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SOCIAL IMPACT ASSESSMENT IN SOUTH DAGON
INDUSTRIAL ZONE (1)

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LIST OF ABBREVIATION

EIA	Environmental Impact Assessment
SIA	Social Impact Assessment
ESIA	Environmental and Social Impact Assessment
HIA	Health Impact Assessment
IEE	Initial Environmental Examination
EMP	Environmental Management Plan
UN	United Nation
GHG	Green House Gas
ILO	International Labour Organization
PAPs	Project Affected Person
IFC	International Finance Corporation
TSP	Total Suspended Particles
PM	Particulate Matter
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
WWTP	Waste Water Treatment Plant
HSE	Health, Safety and Environment
VOCs	Volatile Organic Compounds

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Abstract

Myanmar is moving forward with a momentum to be a more developing country with much transparency although it was a developing country. Though its main economy is dependent on agriculture, it has enormously increased industries and industrial zones. This study explored the positive and negative impacts that are affected to local people, migrants and the workers and revealed the possible anticipated impacts in South Dagon industrial zone (1). Qualitative research method was used in this study. As soon as the economic and infrastructure have been developed within the local area, many migrants are moving to the proponent area. This turns to lead increased population, unsystematic sewage discharge, bad smells and unsanitary drainage discharge. It is found that the income sources of the migrants are much more developed than that of the local people according to the socio economic survey. And the livelihood patterns of the local people dramatically change due to the adverse impacts of the establishment of the industrial zone. Local people, who are 16% in total population of the proponent area, earn their money by taking up any jobs that comes by such as hawkers, laundry and selling fuel wood. Local people are already in conflicts with the migrants in dealing with social relations. And the zone committee and the industrial zone are encouraging to support the Cooperate Social Responsibility (CSR) program, job allocation and negotiation to the local people and the workers. And this study also observed the four selected factories to observe the environmental impacts and to identify the possible mitigation measures and monitoring plan. The positive and negative impacts observed in this study were impacts of air pollution, impacts of water pollution, impacts of noise pollution and impacts on human health and safety and CSR program.

Key Words: Cooperate Social Responsibility, Livelihood Patterns, Local People, Migrants, Positive and Negative Impacts, Mitigation Measures and Monitoring Plan, Qualitative Research Method.

တောင်ဒဂုံစက်မှုဇုန် (၁)၏ လူမှုစီးပွားရေးအကျိုးသက်ရောက်မှုများကို လေ့လာဆန်းစစ်ခြင်း

ဝင်းသီတာခိုင်၊ တောအုပ်ကြီး
အပူပိုင်းဒေသစီမံခန့်ခွဲရေးဦးစီးဌာန

စာတမ်းအကျဉ်း

ပြည်ထောင်စုသမ္မတမြန်မာနိုင်ငံသည် ၂၀၁၅ ခုနှစ် မှစတင်၍ ပွင့်လင်းမြင်သာစွာဖြင့် ဖွံ့ဖြိုး တိုးတက်လာပြီဖြစ်သည်။ စိုက်ပျိုးရေးကိုအခြေခံသော နိုင်ငံဖြစ်သော်ငြား စက်မှုဇုန်နှင့် စက်ရုံအမြောက်အများလည်း လည်ပတ်လုပ်ကိုင်လျက်ရှိပါသည်။ ယခုစာတမ်းသည် ရန်ကုန်တိုင်း ဒေသကြီး၊ တောင်ဒဂုံမြို့နယ်၊ တောင်ဒဂုံစက်မှုဇုန်(၁) တည်ရှိ ခြင်း၏ ဒေသခံ ပြည်သူများ၊ ပြောင်းရွှေ့နေထိုင်ကြသူများ၊ အလုပ်သမားများပေါ် ကျရောက်သောကောင်းကျိုး၊ ဆိုးကျိုးများကို လေ့လာသုတေသနပြုထား ခြင်းဖြစ်ပါသည်။ စီးပွားရေးစတင် ဖွံ့ဖြိုးတိုးတက်လာပြီး အခြေခံ လူမှု အဆောက်အအုံများ ဖွံ့ဖြိုးတိုးတက်လာသည်နှင့်အမျှ သုတေသနပြု ဧရိယာသည် လူနေ များပြားထူ ထပ်လာသည်။ ဤသို့ လူနေထူ ထပ်များပြား လာရာမှ တဆင့် စနစ်မကျသော မိလ္လာစွန့်ပစ်မှုများနှင့် ရေမြောင်းစနစ်များ အနံ့အသက်ဆိုးများ ဖြစ်ပွားလာသည်။ လူမှု စီးပွားစစ်တမ်း ကောက်ယူခြင်းအရ စက်မှုဇုန်အားအခြေခံ သော ပြောင်းရွှေ့ လုပ်သားများသည် ဒေသခံများထက် စီးပွားရေးပိုမိုတိုးတက် ကောင်းမွန်ကြောင်း ကိုတွေ့ရှိရပါ သည်။ စက်မှုဇုန် တည်ထောင်ခြင်းကြောင့် ဒေသခံများ၏ အသက်မွေးဝမ်း ကြောင်းမှုပုံစံများ သိသိသာသာ ပြောင်းလဲလာသည်ကိုလည်း စိစစ်တွေ့ရှိရပါသည်။ မြို့နယ်နေလူဦးရေ၏ (၁၆)ရာခိုင်နှုန်း မျှသာ ရှိသော ဒေသခံပြည်သူများသည် မူလကစက်မှုဇုန် တည်ရှိခဲ့သောနေရာ၌ လယ်ယာ လုပ်ငန်းဖြင့် အသက်မွေးဝမ်းကြောင်းပြုခဲ့ကြသော်လည်း ယခုအခါတွင်မူ ထင်းကောက် ရောင်းခြင်း၊ ဈေးဆိုင် ဖွင့်ခြင်း၊ အဝတ်လျှော်ခြင်း၊ ကျပန်း အလုပ်များဖြင့် အသက်မွေး ဝမ်းကျောင်း ပြုလျက်ရှိကြပါ သည်။ စက်မှုဇုန်ကြီးကြပ်မှု ကော်မတီနှင့် စက်ရုံပိုင်ရှင် များမှ လည်း ဒေသတွင်း အလုပ်များ ကမ်းလှမ်းခြင်း၊ ရပ်ရွာအထောက်အကူ ပြုဖွံ့ဖြိုးရေးလုပ်ငန်းများ ဆောင်ရွက်ပေးခြင်း ဖြင့်ဒေသဖွံ့ဖြိုးတိုးတက်ရေးအားအထောက်အပံ့ပြုလျက်ရှိပါသည်။ ထို့အပြင် ဒေသခံနှင့် ပြောင်း ရွှေ့ လုပ်သားများ၊ စက်ရုံအလုပ်သမားများ၏ လူမှုရေး၊ ကျန်းမာရေးနှင့် သဘာဝ ပတ်ဝန်း ကျင်သက် ရောက်မှုများကို လေ့လာနိုင်ရန် အတွက် စက်ရုံ (၃) ရုံအား ရွေးချယ်ပြီး ဆိုးကျိုး

သက်ရောက်မှုများကို လျော့ချနိုင်သော အစီအစဉ်များနှင့် စောင့်ကြပ် ကြည့်ရှုသည့် စနစ် များကို သုတေသနပြု ဆောင်ရွက်ခဲ့ပါသည်။ လေ့လာခဲ့သော ကောင်းကျိုး ဆိုးကျိုးများမှာ လေထု ညစ်ညမ်းခြင်း၊ ရေထု ညစ်ညမ်းခြင်း၊ ဆူညံသံများ၊ လူထုကျန်းမာရေးနှင့် လူမှု ဘဝလုံခြုံ စိတ်ချ ရစေခြင်းနှင့် ရပ်ရွာအထောက်အကူ ပြုဖွံ့ဖြိုးတိုးတက်ရေးလုပ်ငန်းများ တို့ဖြစ်ကြပါ သည်။

Social Impact Assessment in South Dagon Industrial Zone (1)

1. Introduction

Yangon has many industrial zones in which South Dagon industrial zone is one of the contributable industries because Myanmar still strongly needs to compete the business with neighbours countries to develop basic infrastructure to increase the cost of doing business and increase productivity. Actually, industrialization, though it can create opportunities and benefits for people, while important for the economic growth and development of a society, but at the same time they can also create harmful effects. Amongst other things industrial process can cause pollution to air, water and soil, health issues, extinction of species and more. [2] The zone to be more sustainable, it is important to develop Social Impact Assessment e.g., intensive measuring, integrating them into overall economic policies and strategies and take into account negative and positive impacts on environment and local communities. According to Environmental Law 2012 and Environmental Procedure 2015, establishing industrial zone must be accomplished environmental and social impact assessment. But there are no environmental monitoring plan such as EIA, SIA, ESIA, HIA, IEE and EMP because it was established since 1993 and the Environment Law had not been set yet. But it can carry out environmental management plan to reduce and mitigate the possible negative impacts for the industries through environmental experts.

In assessing the positive and negative impacts concerning with the development projects, this study was to evaluate the environmental and social impacts caused by the industrial development project in South Dagon industrial zone (1). It pointed out that the zone may need to provide the Cooperate Social Responsibility (CSR) program to public in the target area. This research analyzed socio- economic impacts in the target area. South Dagon industrial zone was established in 1992 in Yae Twin Chaung village.

2. Objectives of the Study

There are two objectives in this research. They are as follow,

- (1) to study the environmental and social impacts of the industrial development project that are affected to both local people and the migrants in South Dagon industrial zone (1).
- (2) to provide the suggestion for Cooperate Social Responsibility (CSR) program in order to minimize the social impacts of the people in the target area.

3. Material and Methods

It is being collected primary and secondary data, its analysis and interpretation to achieve the objectives.

3.1 Preliminary site survey and sample size calculation

A preliminary site survey was carried out for obtaining information of the target site and its surrounding area. Households' numbers and population were collected to calculate the sample size to interview in primary data collection. The topography and the existence of three industrial zones were recorded to identify the target area. Observations are made by looking at the natural condition around the village. Recording of the situation were made by taking pictures of any notable object or situation was observed in and around the industrial zone and village. Parel's sample size formula was used to calculate the sample size of the village because the number of households in each street are not equal in quantity and it is quite different the proportion of the household number. [1]

$$n = \frac{NZ^2 P (1-P)}{(Nd^2 + Z^2 P (1-P))} \text{ (Parel et al., 1973)}$$

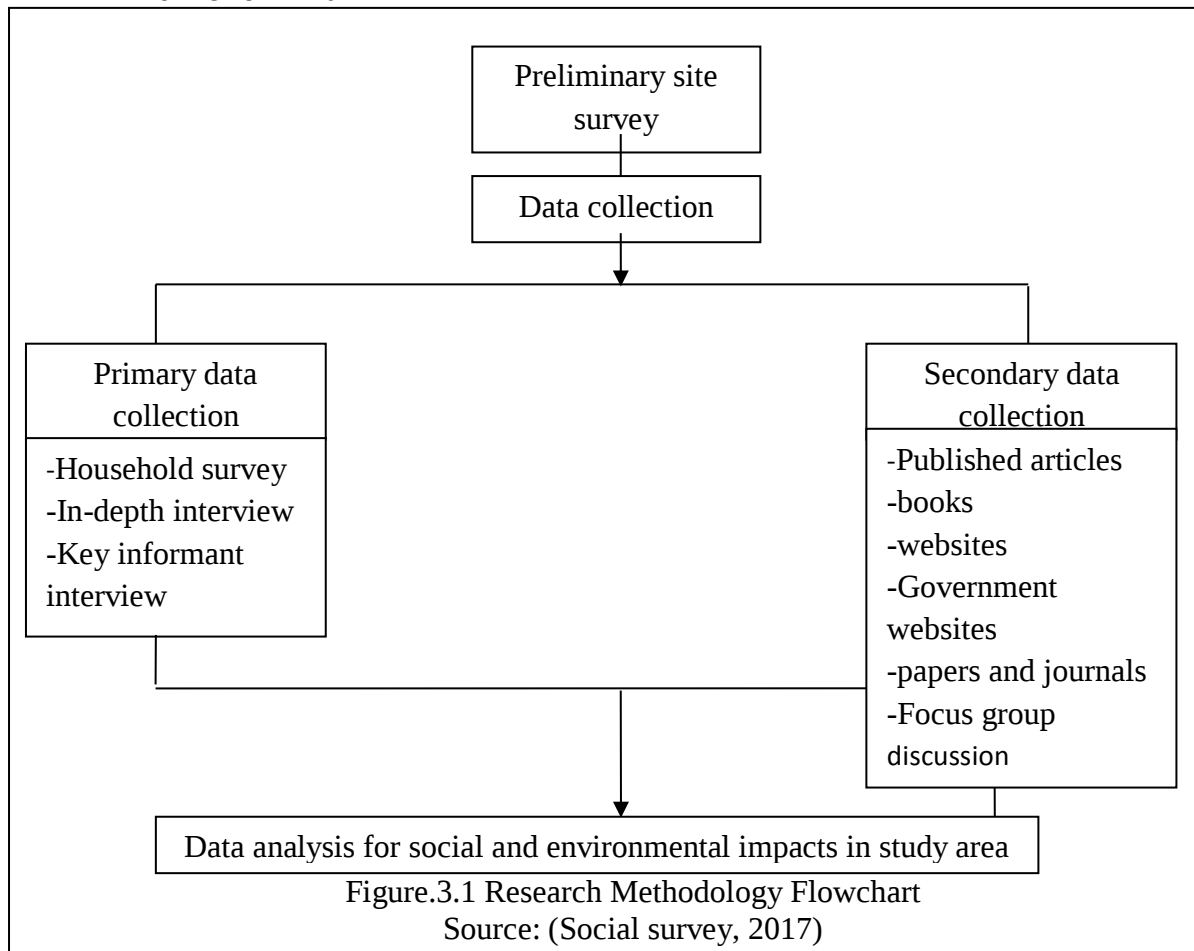
In which, n = sample size

N = total number of households

Z = standard error (at 95%confidence interval, Z = 1.96)

P = estimated proportion of the population (P = 0.5)

d = error limit



3.1.1 Primary data collection

The research methodology is a qualitative method for primary data collection. Household survey using questionnaires was developed to understand the public attitude on the industrial zone, economy before and after the industrial zone, land issues and livelihood change of the local people and the migrants. For effectiveness, in depth interview, key informant interviews with local leaders and discussions interviews with zone's committee were conducted. Based on the experiences and depending on the mentally attitudes of the local people and the migrants, survey was conducted using a semi-structured questionnaire made up of open and closed ended question to know the background information of the Yae Twin Chaung village (now called as 23 Ward, South Dagon) about the data of the household, income, livelihood pattern changes, land issues, social problems such as increasing population, conflicts and living standard.

(a) Household Survey

Total number of household 320 was calculated by the Parel's sample size formula and then it achieved 174 households that were going to be surveyed. Housing number to be surveyed were chosen by using simple random sampling method based on the number households present in each street. Respondents are categorized into two groups as local people and the migrants because the livelihood pattern, culture and the different attitudes on the industrial zone are not different.

(b) In depth Interview

In depth interviews were conducted to know the information of land issues and the attitude of the impacts of the industrial zone. The criteria for selecting households included were that it must not be a new household, not visitor and the respondent must be project affected person and the respondent well knows the situation before and after the industrial zone.

The study explored the effects resulted from the industrial development project on the local people, migrants and the labor from positive and negative point of view.

(d) Key Informant Interview

This activity was conducted accompanied with household survey. Zone committee's member of the management committee, a government's servant from South Dagon township, Yangon City Development Committee (YCDC) and a head person from the administrative office were interviewed to explore the information about procedures, rules, and regulations on the impact of the industrial zone, Cooperate Social Responsibility program, health care and environmental issues.

3.1.2 Secondary Data Collection

Secondary data collection was explored to know the information about demographics data, zone's data from management committee and village administration office. From and Yagon City Development Committee, waste collection system and the data of the industries were obtained.

3.2 Data Analysis

For the qualitative and quantitative analysis, descriptive statistics and surveying method were used. Data collected with open- and closed-ended questionnaires, interpreted using descriptive methods. A qualitative statement analysis was used for qualitative data from field observations and interviews with key informants, focus group discussions, and in depth interviews were added to this research. [1]

Focus group discussion (FGD) was made in Yae Twin Chaung village to know the public altitude both for local people and the migrants. The impacts and changing of the socio-economic impacts before and after the industrial zone also resulted from FGD. FGD was carried out by means of all inclusive particular stakeholder analysis method as the way of village level, township level or district level impact. [3]

For focus group discussion, all strata of stakeholders suggested from diverse point of views. Two specific working groups were organized according to the field survey experiences. Ten respondents (5 local people and 5 migrants) of focus group were formed and give marks as their altitudes and wiliness. All stakeholders' altitudes were collected to cover and to be representative the attitude of all the people in the target area.

By focus group discussion, it can be known the public altitude on the plan intervention and thus the authority can give relevant information with much transparency. Focus group discussion is one of the approaches to know and address the social conflicts. Diverse point of views on the project and on their health, children education and socio-economic benefits can be known through FGD and the impacts can be mitigated, recognized and respected by Cooperate Social Responsibility program. Focus group discussion can be got mutually beneficial and long term partnership between the authority and the society in the target area.

$$\text{Percentage of affected level} = \frac{\text{Value of the sum of impact level} \times 100}{\text{Maximum affected level} \times \text{Maximum damage level} \times \text{number of subject matter}}$$

Table.3.1 Approach Strategy to All Inclusive Stakeholders' analysis

Value	Category		Value	Category
	Public affected marking rate	Measurements of lost marking rate		
0	No impact		0-20	Affected to village level
1	Temporary impact	No lost	21-40	Affected to township level
2	Impact to an extent	Village level lost	41-60	Affected to district level
3	Permanent impact	Township level lost	61-80	Affected to state level
4		District level lost	81-100	Affected to national level
5		State level lost		

Source: (Win Myo Thu, et al., 2013)

3.3 Sample Size

There are 17 streets and total household numbers 320 in the residential area. If it calculates the sample size based on the households in each street, there are 295 households to be surveyed. But because of time limitation, it takes the actual sample by the total number of households 320 that are directly substitute in the formula and get 174 households to be surveyed.

4. Results

4.1 Physical health impacts

Health problems in the project area include illness, asthma, blood pressure, joint pains, gastric problem, hypertension, diabetes, typhoid, etc. The data on ailments and related treatments of the sample households show that some households did face acute ailments for which treatment was taken. Overcrowded latrines facilities due to the displacement of the migrants from the indirect impacts arising from the development of industrialization that can lead to such impacts can cause bad smell, polluted and unhygienic condition such as dizziness, nausea, unpleasant view, etc. Unsafe drinking water that may include coliform bacteria in drinking water was generally a result of a problem with water treatment and possible contamination by disease-causing micro-organism. Diseases of symptoms in the target area included cholera in younger children that is the indirect impacts of the industrial zone because the resettlement area for the removal of their houses is around the wetted farmland place.

Polluted air and dust causes air borne diseases. It was observed that there is an outbreak of the communicable diseases such as measles in one household during the field observation. Many industries potentially affect the local air quality and the health status of its surrounding residents. Particulate Matter (PM) emissions from the some factories have gone off-site and the PM pollution can be in the area within the community, including the local primary school. Most of the industries produce volatile organic compounds and this can cause health adverse impacts. Some of the health impacts due to VOCs observed in the target area is headache, anxiety and abdominal pain. Moreover, respondents reported that some industrial proximity became sick due to the sudden shift from their land to farmland plotted area; many of them were exposed for the first time to health hazards caused by endemic diseases such as malaria, which is rampant in and around the resettlement area.

Much dust produces during the industries' vehicles driving on the land that doesn't pave yet that can cause respiratory diseases such as cough TB and asthma that are described in figure C.1. Better environmental management plan should be introduced in the industries for the air pollution that induced toxicity through inhalation to the people in the target area. The factories should be installed chimney above 100 meter.

There was one 24-hour labor-local people clinic provided by the industrial zone. Moreover, they are providing medicines and other facilities to 24 hour labour clinic.

Table.4.2 Common Diseases Categorized by Gender and Age

Gender	Age (Months)	Common disease					None	Total
		Water borne disease	Air borne disease	Vector borne disease	Illness (cold/flu/cough)	Chronic illness		
Female	6-20	2	-	1	1	-	2	6
	21-50	-	2	4	7	9	44	66
	51-85	1	2	2	24	2	10	41
Male	6-20	-	1	-	-	1	2	4
	21-50	-	3	1	6	1	13	24
	51-85	1	-	1	21	1	9	33
Total		4	8	9	59	14	80	174

Source: (Social Survey, 2017)

- Most common diseases
- Second most common diseases
- Third most common diseases
- Less common diseases
- Second less common diseases
- None

4.2 Educational Facilities in Yae Twin Chaung Village

Educational services in the area before the industrial zone were primary, middle, high school and monastery education. Before industrial zone, there were one primary school, one middle school and one high school. But after the industrial zone, the numbers of schools are significantly increased. The zone committee was established two primary schools, one middle school and one high school for educational services. Moreover, they support much funding and other educational facilities to monastery for monastery education. And one middle school is built in the progress. Therefore, these are the significant positive impacts of the establishment of the industrial zone.

4.3 Water Supply, Sanitation and Sewerage system

There may not be sufficient water available to meet basic needs in the target area, and in these cases supplying a survival level of safe drinking water is of critical importance. The main health problems are caused by poor hygiene due to insufficient water and by the consumption of contaminated water. In this section, project induced resettlement to new locations which were affected water and sanitation in the target area had been described.

Industrial proximities do not treat water for drinking such as boiling, sedimentation, filtration and chlorination. The authority should provide water treatment facilities (e.g., public awareness, chlorination) to the people in the target area.

Surface water cannot be drained off around the residential area and blocked by the large amount of garbage and thus underground water for domestic and portable cannot be used. A housing place where there is few wetted area in which they had dug the tube well and have to distribute for portable and domestic used as communal to other industrial proximities. There is a pond that is divided the village in two parts which is situated in the center of the village. They are also using this pond as communal. When using communal water and

sanitation facilities in these displaced situations, women and adolescent girls can be vulnerable to sexual violence or exploitation. In order to minimise these risks, and to ensure a better quality of response, it is important to encourage women's participation in water supply and sanitation programmes.

All drains are blocked by garbage, cannot be flowed and there is no more sanitation plan to clear that massive garbage that leads to malaria, dengue fever, and lymphatic filariasis.

Most of the people are using the latrine by open pit type and they directly dispose the sewages to the water, a very few use septic tank and some people use bamboo ring and directly dispose to the water make the underground water polluting and causes water borne diseases. Many toilets are crowded and they all are located with different directions in one area that are causing bad smell, bad view point, poor hygiene and sanitation. Drains should always be salvaged and make them flow well. Moreover, there should have well-plans for the village's pond that can be able to reuse because that pond is unsanitary due to the misusing like dumping wastes and washing clothes.

The industrial and government decision makers need to promote water supply and sanitation programmes to reduce the transmission of faeco-oral diseases and exposure to disease-bearing vectors through the promotion of good hygiene practices, the provision of safe drinking water and the reduction of environmental health risks and by establishing the conditions that allow people to live with good health, dignity, comfort and security.

4.4 Food Insecurity

Planned relocation consisted of 50 households of afflicted people who had lost their live due to resettlement, displacement, hunger, and exhaustion, and food insecurity. Local people relied on agriculture and farmland and crop land. When the farmland is lost due to the establishment of the industrial zone, the area is threatened for the food security to get enough food for local supply and local economic. It should settle down the farmland and grazing land for agriculture and livestock breeding to save food security for the area. And the factories should use the goods from farmlands for the raw materials. If so, there may be improvement of the economic status both for the factory and the local people. The key issue with regard to industrial series and agriculture is to balance the resilience in agriculture and the growing and changing demands of industries. On the other hand, 30% of the local respondents said they had same food because they use to buy food from the market even before the industrial zone was introduced. But 12% respondents answered they had more food and increased income after the introduction of the industrial development project because they maintained their income by taking up another jobs by opening shops and local restaurants.

Clear cutting of the forest area in the Ye Twin Kyaung village restricted the livelihood and food security for the local people. Losing grazing land, crop land and fodder were seriously decreasing that limited the production of eats eggs and affected the livestock breeding. These losses had induced to low income, malnutrition and high expenditure for health problems.

The impact level of the agricultural and food insecurity is then later mentioned by focus group discussion. And it also mentioned that food intake of the local people after the industrial zone and that of the migrants after they moved to the industrial zone if it compares when they were in their homelands.

4.5 Resettlement, Displacement and Land Issues

Industrialization typically displaced people and disrupted their livelihoods. Being displaced and/or resettled can be a very traumatic experience for local people, disrupting their sense of place, their livelihoods, their social networks and community connectedness. The resettlement process is intended to fully re-establish people in well-functioning communities and with appropriate sustainable livelihoods. There should be full and fair compensation for lost assets and any distress or inconvenience caused. In this sector, the local people in the target area had to be displaced by the involuntary movement because people who are intimidated or forced to leave their habitual environment or place of origin. Two groups of the respondents are categorized. They are the local people and the migrants. Local people are interviewed about land issues in the Yae Twin Kyaung village. According to survey, some PAP got full compensation, some got partial compensation and some totally got nothing for farmlands. Most local respondents in the study areas relied on farming by growing rice individually. Local people's main livelihood was agriculture and livestock breeding and their livelihood pattern was significantly changed.

The authority compensated 40-60 plots of lands that were demarcated and settled for the residential areas to the entire project affected person in the project area. Each afflicted person should get back the compensation for farmlands. Most of the peasants whose farmlands were near the main road had got the compensation for their prosperity. In the alternatives, the peasants whose farmland is far away from the main road didn't get any compensation yet.

4.6 Energy Usage Status of the Local People before and After the Industrial Zone

National grid line was established before 1993 in the target area. Some of the local people who lived beside the highway road got the electricity and some had to use energy status by communal, battery and kerosene. One of the positive impacts is that the energy usage types were significantly increased after the industrial zone because the project is industrial development project and electricity is the most significant asset for operating the process. Though some local people still have to use electricity by communal, battery and kerosene, they will get the access to electricity soon by the help of the government decision makers. Therefore, improvement of electricity is the significant positive impacts of the industrial development project.

4.7 Household income

The incomes of 174 respondents both of the local people and the migrants included the following sources: government staff, non-government staff, shopkeeper, industrial worker and casual labour. About 18% inhabitants of the government staff support their family. In 174 households, around 33% of the inhabitants are non-government staff. Opening different kinds of shops by 48% of the shopkeeper and casual labour of 30% of the inhabitants are mostly local people. Data indicated that shopkeeper and the casual labor are likely to depend on the industrial zone directly and indirectly. The largest amount of income came from workers in the industries within a household. About 30 households were totally dependent of their income on industries i.e. 100%, nearly 9 households were dependent 67% of their household

income from industries, 16 households were 50% and other 16 households earned 33% of the income from industries. Another 2 households made their money of 60% from the factories. Around 25% for 10 households, 20% for one household and 80% for another one household were dependent on the industries respectively. Therefore, nearly 50% for 86 households were totally made their money by the industries in the target area. And it was also observed that 59 households for 50 and 50% of household income made their money by the support of the industries as shown in figure 5.9.

Household income before the industrial zone relied on agriculture and livestock breeding and their household income steadily improved. A very few people make their money by opening shops, companies and others. Money term can't be compared before and after the industrial zone because the industrial zone was established since 1993 and there is a lot of inflation rate between 1993 and 2017. After the industrial zone, all of the local people had lost their household income from farming and they have to take up any jobs that come by. It is more difficult to earn regular household income because of the migrants who largely relies on the industrial zone. Migrants' household income is just for food shelter and clothing but their household income are better than they was in their native. All local people and migrants directly and indirectly depend on the industrial zone for their household income. Most of the shopkeepers and the casual labours are the local people because their livelihood pattern changes for the removal of farmlands to grow rice which was the main livelihood of the local afflicted people. And most of the industrial workers are the migrants. Only 20% of the local people increased their household income after the industrial zone. 50% remained their income the same when comparing before and after the industrial zone and 30% of the respondents dropped their economy and became significantly gapped before and after the industrial zone. On the other hands, the economy of the migrants is distinctly developed except 10 respondents; 10% for each of the remaining two categories are neither decreased nor decreased and decreased because these two categories paid back their money to their native home for their family and they lived with little or limited amount of money in the target area. Therefore, the living conditions of the migrants are better than that of the local people as shown in figure 4.15.

4.8 Culture Changing and Cultural Heritage

Significant impact didn't occur on culture and cultural heritage. There is a monastery and a pagoda in the middle of the ward 23, Yae Twin Kyaung village and the ward is divided into south and north by the monastery. Local people, migrants and the industries donate money to prepare the monastery and pagoda. There may get much more funds to prepare the pagoda and monastery by the donation of all community.

From cultural heritage, a community can lose self-awareness and guidance and grows weak and vulnerable, suffers a lack of identity, dignity, self-respect and a sense of density. The government and the authority decision maker should respect cultural identity, traditional local governance structures and decision making processes and

4.9 Aesthetic Point of View

Clear cutting of the forest area had been degraded aesthetic point view in the targeted area. Industries are located in dense between the residential areas. Increased population needs many latrines that are located in different direction that make lost the scenery of the beauty of the area. Urbanization and infrastructure make the scenic of the rural area destroyed. Unsystematic drainage channel for industries may annoy the people in the area. Zone committee is trying to address those problems to improve the area such as salvage the drainage channel by salvage vehicles, construction of the concrete roads and planting small trees but concrete roads are quite bad from environmental point of view.

4.10 Corporate Social Responsibility (CSR)

CSR program is the most significant positive impacts on carrying out the development projects. Cooperate Social Responsibility (CSR) plan is taken into account the diverse core subjects and issues as organizational governance, labour practice, the environment, fair operating practice and community involvement and development. The most important factors for investment is in health care issues both for the employees and local communities by Free of Charge (FOC) labour clinic.

Job allocation to people especially to local people is the most important factor in CSR program. Improving the economy of the people directly and indirectly contribute the health care, education and socio economic status.

Table.4.13 Corporate Social Responsibility Plan (CSR)

No.	Activity	Timing
1.	Provision of school uniforms, books and other educational facilities for children at the beginning of the school season, Provision salaries to teachers	Annually
2.	Social and environmental assistance to nearby ward (provide teaching materials to school, basic medicines to labour clinic, tree planting program, funds offered to local pagoda and monastery)	Annually
3.	Cooperation with nearby factories, industries and concerned authorities for local environmental safety and sanitation (cleaning and maintenance drainages, roads, power lines, contribution for local fire protection and greening activit)	Annually

4.11 Focus Group Discussion Results

Table.5.14 Impact Assessment to South Dagon industrial zone (1) by Focus Group

Discussion (Local People Focus Group)

Sr	Subject matter	Affected level	Damage level	Impact level
A	B	C	D	$C \times D = E$
1	Groundwater contamination	2	1	2

Sr	Subject matter	Affected level	Damage level	Impact level
2	Surface water pollution	3	3	9
3	Air pollution	2	1	2
4	Land pollution	1	1	1
5	Communicable diseases and public health impact	2	1	2
6	Access to clean water, sanitation and distribution system impact	2	1	2
7	Impact to agricultural industries and food security	3	2	6
8	Impact to usage forest products and minor-wood forest products	3	2	6
9	Impact to usage of fuel woods	3	2	6
10	Impact to job opportunities	3	1	3
11	Impact to household income	3	1	3
12	Impact to social stability	3	1	3
13	Impact to culture and cultural heritage	3	0	0
14	Impact to aesthetic and amenity value	3	2	6

The possible highest mark for each of the impact is that column C rating 3 is multiplied by column D rating 5 and got 15 marks. There are (15) subject matter of possible impacts in column B. Thus the highest mark for all of the impact is $14 \times 15 = 210$. Total sum of the overall impact level is $2+9+2+1+2+2+6+6+6+3+3+3+0+6 = 51$. From the results of local people focus group, total sum of the overall impact level is 51 in the highest mark 210 so it got 24% of the total impact level. 24% is within the affected level of village. Thus it is not affected to national level. Local people were more suffered in some sector such as job opportunity, household income, social stability, forest products and fuel woods utilization and agricultural industries than that of the migrants according to the impact level of the above level. Therefore, the living condition of the migrants is more convenient than that of the local people.

Table.4.15 Impact Assessment to South Dagon Industrial Zone (1) by Focus Group
Discussion (Migrants Focus Group)

Sr. no	Subject matter	Affected level	Damage level	Impact level
A	B	C	D	$C \times D = E$
1	Groundwater contamination	2	1	2
2	Surface water pollution	3	3	9
3	Air pollution	2	1	2
4	Land pollution	1	1	1
5	Communicable diseases and public health impact	2	1	2
6	Access to clean water and sanitation	2	1	2
7	Impact to agricultural industries and food security	-	-	-
8	Impact to usage of forest and non-wood forest products	-	-	-
Sr. no	Subject matter	Affected level	Damage level	Impact level
9	Impact to usage of fuel woods	-	-	-
10	Impact to job opportunities	0	0	0
11	Impact to household income	0	0	0
12	Impact to social stability	0	0	0
13	Impact to culture and cultural heritage	-	-	-
14	Impact to aesthetic and amenity value	2	1	2

The possible highest mark for each of the impact is that column C rating 3 is multiplied by column D rating 5 and get 15 marks. There are 15 subject matter of possible impacts in column B. Thus the highest mark for all of the impact is $15 \times 14 = 210$. Total sum of the overall impact level is $2+9+2+1+2+2+2= 20$. From the results of migrants' focus group, total sum of the overall impact level is 20 in the highest mark 210 so it got 10% of the total impact level. 10% is within the level of the village. Therefore, it is not affected to national level. On comparing the impact level, the impact level of the migrants about 10% are less affected than that of the local people about 24%. And thus it is more required to promote the socio economic status of the local people by Cooperate Social Responsibility (CSR) program.

4.12 Impact assessment of the Sunshine Plastic Water Bottle Factory

Table.6.1 Potential Environmental Impacts and Mitigation Measures of the Plastic Factory

Anticipated Impacts	Activities	Mitigation Measures	Monitoring Plan
Air pollution	-Diesel and Operating generator -Dust from loading and unloading raw materials by vehicles -Bad smell of plastic (PET) dispersed to the air during operation	- Planting around factory, grow Yae Ta Mar species with spacing 3 for 40 plants in length and 20 plants in width	- Air quality monitoring
Noise pollution	- Operation generator, machines, driving vehicles but not significant impact	- Installing noise barrier	-Measuring noise pollution
Water pollution	No significant activity and cooling water is reused	-	-
Waste management	- Packaging of the polyethylene bags	- Reused the package of the plastic bags 100 bags per month) of polyethylene - Collection and storage of the plastic wastes	- Regularly monitor the waste disposal, not to dispose public area
Land pollution	- Oil and grease spillage while filling diesel and petrol to vehicles -Washing the vehicles	- Use iron ponds to protect oil spillage	- Regularly monitor vehicles

4.12.1 Cooperate Social Responsibility (CSR program)

Donation 10000 kyats to twenty hour labor – local people clinic (monthly), donation of food and water to the local people in the ceremonies and annual bonus and lucky draw offering to the factory's workers are the CSR plan of the factory.

4.13 Impact assessment of the Khin Mg Nyunt Electrical Panel Box and Accessories

Manufacturing Factory

4.13.1 Impacts of Air Pollution

There would be emission of Green House Gases (GHGs) from air pollutants such as volatile organic compounds (acetone, toluene, xylene) which evaporate under normal atmospheric conditions when spraying or coating. Dipping the electric panel frame in phosphoric acid vaporize to produce phosphates. Coating in the acid tank of hydrochloric acid induced emission of chloride. Other pollutants are Pb/TSP/PM10/liquefied petroleum gas, n-Butyl acetate, methyl ethyl ketone/ magnesium silicate/ ethyl benzene/carbon black, isocyanine, aerosol from painting section. In order to minimize this, all the air pollutants dispersed to air which are being controlled by dust collector method. And the factory used the

method of absorbing all air pollutants from coating and spraying room by pipes and connected to an enclosed tank filled with water.

4.13.2 Impacts of Water Pollution

Phosphoric acid and hydrochloric acid are discharged per year after the treatment that pollutes the nearest water body of Nga Moe Yeik creek to some extent. Ground water pollution can't take place from watering the frames that are dipped into DEP 82 tank. Overloading septic tank and washing the vehicles/ lunch box are also the sources of generating waste water. In order to mitigate this, test water quality analysis of wastewater in laboratory and test the BOD, COD, pH, suspended solid, total solid. Water quality was maintained by adjusting the pH level of the wastewater by diluting the tested acid wasted with base (lime) and water (8434 liter), passing through the three filtration tank, calcium carbide, paddy husk and sand and discharge to the drain, and installation of flow meter that can save the water. It should provide water quality test of pH of drinking water in line with national drinking water standard. Using separate sewer for wastewater discharge and using harmless bleaching powder can reduce the water pollution.

4.13.3 Impacts of Noise Pollution

There will be noise from machines, cutting and welding the metal sheets and spraying the molding panel box but the machines are low-noise equipment to reduce noise pollution.

4.13.4 Impacts on Human Health and Safety

Volatile organic compounds that are emitted from spraying and coating are causing adverse health affect. Concentrations are low and symptoms are slow to develop though it is not acute toxicity but have long term health effects. Spraying area contains dangerous flammable vapor, mist, combustible residues, dusts, and deposits owing to the spraying process. To avoid this, provide adequate ventilation and spray booth is strongly recommended. TGIC (Triglycidylisocyanurate), used in powder coating cause a skin sensitizer, geno-toxic and serious eye damage that are toxic by ingestion and inhalation. Injuries and accidents from slip, falls, fire, respiratory diseases, asthma attack, fatal consequences, and noise pollution, cutting the metal sheets, electric shocks and fire can be significant serious risks. In order to reduce this, make sure to wear PPE and sufficient fire protection system must be provided.

4.13.5 Corporate Social Responsibility plan (CSR)

Donation the funds to monastery, supporting 200000 kyats per month to staff, labor free of charge clinic, management committee and provision salaries to the teachers who are serviced at the monastery education school are CSR plan of the factory.

4.14 Impact Assessment of Aung Sein Lin Sawmill

Anticipated Impacts	Activities	Mitigation Measures	Monitoring Plan
Noise pollution	-Sawn timber, produce loud noise - Operation generator, machines, driving vehicles but not significant impact	-Make sure PPE to labor - Used noise reduced barrier	-Measuring noise pollution -Information disclosure to public altitude
Air pollution, Wood dust Waste Management Health and sanitation, cause asthma, respiratory diseases, hearing loss, nuisance, injuries and accidents by sawn timber machine , fire due to saw dust Cooperate Social Responsibility program	- Sawn timber and wood logs	- Used dust collector - Return to the wood manufacturing products industry - Make sure PPE, earplug, Surgery mask - Safety training by safety officer - Use fire hose, fire extinguisher, Storage water for fire safety by tank, iron hook for fire safety	-Regularly monitor by ECD and YCDC

Table.6.3 Potential Environmental Impacts and Mitigation Measures of the Sawmill

4.14.1 Corporate Social Responsibility plan (CSR)

Provision of the funds to monastery and clinic is carried out as a CSR program.

5. Conclusion

Myanmar is moving from agricultural trend to Industrial trend. Industrialization is essential to be a better moving and economic development of the country and promote Nation's GDP and paying tax to Government. In the alternatives way, negatives impact such as air pollution, dust, noise pollution to elder and chronic illness patients, culture change due to displace people, water pollution from untreated effluent to unhealthy condition, land area crowded, increased population, unsystematic sewerage system are expected. However, implementation of appropriate mitigation and management plan will minimize these impacts. The combination of weak institutions and increasing land scarcity creates potential for increasing conflict between companies and local communities, especially where the risks are not identified early and mitigation plans not implemented early enough or not undertaken in cooperation with the impacted peoples themselves. The intention of this document was to

assist in determining what should be done to address project-related social impacts. It provided the actions to be done in relation with social issues in South Dagon industrial zone 1 and some standard good practice in social impact assessment. A key point underpinning everything in this document is that to mitigate the social conflicts and environmental impacts arising from the existence of the industrial zone. This research provided the Corporate Social Responsibility (CSR) plan to address the social impacts over time. Government association, industrial decision makers and other perhaps must be urged to avoid going to the wrong way and brown-economy must be started to move in the right direction. Therefore, the long-term existence of the industrial zone and the endurance of its cost and benefit analysis must be hold by the industrial decision makers and the government. This research concluded that the industrial zone must also be strengthened in support of sustainable development, environmental protection and the well-being of all people in the proposed area, including the workers, local people and the migrants are essentially ensured, encouraged and supported social ,economically and ecologically sustainable both in the short long terms, the mandated goals including investment, employment, food, energy and other economic and social goals are reinforced by a steady enhancement of the environmental resource base of their own community.

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7. REFERENCES

1. Aye Chan Myae. 2016. Gender impacts on rubber plantation
2. J Health Soc Behav. 2005 Sep; 46(3): 289–305. Environmental Stressors: The Mental Health Impacts of Living Near Industrial Activity
3. Win Myo Thu, et.al, 2013 Resource curse