1.00	1.34	1.42	1.59	2.44
Annual Change in CPI (%)	59.25	30.7	0.48	6.26	27.84

Source: Myanmar Data CD Rom, 2007

Compared to the base year of 2002-3 when implementation of the EWEC project began, price has risen most dramatically for transportation-related conveyances, an early indication in this study that the potential impacts of the road have not yet been realized. Other sources of inflation in consumer purchases have been house rent and repairs and fuel and light. Fortunately, there has been less inflation in food prices (1.70) than in non-food (2.01) over the period; and educational price rises have been contained (1.59). Cost rises have been the lowest for oil, cleansing and toilet articles, and education.

3.6 Economic, Social and Transportation Sectors

Urban residents in Mon State mainly live on trade, while rural people earn their living by cultivating paddy, garden crops, and fruit trees. Average annual rainfall is nearly 5000 millimeters, an amount that is very favorable for growing crops. The main crops are paddy and rubber. In 2009, the target monsoon paddy (18,450 acres or 7466.72 hectares) was planted. High-yield seed paddy strains such as Manawthukha and Kyunshwewah are cultivated and it was targeted to grow 1254.57 ha of summer paddy. Luckily, the Mawlamyine area was not significantly affected by the 2008 hurricane Nargis. Table (3.8) has shown the land utilization in Mawlamyine.

Table 3.8 Land utilization in Mawlamyine

No	Particulars	Thousand acres	Percentage
1	Net Area Sown	23445	43.4
	Paddy	13574	25.1
	Orchard	6307	4.0
	Island Resulting from sitting on which cultivation is done(Kain/Kjun)	2072	3.84
	Nipa Palm (DANI)	1492	2.8
2	Fallow Land		0
3	Culturable Waste Land		0
4	Reserved forest	1352	2.5
5	Other forest area		0
6	other land	29272	54.1
	Total	54069	100

Source: Mon State Facts and Figures , 2010

Around 43% of the total is net sown area and more than half of that is paddy land. Almost 3% of the land is under Nipa Palm, as Mawlamyine is close to the bay. 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), sugar

cane, maize and long staple cotton. However, monsoon paddy, summer paddy, ground nuts and beans and pulses are major crops for Mawlamyine. Table (3.9) shows that some major crops in Mawlamyine Township. In 2009 it was projected that the total cultivated area of oil-crops (ground-nut, sesame and sunflower) would reach 1234.34 hectare.

Table 3.9 Output and yield by crop

	Output (Baskets)		Output per acre		Year
	Mawlamyine		Mawlamyine		
	Township	District	Township	District	
Paddy Monsoon	961879	31135738	64.56	69.31	2007-08
Paddy Summer	251256	6292162	83.28	77.31	"
Ground nut	12814	167758	50.25	48.4	2009-2010
Sesame	3973	43322	9.81	10.74	"
Sunflowers	3346	162785	24.25	22.96	"
Black Gram	8734	114283	15.68	13.81	"
Green Gram	5604	78274	15.61	14.28	

Source: Mon State Facts and Figures (2010) and Mawlamyine Township Development Gazetteer (2007)

. As shown in Table 3.9, except for monsoon paddy and sesame, output per acre at the township level has surpassed that at the district level.

Furthermore, the perennial crops such as rubber, oil palm and *belleric mymobalan* (Thitsein) have been planted. *Belleric mymobala* is a new perennial crop that was introduced in 2009. Perennial crops are shown in Table (3. 10).

Table 3.10 Perennial crops in Mawlamyine

	Total Cultivated area (Acre) in March 2010		Output per acre		Remark
	Township	Distinct	Township	Distinct	
Rubber	1780	316368	656.32	636.93	Pound
Oil Plam	17	105	3.33	3.95	Ton
Belleric mymobala (Thitseint)	1758	12165			

Source: Mon State Facts and Figures (2010)

The industrial crops rubber and oil palm are planted on areas of 720.37 ha and 851.89 ha, respectively. In addition, orchard crops such as durian, rambutan and mangosteen are grown on an economic scale. The water for cropping is usually provided by rain-water and water from the Shwenattaung reservoir. Shwenataung reservoir supplies water for agricultural and household purposes apart from drinking water.

The Transportation Sector in Mon State

Myanmar has undertaken the following measures to facilitate economic and social development:

- extending roads and bridges to ensure smooth and secure transportation
- extending the construction of hospitals and schools
- extending the construction of rail track, airstrips, international level airports and port development works
- extending the construction of irrigation and embankments
- establishing industrial zones for industrial development

For transportation services, there are more than 50 bus lines operating in Mawlamyine Township and District. For tourism, there are all together 23 hotels, motels and guesthouses for local visitors and international tourists. In the transportation sector, the main roads have been repaired and upgraded. This includes not only the urban roads but also the roads in rural areas according to need.

Table 3.11 Road transportation sector in Mon State

Year	1990-91	1995-96	2000-01	2002-03	2003-04	2004-05	2005-06	2006-07	Increment during 1990 and 2007
Total miles	424	434	431	431	431	431	440	440	16
Bituminous	353	355	362	377	377	377	387	387	34
Metalled	7	9	22	22	22	22	22	22	15
Surfaced	34	32	38	23	23	23	23	23	Upgrading
Earth	30	38	9	9	9	9	8	8	Upgrading

Source: Myanmar Data CD Rom 2007

To ensure balanced development among the region, one of the major emphasizes has been placed on construction, renovation and maintenance of roads and bridges in all states and divisions. Table (3.11) has exhibited road infrastructure extension in Mon State, comprising of bituminous, metalled, surfaced and earth roads.

The total number of bridges (above 180 feet) constructed by the Public Works Department increased to seven in 2008 from three in 1988. The new bridges include the Attayan Bridge (Mawlamyine), Thanlwin Bridge (Mawlamyine) and Sittaung Bridge (Mupalin) in Mon State. Of these, the Thanlwin Bridge is the longest bridge in Myanmar and connects the city of Mawlamyine with Mottama. Constructed at the

confluence of the Thanlwin River, the Gyaing River and the Attayan River in Mon State, the bridge supports a 3.2 km long motor road and a 6.4km long railroad, as well as pedestrian lanes. The approaching structure of the rail bridge on the Mawlamyine bank is 1.96 km long, and on the Mottama bank it is 2.29 km long. The total length of the rail bridge is 7.640 km. The bridge was designed and built by the Ministry of Construction.

The development of bridges, including special project bridges – Attayan, Thanlwin and Sittaung, in Mon State is summarized in Table (3.12)

Table 3.12 Mon State's development condition (Bridges)

	1988	31-12-2008	increment	Remarks
Above 180 feet	3	7	4	Improvements made in 1988 and 2008
Below 180 feet	127	258	131	

Source: Mon State Facts and Figures (2010)

As the Attayan Bridge (Mawlamyine) lies on the route of the EWEC, it has grown in importance and surpassed that of the Thanlwin Bridge (Mawlamyine). It connects Mawlamyine to Myawaddy (a border city with Thailand) and Pha-ann, Kayin State. The route through Pha-ann is likely to be more useful, in terms of trade, than the one through Mawlamyine since Pha-ann is situated along the Asian Highway project. Attayan Bridge's upper structure is a steel frame and the bridge can withstand 60-ton loads of the full range of vehicles.

Sittaung Bridge (Moppalin) was built four miles downstream from the existing Sittaung Bridge (Theinzayat). The bridge connects two approaching roads. The 224.1-

foot long approaching road was constructed on the Kyaikto bank and the 783.6-foot long approaching road was built by on Waw bank. The bridge is 2,392.7 feet long and 28 feet wide. The motorway is flanked by six-foot wide pedestrian walkways.

Businesses and the Industrial Zone

Concerning the industrial sector, an estimated 1600 businesses, excluding factories from the industrial zone, are operating in the city area. In addition to this, there are 136 private factories in the Mawlamyine Industrial Zone, which covers 141 acres. Although it is called the Mawlamyine Industrial Zone, because of regulations that any industrial zone must belong to the capital of its state or division or distinct, in reality it actually belongs to Kyaikmayaw Township.

Social Sector

In order to provide young people with access to higher education in the region, there are a number of higher education institutions including an institute of technology, Mawlamyine Art and Science University, and one educational college producing professionals and technicians. In regards to basic education, there are 15 basic education (pre-university) high schools (branch), one basic education high school, one basic education affiliated high school and 14 basic education middle schools, 13 post-primary schools, and 120 primary schools. In terms of quality, Mon State won the first prize for best matriculation results for the education year of 2008-2009.

In an attempt to achieve the four social objectives laid down by the state and fully utilize the Information and Communication Technology (ICT) that has been

widespread in this globalization era, work schedules have been upgraded for the basic education and higher education services. This includes promoting efficiency in the basic education schools, expanding access to acquire modern communication technology, improving the proficiency of teachers, finding ways and means for all ethnicities to obtain basic education, and a creating lifelong learning society to counter challenges of the knowledge age. The improvement to the Basic Education sector can be seen in Table (3.13).

Table 3.13 Education Sector in Mon State

Basic Education	Accounting System	1988	end 2008	Growth
Multimedia class room	school		172	172
e- Learning centre	school		27	27
Teachers	person	8,619	11,691	3,072
Students	person	258,892	349,344	90,452
Primary school enrolment rate	%	71.42	99.31	27.89
Adult Literacy Rate	%	79.2	97.41	18.21

Source: Mon State Facts and Figures (2010)

Under these social objectives, multimedia classrooms and e-Learning centres have been opened to access advanced communication technology. The primary school enrolment rate has increased from 71.42% in 1988 to 99.31 % in 2008.

Hospitals, dispensaries and health centres are being expanded to provide health care services in Mon State. Table (3.14) shows the growth of public health institutions in Mon state.

Table 3.14 Public Health Institutions in Mon State

Year	General Hospitals						Total		Dispensaries
	With Special Services		Other		Station				
	no	Scheduled Bed	No.	Bed	No.	Bed	No.	Bed	
2002-2003	1	350	10	341	14	224	25	915	35
2003-2004	1	350	10	341	14	224	25	915	18
2004-2005	1	350	10	341	15	240	26	931	12
2005-2006	1	350	10	341	18	288	29	979	13
2006-2007	1	350	10	341	18	288	29	979	13

Source: Myanmar Data CD Rom 2007

Although there has been a nominal increase, the improvement has been quite small compared with the population size of Mon State and there is no reported evidence that any of this development is associated with improved road infrastructure.

Regarding Mawlamyine Township, in 2008 health facilities providing health care services for the populace included one hospital of 350 beds, three station hospitals of 16 beds, one maternal and child health care centre, three rural health centers and 12 sub-centers.

Table 3.15 Mon State's Public Health Personnel Condition 1988 and 2008

Personnel type	Unit	1988	end 2008	Growth (%)
Doctor	person	108	167	59
Dental Surgeon	person	13	19	6
Health Assistant	person	47	67	20
Nurse	person	171	293	122
Midwife	person	327	371	44
Lady Health Visitor	person	60	69	9
Public Health Supervisor (I)	person	18	18	0
Public Health Supervisor (II)	person	21	60	39
Nurse (Dental)	person	2	2	0

Source: Mon State Facts and Figures (2010)

From the table, one can see that the economic, social and infrastructure sectors such as education, health and road transportation are making headway over time. So the socio-economic life of people living in Mawlamyine should theoretically be improving.

Features of the EWEC in Mawlamyine

Table 3.16 Segment From Yangon-Myawaddy-Mawlamyine Road

	Distance (Km)
Yangon – Mawlamyine (Before Than Lwin Bridge) Using Attayan Bridge)	
Yangon – Bago	80
Bago- BayarGyi(Junction)	11
Bayargyi- Waw	16
Waw-Sittaung	24
Sittaung- Kyaikhto	34
Kyaikhto-Belin	29
Belin-Thaton	35
Thaton – Pha-ann	51
Pha-ann -Mawlamyine(from Pha-ann)	52
Yangon – Mawlamyine (after Than Lwin Bridge)	
Yangon – Bago	80
Bago- BayarGyi(Junction)	11
Bayargyi- Waw	16
Waw-Sittaung	2
Sittaung- Kyaikhto	34
Kyaikhto-Belin	29
Belin-Thaton	35
Thaton – Paung	36
Paung-Mawlamyine	28
Mawlamyine- Myawaddy	
Mawlamyine – Zarthabyin	45
Zarthabyin-Eindu	25
Eindu- Myawady (Eindu-Kyondoe- Kawkayeik- Thingyannyinayung- Myawaddy)	129
Pha-ann- Myawaddy	
Pha-ann-Eindu	19
Eindu-Myawaddy	129

Source: Myanmar Economic & Management Institute (2007)

The EWEC starts at Dannang Port in Vietnam and ends at Mawlamyine Port of Myanmar. On this route, the Myawaddy-Mawlamyine road (almost 200 km) is expected to play a vital role in the Myanmar side of the EWEC. The Myawaddy – Mawlamyine road is on the way back to Pha-ann and departed at Eindu (24 km from Pha-ann). Myawaddy, Myanmar and Maesot, Thailand are connected by a friendship bridge.

Eindu-Mawlamyine (MLM) road is divided into two parts: the Eindu-Zarthabyin and the Zarthabyin-MLM routes. Eindu-Zarthabyin is a 14-foot wide, two lane tar road up to Zarthabyin bridge. This bridge is a 2900-foot Bailey Girder Bridge crossing the Gyaing River. The bridge's weight allowance is 36 tons. Zarthabyin - MLM road is a 22-foot, two lane new bituminous road which passes the MLM Industrial Zone and Attanyan Steel Girder Suspension Bridge near MLM. Thaton is the junction of Yangon – Mawlamyine road and the Yangon-Pha-ann-Myawaddy road.

The kingpins for the success of the EWEC are the ports at each end of the corridor. To the East there is the Da Nang Port which consists of two areas, the Tien Sa Seaport and the Han River Port. It is fully operational with a capacity of 4 million metric tons a year. To the West preliminary plans were to have a deep sea port in Mawlamyine but there are no concrete plans to designate a proper area for this port from the Port Authority of Myanmar. As will be explained below, it has been found that it is not possible to have a deep sea port in Mawlamyine because the geography does not allow it.

Mawlamyine Port

Mawlamyine Port is one of the nine coastal ports in Myanmar. After an in-depth study, the Port Authority of Myanmar has deemed that, since it is 37.04 km from the mouth of Thanlwin River, Mawlamyine is inappropriate as a deep-sea port because the maritime access for seagoing vessels to Mawlamyine Port is not deep enough for vessels with more than 0.0045 km draft. 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.

Moving to Kalegauk

The closest potential site for constructing a deep sea port around this area, according to the Port Authority of Myanmar, is the Kalegauk 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. The Major drawback of this location is that it is not on the proposed direct route of the EWEC which follows a line that is as direct from Kalegauk, 150 km south of Mawlamyine. It will add an extra 2 to 3 hours at least to the journey. This will virtually prevent the port from being used for importing or exporting perishable commodities such as fish, milk, fruits and vegetables.

Current Condition of the EWEC and deep sea port

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.

Dawei Deep Sea Port

Currently, the Dawei Deep sea port project is the western most point of the Southern Economic Corridor which starts at Quy Nhon and Vung Tau in Vietnam. The corridor passes through Cambodia and then Thailand through Bangkok and Kanchanaburi. It extends into Myanmar and ends in Dawei. The project is currently in the preparation stage but construction will begin soon.

Sample Selection

3.7 Sampling Techniques

The method we used for data collection is the Systematic Propionate Random sampling method¹⁸ in a survey. Since the participants taking the surveys must be from

¹⁸. Systematic sampling is a statistical method involving the selection of elements from an ordered sampling frame. The most common form of systematic sampling is an equal-probability method, in which every k^{th} element in the frame is selected, where k , the sampling interval (sometimes known as the *skip*), is calculated as

$k = \frac{N}{n}$ where n is the sample size, and N is the population size. Using this procedure each element in the population has a known and equal probability of selection. This makes systematic sampling functionally similar to simple random sampling. It is however, much more efficient (if variance within systematic sample is more than variance of population). The researcher must ensure that the chosen sampling interval does not hide a pattern. Any pattern would threaten randomness. A random starting point must also be selected. Systematic sampling is to be applied only if the given population is logically homogeneous, because systematic sample units are uniformly distributed over the population.

different occupations, the selected wards and villages should have a considerable number of households surveyed. For instance, the sample size should be at least 30 in one ward or village. Thus, the sample design that was used in data collection is the Unequal Probability Proportionate to Size (PPS) sampling without replacement which was firstly used by Madow (1949) when he used the systematic sampling with probability proportional to size and avoided the chance of any unit being selected more than once (Khawaja, 2005).

PPS design enables villages or wards with larger numbers of households to be selected with a greater chance. The sample wards and villages have been chosen without a replacement PPS method. However, a particular village chosen may turn out to be difficult to reach. In order to overcome some difficulties, a reserve village will be chosen in advance. For this case, we might substitute the reserve village for the inappropriate village. No list of wards and villages organized by income class or land size was available beforehand. Therefore, a random sampling process was used.

3.8 Survey Instrument

After preliminary interviews with target group members and key informants, and extensive field observation, a previously prepared questionnaire from the EWEC research project at Chiang Mai University was modified to suit in our SAM analysis.

The Thai language questionnaires were translated into English and then into Myanmar language. Research assistants and local staff were trained in a two-day preparatory training. After the first three days of survey, the survey experience helped the researcher to improve assistants and local staffs' skills dealing with households.

3.9 Data Collection

Secondary data and statistics on population have been collected from the Mon State Peace and Development Committee, the Township Development Committee, the Immigration Department and the Township Planning Office. Key informant interviews were with some government officials, NGO staff and other informants. 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.

Households and firm surveys of the study population were conducted using a structured questionnaire, which was the main data collection tool for our analysis and included all relevant questions on population, income, expenditure and production.

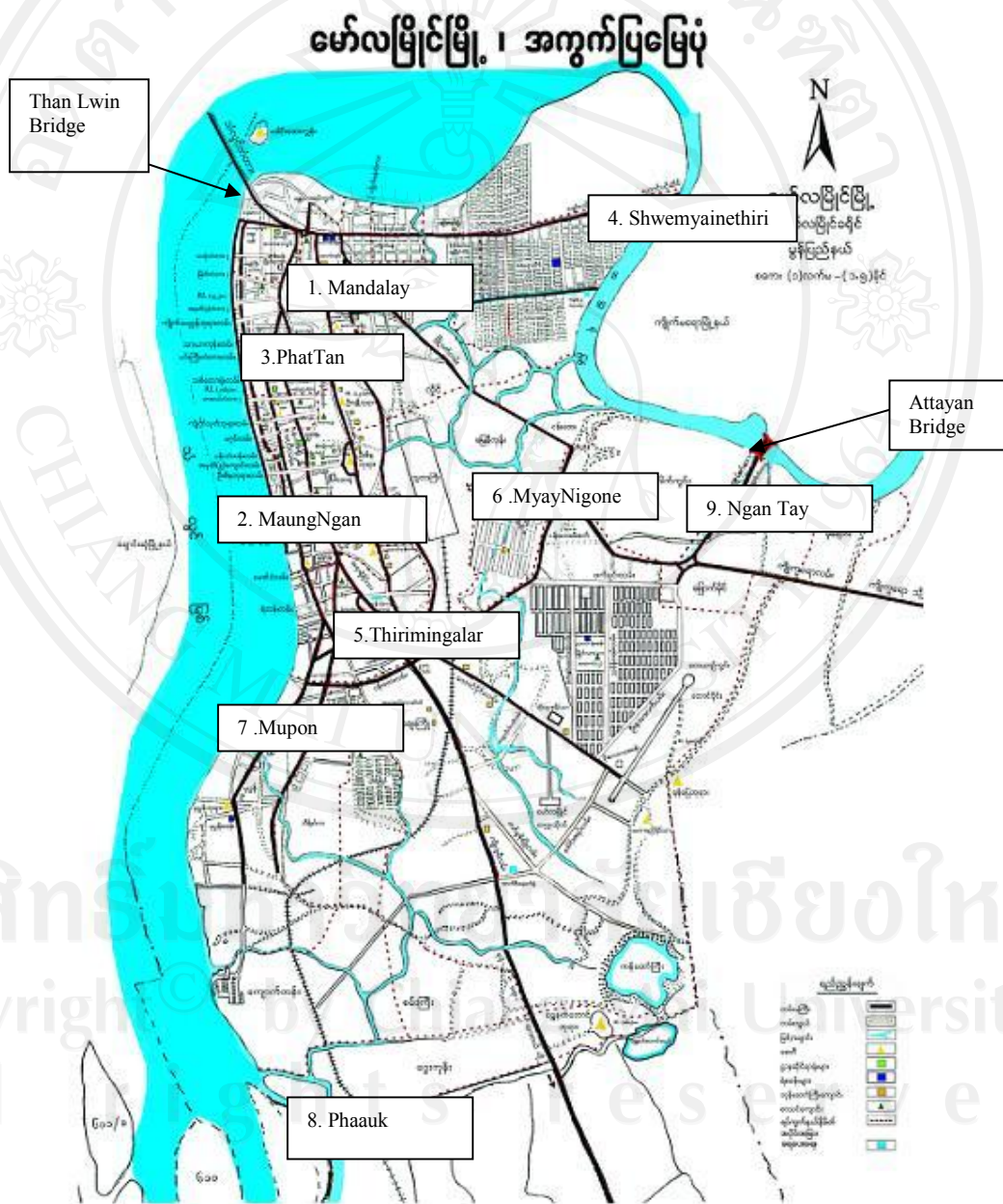
3.10 Research Site and Sample Household Selection

The research site we have chosen is Mawlamyine Township which consists of 22 wards and 19 village groups. The wards are divided into urban and semi-urban areas by the authorities based on the wards' economic size. The number of wards and villages from which the sample were to be chosen were arranged serially by calculating the respective cumulative frequency of households. For urban wards, the township development committee has some standard to demarcate rankings of areas by economic condition and rurality : urban rank 1, rank 2, rank 3 and rural.

Detail procedures will be discussed in later sections. From the existing 22 wards and 19 village groups from the whole township, we selected 7 wards and 2 village groups. The chosen wards and villages such as Mandalay, Mupon, MaungNgan, Phattan, Myaynigone, Shwemyainethiri, Thirimingalar, Ngantay and

Phaauk are shown in Map (3.2). Phaauk and Ngantay are only villages in our sample though Phaauk is far from the town.

Map 3.2 Samples in Study Site



Source : Mawlamyine Township Development Committee 2009

3.11 Sampling Procedures and Types of Data Collected

To divide up the urban and semi-urban areas we decided to rank 1 and 2 as a urban and rank 3 as semi-urban. The sample size was taken proportionately according to their known population sizes again.

After establishing the urban and semi-urban zones, a random village was chosen based on the cumulative number of houses. (The formula in EXCEL is random number of village =RAND ()*23,669 where 23,669 is the cumulative number of houses in rank 1 and 2). Due to some constraints, it was only possible to survey cumulative houses not cumulative households. For choosing the starting house, a segmented sampling procedure was used and we applied the previous formula again using the total number of houses in that ward. To get the interval for the second and the following houses, we used the total number of houses for that ward divided by the total number of samples required for that ward. The example of our procedure in our survey is shown in the foot note below.¹⁹

Regarding the firms' surveys, this was quite difficult to do in a systematic manner for Mawlamyine, especially when it came to large-scale firms, banks and other institutions. The systematic sampling method could not be applied. We could get interviews for data only through convenience surveys.

¹⁹. For example, suppose we have chosen a random number 17001, then Mandalay ward will be chosen. If it has been chosen, we have to take random house to start. Then = RAND()*1558 , where 1558 is total houses in Mandalay . Suppose we have received 48 then we need an interval to collect the survey at that quarter. Since we decide 30 house should be taken in Mandalay, then the interval might be (= 1558/30 =) 51 or 52 for this quarter.

3.12 Choosing Sample Size

Though the methods used in surveys can differ substantially by researchers, the basic determination ends up being almost the same. In the present research, we have adopted the technique for large populations that has been prescribed in Rea and Parker (1997).

Based on the confidence interval, the level of confidences and the standard errors, the formula for deciding the sample size can be written down as follows;

$$C_p = \pm Z_\alpha (\sigma_p)$$

$$N = \left(\frac{Z_\alpha \sqrt{\rho(1-\rho)}}{C_p} \right)^2$$

Z_α = z score for various levels of confidences (alpha) = mostly commonly set 1.96 for 95 %

C_p = Confidence intervals in terms of proportions = not to exceed 10%

$\sqrt{\rho(1-\rho)} = Z_p = \sigma_p$ = standard error for a distribution of sample proportions

"To proceed with the calculation of specific sample sizes (N), the values of Z_α , C_p and ρ must be established. Z_α is most commonly set at 1.96 for the 95 percent level of confidence or 2.575 for 99 percent. The confidence interval C_p is typically set not to exceed 10 percent and is more frequently set in the 3 to 5 percent range" (Rea and Parker, 1997, p. 117). Table (1.17) presents the expected proportionate to sample for study area.

Table 3.17 The Expected Proportionate Sample

	Houses	Expected Proportionate Sample	Households	Population
Rural	12412	76.1	13221	103646
Urban	50204	308	56586	360211
Mawlamyine	62616		69807	463857

Sample size = 384.16 (with margin of error 5%)

Urban: rural =4.0

Urban sample = 304.6 and Rural sample = 75.3

We have seen that expected proportionate sample size is 385 (or) 384 in our study area .

3.13 The Percentage Used in Survey

As we have seen, the true proportion (ρ) is unknown. The most conservative way of handling this uncertainty is to set the value of ρ at the proportion that would result in the highest sample size. This occurs when $\rho=.5$. To obtain the appropriate sample size for this study, it can be substituted into the equation.

$$N = \left(\frac{Z_{\alpha} \sqrt{\rho(1-\rho)}}{C_{\rho}} \right)^2$$

$$N = \left(\frac{(1.96) \sqrt{.5(1-.5)}}{.5} \right)^2$$

$$N=384.16$$

$Z_{\alpha} = 2.575$ must be substituted for $Z_{\alpha} = 1.96$ when 99 percent confidence is required and that the confidence interval (C_p) also can be varied according to the researcher's requirement for various levels of sampling accuracy. The following table shows that the general population from which the sample or samples are taken is large.

Table 3.18 Minimum sample sizes for variables expressed as proportions

Confidence Interval (Margin of Error, percent)	Sample Size	
	95% confidence	99% confidence
±1	9604	16590
±2	2401	4148
±3	1068	1844
±4	601	1037
±5	385 ²⁰	664
±6	267	461
±7	196	339
±8	151	260
±9	119	205
±10	97	166

Source: Rea and Parker, 1997, p. 119.

3.14 Sample Characteristics

The next step was to check the sampling characteristics by rurality and income class in order to better explain how rural, semi-urban and urban people actually live in the Mawlamyine area. Table (3.19.a) explains religious²¹ affiliation, ethnic group²² and total education of households in our sample.

²⁰ . This target is used in the present study.

²¹ . Religions: Buddhist=1, Christian=2, Isalm=3, Others=4

²² . Ethnic Group : 1=Myanmar, 2=Mon, 3=Mon+Myanmar , 4=India , 5=Others

Table 3.19a Sampling Characteristics : Income by rurality class

Income_ by_ rurality class (1 to 15)	Religious affiliation	Ethnic group	Household members (persons)	Household males (persons)	Household females (persons)	Total education of all members of the household (years)
Rural Avg	1.1	1.8	5.0	2.5	2.5	31.7
1.0	1.0	1.9	6.3	2.8	3.5	40.3
2.0	1.3	1.9	5.3	2.9	2.3	25.1
3.0	1.0	1.5	5.1	2.5	2.5	30.7
4.0	1.1	1.8	4.1	2.2	1.9	28.9
5.0	1.1	1.9	4.2	1.9	2.3	33.7
Semiurban Avg	1.3	1.9	4.8	2.4	2.5	29.6
6.0	1.6	2.1	5.4	2.6	2.8	27.5
7.0	1.2	1.5	4.6	2.2	2.4	25.9
8.0	1.1	1.8	4.5	2.1	2.4	28.2
9.0	1.3	2.0	5.2	2.6	2.6	31.1
10.0	1.2	2.1	4.4	2.3	2.1	35.4
Urban Avg	1.2	2.0	4.9	2.4	2.5	41.7
11.0	1.2	2.0	5.2	2.6	2.5	34.4
12.0	1.2	1.5	4.8	2.2	2.5	38.8
13.0	1.1	1.8	5.0	2.3	2.6	50.2
14.0	1.2	2.2	4.8	2.5	2.3	43.9
15.0	1.5	2.5	4.7	2.2	2.5	41.2

Source: Calculated by the researcher

The sampling method used to collect household data is proportionate random sampling. Seven wards for the urban and semi-urban areas and two villages for the rural area were selected at random. Subsequently, the households were divided into 15 groups (5 rural, 5 semi-urban, 5 urban) in accordance with their quintile ranking by income status within each geographical setting. This is because our target was to check and observe whether their income flows could be increased based on their jobs after improvements were made to the transportation infrastructure and transportation services. More specifically, in our sample, income by rurality class 1 to 5 represents

rural areas or villages, class 6 to 10 represents semi-urban areas and class 11 to 15 represents urban areas. Income was ranked from the lowest, 1, to the highest, 5, in the rural class; the lowest, 6, and the highest, 10, in the class of semi-urban; and the same procedure was applied in the urban area, where the lowest to the highest is 11 to 16.

As shown in Table 13.9a, the religious affiliation of all interviewed households in the sample was Buddhist. The majority of people in Mawlamyine are Myanmar and Mon, although there are some Kayin, Tamil, Hindu and Muslim. The lowest income quintile has the biggest family size which is 6.3 and urban family size seems to be on average five persons per house. Male –female ratio is ‘0.96’, which is almost equal to ‘1’. In general, the sum of the years of education of family members is only 34. This means that the average years of schooling per member is only seven, which would mean they attended only until middle school.

It is not surprising to see the total education of all members of the household (years) in the lowest rurality as the average number of rural household members is eight persons. (See Table 3.2a.) Therefore, their average number of education (years) seems to be high even if their education status is primary school education.

Table 3.19b Sampling characteristics: Income by rurality class

Income_by_rurality class (1 to 15)	MLM-employed males	MLM-employed females	Migr-males	Migr-females	Total workers (persons)	Liv-spa per household (sq m)	House type
Rural Avg	1.0	1.0	0.6	0.2	2.8	88.9	3.4
1.0	0.9	1.2	0.9	0.5	3.6	103.8	3.5
2.0	0.8	0.3	0.8	0.3	2.3	82.6	3.1
3.0	1.1	0.9	0.6	0.2	2.9	92.0	3.5
4.0	1.0	1.1	0.5	0.0	2.5	73.2	3.3
5.0	1.2	1.3	0.1	0.0	2.7	92.7	3.5
Semiurban Avg	1.3	0.9	0.2	0.1	2.5	60.1	3.3
6.0	1.2	0.9	0.2	0.2	2.5	59.4	3.1
7.0	1.2	1.1	0.2	0.1	2.7	44.9	3.0
8.0	1.2	0.9	0.2	0.0	2.4	52.6	3.2
9.0	1.7	0.9	0.1	0.0	2.7	51.8	3.5
10.0	1.2	0.7	0.2	0.0	2.1	91.7	3.6
Urban Avg	1.1	1.0	0.3	0.1	2.6	79.5	3.7
11.0	1.4	0.8	0.2	0.2	2.6	49.1	3.2
12.0	1.1	0.9	0.3	0.3	2.6	72.3	3.3
13.0	0.8	1.3	0.4	0.1	2.6	72.3	3.5
14.0	1.2	1.2	0.4	0.0	2.7	85.8	4.2
15.0	1.0	1.0	0.3	0.0	2.2	118.1	4.5

Source: Calculated by researcher

When we turn our attention to employment, both males and females have almost the same ratio of working in the Mawlamyine area. Additionally, while both groups have migrant workers, the majority are males. According to our survey results, the majority of migrants go to the Myawaddy – Mae Sot region on the Myanmar – Thai border along the the route of the EWEC. In addition, some migrants go to Malaysia and Singapore. Living space per household for study site is shown in Table

(3.19 b). When the study area's house types²³ were observed, it was found that people live in wooden houses and that only a few people live in brick houses.

Table 3.19c Sampling Characteristics: Income by rurality class

Income_by rurality class (1 to 15)	Share Inco (Agri)	Share Inco (HH-Indu)	Share Inco (Tran)	Share Inco (Oth-Serv)	Share Inco (Oth-Serv)	Share Inco (Remitances)	Share Inco (all other)	Labourer in other sources of Inco (Persons)
Rural Avg	0.1	0.1	0.1	0.1	0.2	0.3	0.2	1
1	0.1	0.1	0.1	0.1	0.1	0.4	0.2	1.7
2	-	-	0.1	0	0.2	0.5	0.2	1.3
3	0.1	0.1	0.1	0.1	0.1	0.3	0.2	0.6
4	-	0.1	-	0.1	0.2	0.3	0.3	1
5	0.2	-	0.2	0.1	0.3	0	0.2	0.3
Semi-urban Avg	0.1	-	0.1	0	0.1	0.1	0.5	1.5
6	0	-	0.2	0	0.1	0.2	0.5	1.6
7	0.1	-	0	0	0.1	0.1	0.7	2.2
8	0.1	-	0.1	-	0.1	0.1	0.6	1.7
9	0.1	-	0.2	0.1	0.1	0.1	0.4	1.1
10	0.1	-	0.1	0.1	0.2	0.1	0.4	1.1
Urban Avg	0	-	0.1	0.1	0.2	0.2	0.4	1.5
11	0	-	0.1	0.1	0.1	0.1	0.6	1.8
12	0	-	0.1	0	0.1	0.2	0.6	2
13	-	-	0.1	0.1	0.1	0.2	0.5	1.7
14	0.1	-	0.1	0.1	0.3	0.2	0.4	1.4
15	-	-	0.2	0.1	0.4	0.2	0.1	0.8
Total Average	0.1	0	0.1	0.1	0.2	0.2	0.4	1.4

Source: Calculated by researcher

²³ . House types: 1=straw, 2= earth, 3=wooden, 4=stone, 5= brick, 6=others

Surprisingly, the percentage income from remittances is the highest ratio in income classes 1, 2, 3 and 4, which are in the rural area. Based on an unofficial focus group survey we conducted at Pha-auk village, the majority of working group people are currently in Thailand and send money back to their parents who are already old, or to their primary and middle school-age children for their studies. Some middleaged couples are working at the border while elderly people are taking care of the couples' sons and daughters back in the village. The majority of the youth in that village are not interested in formal education and are willing to go to work on the border. Working away from home and sending money back to the village brings people high prestige in their native village.

Generally, the percentage income from industrial output shows that industrialization in the Mawlamyine area has not yet started to boom. Most importantly, the majority of people we asked about the East –West corridor had never heard of it. Indeed, much less than half of the sample knew about the EWEC, although some of them knew the Asia-Highway (AH). Table (13.9d) shows those results by rurality class.

Table 3.19d Sampling characteristics: income by rurality class : Have you heard of the EWEC?

(1 to 15)	(Yes=1, otherwise =0)
Rural Avg	5%
1	0.0%
2	13.3%
3	6.7%
4	0.0%
5	6.7%
Semiurban Avg	14%
6	18.2%
7	5.9%
8	14.7%
9	20.6%
10	11.8%
Urban Avg	24%
11	12.0%
12	19.2%
13	30.8%
14	24.0%
15	34.6%
Total average	15.9%

Source : Calculated by researcher

3.15 Conclusion

As we have seen, the EWEC is an unfinished transportation project and the project has met with challenges and postponements in terms of constructing and choosing the site for a deep sea port. 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 tells 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.



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved