

ENVIRONMENTAL SUSTAINABILITY BY ECO-INDUSTRIAL NETWORK APPROACH PROJECT: MAPTAPHUT INDUSTRIAL ESTATES COMPLEX IN THAILAND

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ABSTRACT: Corresponding to industrial development in Thailand, it typically changes in physical, social and environment surrounding the developed areas especially for Maptaphut Industrial Estates Complex, Thailand. The change may give both adverse and positive effects on communities even benefit, way of life, cultural structure, non-systematic growth, population expanding and environment, etc. Therefore, it needs to provide tools or management system to solve these problems with sustainable development.

Eco industrial scheme is introduced by Industrial Estate Authority of Thailand to implement industrial developing sector with balancing economics, society and environment. The authority directs new industrial estate operating in line with eco-concept to ensure that industrial estates will generate lower emission, consume effective energy, manufacture environmental friendly products and expand good relationship with communities. The enhancement process for eco-industrial estates is aimed to develop completely in line with five areas; e.g. physical, economic, social, environment and management. Concerning on this study project, the steps implemented to approach eco-industrial network are; 1) collect IEAT information, policy and direction to develop eco-industrial estates and network, 2) select the appropriate indicators of each area and aspect to compare with baseline information/data to close the gaps, 3) collect baseline information of target industrial estates, 4) conduct stakeholder engagement, 5) collect gaps, potential scan, needs, attitude and potential measures to achieve eco-industrial accomplishment, 6) establish preliminary master plan by collaboration from relevant parties, and 7) develop sustainable network in studied areas to approach eco-industrial town.

Considering the outcome of this study, it's expressed that the collaboration between authorities is necessary key to establish provincial master plan for sector management in future. As a role model, the process to approach eco-industry can be extended to other industrial estates throughout Thailand by modifying in their proper way of each industrial estate towards sustainable development.

KEYWORDS: eco-industrial network, eco-industrial town

1. INTRODUCTION

Industries have been contributing factors for both enhancing economic activities and sources of

environmental pollutions. Industry is indispensable motor for economic growth of modern society and inevitable to developing countries. Most of human

needs are fulfilled through goods and services produced by industry (World Commission on Environment and Development, WCED, 1987)

In order to develop industrial sector by Industrial Estate Authority of Thailand (IEAT), it typically changes in physical, social and environment surrounding the developed areas especially for Maptaphut Industrial Estates Complex, Thailand. The change may give both adverse and positive effects on communities even benefit, way of life, cultural structure, non-systematic growth, population expanding and environment, etc.

Subsequently, Pollution Control Zone was notified on 13 March 2009 to determine the specified areas in Rayong province to manage pollution prevention and mitigation program (Pollution Control Department, 2010) from the source of pollution typically factories located in such areas. However, inadequately for sustainability, it needs to provide tools or management system to solve these problems with sustainable development. Eco industrial scheme is introduced by Industrial Estate Authority of Thailand to implement industrial developing sector with balancing economics, society and environment together (Industrial Estate Authority of Thailand, 2010). The authority directs new industrial estate operating in line with eco-concept to ensure that industrial estates will generate lower emission, consume effective energy, manufacture environmental friendly products and expand good relationship with communities. From this reason, eco-industrial estate can potentially induce oversea investors to select the addressed eco areas and operate green process including considering life cycle which result in great benefit, economic growth together with higher quality of life.

K. Charmondusit (2011) also proposed the eco-efficiency concepts to the environmental management system of the industrial sector in both

micro and macro levels. In order to meet the goals and benefits of the eco-efficiency, the concepts must be presented to the governmental authority managers. Eco-efficiency workshops for both micro and macro levels need to be held. Lastly, in order to maintain a high level of performance, eco-efficiency must be encouraged to be properly used as a tool in corporate evaluation and reporting.

1.1 Objectives

Our main objective is to contribute to sustainable development by conducting eco-industrial concept to Maptaphut site, Thailand. The Eco Model is also aimed to drive other industrial estates throughout Thailand by modifying in their proper way of each industrial location and stakeholder needs.

The integrity of management is an expectation to enhance by collaboration between relevant authorities and communities.

2. METHODOLOGY

The framework was designed especially for Maptaphut area. The schematic of work can be drawn and combined with five steps in Fig. 1

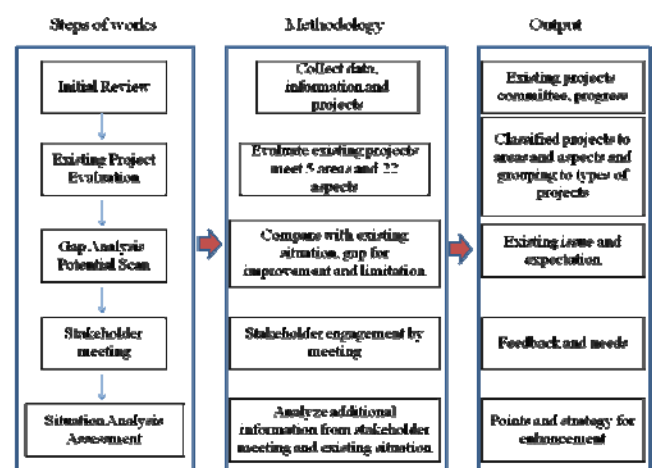


Fig.1 Schematic Diagram to conduct Maptaphut Eco-Industrial Network

2.1 Data and information collection

Maptaphut Industrial Estates complex is located in Muang District, Rayong Province, eastern of Thailand, developed by the state enterprise, Industrial Estate Authority of Thailand, Ministry of Industry, to serve industries that use natural gas as the main raw material development. The complex is including five industrial Estates such as Maptaphut, Hemmaraj (Eastern), Padaeng, Asia and RIL Industrial Estates (Fig. 2)



Fig.2 Mataphut Industrial Estates Complex, Rayong Province, Thailand

Considering the local site, there are 33 communities located over Maptaphut areas. Not only impact on health and environment among communities, but physical characteristics; urban planning and green area, economics and safety are also considered to improve.

Working team considered to develop eco criteria with five areas and 22 aspects aimed to cover environment, society and economics by means of sustainability triangle those can be shown in the Table 1

Table 1 Eco criteria

| Areas | Aspects |
|-------------|--|
| Physical | - Zoning - Green Building |
| Economics | - Industrial - Local - Communities - Marketing - Logistics |
| Environment | - Water - Air - Waste - Energy - Noise - Production Process - Eco-efficiency - Safety and Health Management - Monitoring |
| Society | - Quality of life and society of employee - Quality of life and society of community |
| Management | - Integrity Management - International Standard Implementation - Human Development - Information/ Reporting |

2.2 Existing Projects Evaluation

From data and information collecting, it's found that there are several projects relevant to environmental mitigation and management and social promotion occurring in Maptaphut site developed by IEAT and related authorities as shown in Table 2.

Table 2 Number of existing projects

| Areas | IEAT ^{1/} | Related authorities |
|-------------|--------------------|---------------------|
| Physical | 9 | 3 |
| Economics | 11 | 3 |
| Environment | 35 | 56 |
| Society | 19 | 8 |
| Management | 18 | 17 |
| Total | 92 | 87 |

1/ Industrial Estate Authority of Thailand

Regarding the projects, they are mostly focusing on monitoring program as shown in Fig 3. Almost projects were developed to meet Pollution Control and Mitigation Plan according to the Notification in 2009 as the urgent requirement by government.

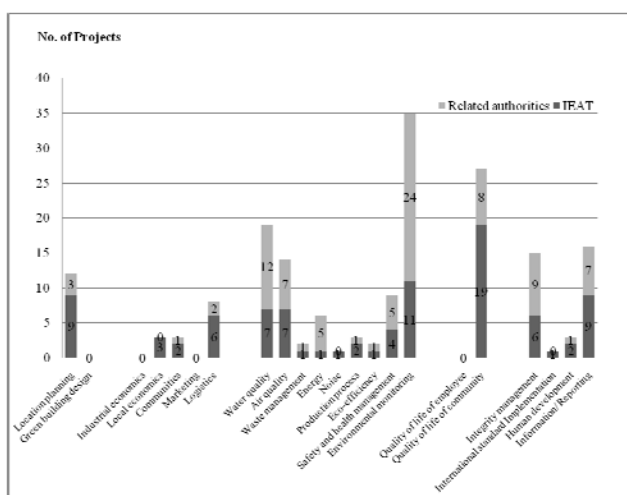


Fig. 3 Projects developing in Maptaphut sites, Thailand

2.3 Gap analysis and potential scan

Considering the existing 179 projects, the working team analyzed the gaps and found some potential for improvement and enhancement to meet eco-industrial purpose.

The tentative activities or potential projects can be raised and separated to areas such as;

2.3.1 Physical

- Urban planning suitable for social condition, economics, environment and human beings
- Drive the chemical transportation route via Rayong subcommittee of transportation
- Drive and promote protection strip and buffer zone
- Promote and improve the existing building and new building construction to comply with green building standard

2.3.2 Economics

- Promote green technology or high value industry, lower environmental impact such as related industry
- Promote local employment
- Drive the hidden population issue to subcommittee of Rayong Province
- Promote community product and e-market
- Develop green logistics friendly to environment

2.3.3 Environment

- Motivate factories to achieve zero discharge
- Recover the contaminated seawater and beach
- Integrate several air pollution solutions
- Promote carbon reduction from industrial sector
- Promote 3R waste management
- Promote energy program by ISO 50001
- Develop effective emergency response
- Integrate environmental monitoring result and analysis

2.3.4 Society

- Promote occupation welfare
- Develop CSR network

2.3.5 Management

- Integrate existing committee and develop information center
- Promote implementing international standard

2.4 Stakeholder Meeting

After collecting the tentative activities or potential projects as above, the stakeholder meeting was

organized in June 2011 to discuss about the direction or feedback in order to improve the proposed plan/activities.

Anyhow, Maptaphut site has wide engaged in several parties and organizations. All of them should involve in eco-industrial estates project even communities, local or national authorities NGOs and factories. From this reason, all kinds of stakeholders are invited to participate in brainstorming so that the outcome is contributed in situation analysis assessment and draft eco master plan. The stakeholders engaged are categorized into;

2.4.1 Communities

2.4.2 Academic institutes

2.4.3 Local related authorities such as municipality, Rayong province (Governor), Industrial Office of Rayong, IEAT, ONEP, MONRE, etc.

2.4.4 National organization; The Federation of Thai Industries (FTI), Petroleum Institute of Thailand (PTIT), Thai Environment Institute (TEI), Thailand Greenhouse Gases Management Organization (Public Organization) (TGO)

2.4.5 ECO and Environmental Expertise

2.4.6 Factories

There are several opinions to practically develop eco-industry by collaboration between related authorities.

2.5 Situation analysis assessment

Based on the outcome from stakeholder engagement, several projects are rather driven by only IEAT. Anyhow, after situation analysis, the eco-preliminary projects could be prioritized and potentially developed by 2012 as followings;

2.5.1 Green Logistics Development

2.5.2 Integrated water and quality of water management

2.5.3 Safety management system enhancement

2.5.4 Integrated environmental information management

2.5.5 Community strength and sustainable promotion

2.5.6 Air pollution management enhancement

2.5.7 Effective waste management enhancement

All above projects are proposed in IEAT master plan 2012-2016 and annually revised in

3. Results and discussion

Considering the existing projects, almost are pointed to monitor environmental quality monitoring. However, it's also found that the data or information were not integrated or published resulting in lack of communication to communities or stakeholders. Moreover, there is no public forum or state for sharing information those are encouraged to authorities' managers to establish the national master plan for developing eco-industrial sector.

Another point of view, eco-industrial estate could not be driven by IEAT. The relevant authorities or organizations need to be involved.

4. Conclusions

From the case study, it's expressed that the eco-industrial network could be driven and enhanced together by relevant stakeholders in terms of 'symbiosis' with positive attitude in development of green industry. National and local policies are needed to promote and direct eco-industry to practical way. Additionally, the collaboration between governmental authorities is necessary to establish provincial master plan for sector management in future. As a role model, the process to approach eco-industry can be extended to other industrial estates throughout Thailand by modifying in their proper ways of each industrial estate towards sustainable development.

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