

A COMPREHENSIVE APPROACH TO THE DEVELOPMENT GUIDELINE OF COMMUNITY SOLID WASTE MANAGEMENT FOR LOCAL GOVERNMENT ORGANIZATIONS IN EASTERN PROVINCE GROUP, THAILAND

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Abstract

Municipal Waste is a big problem and challenge in the eastern economic and tourism industry. The amount of waste continues to increase each year, especially in Chon Buri province. Waste management is not comprehensive cycle assessment results in the negative impacts of improper solid waste management on the image of the destination. The objective of this research was to take off the lesson of local waste management situation of the municipal solid waste in the Eastern area including with the 21 areas of local government organization which were divided into 17 areas, such as City Municipality 2 areas, City Municipality 5 areas, Sub-district Municipality 5 areas, Administrative Organization Areas 2 areas, Community areas 3 areas, and 4 Hotels in Chon Buri, Rayong, Chachoengsao, Trat provinces. One hundred and fifty-two key informants included municipality workers, networking leaders, and residents gave the details data information. Qualitative data were collected using in-depth interviews and group discussions and the data were analyzed by content analysis. The results of the study showed the proposal of concept guidelines of code of practice for local participant waste management's administrative authorities and conduct of the tourist ethics that may be established. The result of feasibility model to increase efficiency of distinguish of waste management using color garbage bags around the shops beach and increasing waste utilization by school youth volunteers together with community enterprise via Waste Banks. In addition, our result demonstrates the recommendation of spatial policy on waste management to achieve the integration of cooperation among agencies in various ministries of the country together with comprehensive waste management of local governments in the future.

Keywords: Participatory Waste Management, Local Government Organization, Practice Guideline, Policy Recommendations.

1. INTRODUCTION

In 2019, Thailand has quantity of solid wastes at 29.73 million tons with growth rate average at 2 percent annually. As generating solid wastes per person is expanding from 1.13 kilograms to 1.15 kilograms. The factors are economic and social growth, increasing tourism and expand of city and community. The solid wastes had correctly and systematically managed at 9.76 million tons or 35 percent. As some of them had reused at 9.76 million tons or 35 percent. The solid wastes had correctly and systematically managed at 10.85 million tons or 39 percent. (Pollution Control Department, 2023).

Eastern Province Group (EPG) is importantly driving engine for national economic growth and development. The EPG covers Chonburi, Rayong, Chanthaburi, Chachoengsao, Trat, Prachinburi, Sa Kaeo provinces. With industrial development, multinational companies invest in industries. Also tourism is promoted to boost and generate revenue in community. On the other hand, the development, in turns, generate negative impacts such as pollutions, garbage or solid waste to the EPG.

In 2019 the Eastern Province Group generated quantity of solid wastes from industry and agriculture sectors at 2.43 million tons. The solid wastes had correctly and systematically managed at 0.99 million tons or 40.7 percent. As some of them had reused at 0.74 million tons or 28.8 percent. (Pollution Control Department, 2023).

The research reveals that quantity and growth rate of solid wastes is rapidly increasing in 2023, however, growth rate of recycling and reusing solid wastes is significantly decreasing. When considering quantity of solid wastes in seven provinces in Eastern Province Group, it shows that big provinces tend to generate large quantity of solid wastes, for example, Chonburi province has highest quantity of solid wastes, but lack one stop service for solid waste management, compared with Rayong and Chachoengsao. Medium province, i.e. Chanthaburi, Prachinburi, and Sa Kaeo provinces have lacked correctly and systematically management.

Currently, Thai government has legislated and lunched public policy, National Strategic Plan, and projects to implement and control solid wastes in levels: National Agencies, City and Subdistrict Municipality, Provincial Administrative Organizations and communities. The purpose is to sustainably reduce quantity and management of solid wastes. However, past decades, solid waste management has been big challenges for Thailand government.

The questions are how to manage them efficiently and effectively, and how to reduce quantity of upstream wastes. Including how to implement measures of reduce, reuse and recycle (3R) successfully. What is a purposive model which measures fit with locals or area-based implementation? The study shows that pattern of public relations, campaign and providing positive information related with upstream, middle stream and downstream management of solid waste would reduce sources and quantity of wastes. Further, it reveals that measures for recycle and reuse have not fully been adopting.

2. LITERATURE REVIEW

Municipal solid waste is an emerging concern for countries around the world. (World Bank, 1999), particularly developing nations with limited financial resources, lack of technologies, and an absence of policy framework. In particular, developed countries seem to have a higher annual growth rate at 3.2–4.5%, while the yearly growth rate in the developing world is 2–3%. (Scheelaase T. and Bidlingmayer W 1997). An increase of solid waste generation is related with population or economic growth, rapid urbanization, and national GDP.

While economic and tourism growth in past recent years has spurred, developing countries to devote effort to waste management challenges. (Puncharoen, N, 1993; World Bank, 1999) Solid waste in Thailand is classified into three categories: household waste, commercial waste, and industrial and hazardous wastes. Municipal solid waste (MSW) combines wastes from households and commercials, they generated from households, markets, restaurants, shops, hotels, offices, and street sweepings.

Municipal solid waste composition is primarily food and organic waste (45–52%), usually disposed of by mixing with paper, plastic, glass, textile, paper, and other fractions without separation at the original sources.

The practices have not only polluted the environment, but also negatively affect human health and life. Municipal solid waste or garbage management, in term of logistics, is the process of physical flow such as collecting, storing, transporting, treating, and disposing of solid waste in a safe and organized manner. (Bowersox DJ & Closs DJ, 1996). Its goal is to properly dispose of waste without damaging the environment. The new idea is attempting to reduce upstream materials or friendly substitute materials to environment.

A rapid increase in municipal solid waste in urban areas has put pressure on the gathering, sorting, collection, disposal, and management system. (Puncharoen, N, 1993; Scheelaase T. & Bidlingmayer W 1997). The sorting, gathering and collection service are mostly prioritized in populated areas with good infrastructure and high commercial activities due to lack of transportation and low revenue collection. The sorting is the first priority for solid waste management. The gathering and collection rate varies by city and district. Saen Suk, the municipality of Thailand, for example, has the highest collection rate at 70-75%.

The limitation of public awareness and participation also poses a challenge for the environmentally sound management of municipal solid waste. (Leikam K. and Stegmann R, 1997). Thailand has large-scale solid waste treatment and recycling facilities, but they locate in big city. The lack of waste treatment technologies and infrastructures has shortened the lifespan of landfills since municipal solid waste gathering and collections are directly sent to landfills without intermediate treatment. The effort to reduce, reuse, recycle and refuse materials is still weak and challenge.

The management of landfills is also poor. In recent years, the governments have made many efforts to enhance municipal solid waste management by developing new regulations, policies, strategies, and guidelines. Solid waste management is a worldwide problem and challenge with substantial environmental, social, and economic ramifications. (Burnley S.J., Coleman T., Gronow J.R., 1999).

The review provides a complete assessment of solid waste management from municipality and community in Thailand viewpoint. It reveals an overview of the current state, difficulties, and prospects in solid waste management, focusing on environmental sustainability and public health. (Leikam K. and Stegmann R, 1997).

The goal is to give a comprehensive overview of many approaches utilized to manage and reduce the expanding problem of solid waste in municipality in Eastern Province Group. (Bangkok Metropolitan Administration, 2000). It examines a variety of waste management techniques, such as landfill disposal, recycling, composting, waste-to-energy practices, and waste elimination and minimizing. Many municipalities across the country prefer landfilling for the removal of solid waste.

However, many research shows that they can reduce solid wastes at original sources or upstream materials. In landfills, waste is transformed through chemical, biological, and physical processes, functioning as an environmental furnace. (Pohland, F.G. & Harper, S.R. 1985). Therefore, soil cover thickness, barriers, leachate collecting, landfill gas recovery, and flaring facilities are essential for sustainable landfilling.

The benefits of composting and anaerobic breakdown for decreasing the environmental effect of biological waste are examined in this review.

Hazardous chemicals in landfills can have severe ecological and public health consequences. (Pohland, F.G. & Harper, S.R. 1985). It looks into the benefits of effective dangerous waste disposal, such as pollution control and resource recovery.

Mining and reusing landfills for diverse uses, such as renewable energy generation and recreational areas, have the potential to be beneficial.

The paper discusses upcoming solid waste management trends and technologies such as intelligent garbage collection mechanisms, reuse and recycling concepts, and sustainable packaging solutions. It emphasizes the potential of these advances to improve overall waste management effectiveness and sustainability.

There are methods used in municipal garbage management:

- **Landfills:** The most common method for disposing of solid waste, landfills bury waste in the ground after treating it to eliminate odors and dangers.
- **Incineration:** A method for addressing hazardous aspects of municipal waste.
- **Composting:** A method for addressing hazardous aspects of municipal waste.
- **Anaerobic digestion:** A method for addressing hazardous aspects of municipal waste.
- **Material recovery:** A method for addressing hazardous aspects of municipal waste.

The quality and source of the waste produced determines the most suitable garbage management process. (LrNEP-UNIDO 1991). Waste can come from many sources, including homes, businesses, schools, and hospitals.

Some ways to reduce the amount of waste you produce include:

- **Refusing:** Rejecting certain items
- **Reducing:** Using fewer harmful, wasteful, and non-recyclable products
- **Reusing:** Reusing items instead of throwing them away
- **Repurposing:** Finding new uses for items
- **Recycling:** Recycling items

The literature concludes that municipal solid waste is new challenge for countries around the world, particularly developing nations with limited financial resources, lack of technologies, and an absence of policy framework. Municipal solid waste is the process of physical flow management such as collecting, storing, transporting, treating, and disposing of solid waste in a safe and organized manner, with less costs. Its goal is to properly dispose of wastes with minimum costs and without damaging the environment. The new coming idea is 3R measures by attempting to reduce upstream materials or friendly substitute materials to environment.

Currently, there is rapidly increase pressure on the gathering, sorting, collection, disposal, and management system. However, the lack of solid waste treatment technologies and infrastructures has shortened the lifespan of landfills, since municipal solid waste gathering and collections are directly sent to landfills without systematically intermediate treatment.

The effort to reduce, reuse, recycle and refuse materials is still weak and big challenge for public policy makers. In recent years, the government has made many efforts to enhance municipal solid waste management by developing new regulations, policies, strategies, and guidelines.

The review presents that there are gaps in literature. First, solid waste management would combine soft measures (i.e. give positive information, campaign, garbage bank) and hard structure measures (i.e. incinerator, landfill, gasifier). Second, municipal solid waste management would start at household from 3R measures. Third, one of first priority is importantly sorting process to reduce quantity of upstream wastes. Finally, public policy making would focus on providing information for effective and sustainable garbage management.

The information changes people motivation for effective and sustainable garbage management, and then transforming their behaviors for effective and sustainable garbage management, As a result, they facilitate reducing garbage quantity and reducing pollutions from garbage uses and disposal.

3. RESEARCH METHODOLOGY

This study initially conducts *a literature review* related to balance of economic development, and pollutions and environmental impacts; effective garbage and waste management in area-based context; factors influencing to effective and sustainable garbage management; and a purposive model to effective and sustainable garbage management. It also explores the use of systematically effective garbage management in municipality and area-based community.

The objective of this study is to explore SWOT analysis and critical success factors and failure for managing garbage in City and Subdistrict Municipality, Provincial Administrative Organizations and communities in Eastern Province Group. It also develops the purposive model for effective and sustainable garbage management in Eastern Province Group, and create a code of conduct (COC) for effective and sustainable garbage management, and provide for effective policy and area-based recommendations.

The paper develops hypothesis framework to investigate the relationship between variables related to supportive measures, and behaviors and motivation to effective and sustainable garbage management. To answer the objectives and questions, data collection combines in-depth interview jointly with focus groups and observation in real areas in order to obtain relevant and depth information from samplings.

The population covers 7 City and 5 Subdistrict Municipality, 2 Provincial Administrative Organizations and 3 communities and 4 hotels in Eastern Province Group. To obtain the data, in-depth interview is randomly used to 152 samplings, according to figure 1 shows type and number of samplings. The rate of response was very good. The data collection period took four months.

Figure 1: Type and number of samplings

Type of samplings	Number of samplings	respondents	Percent
Hotels	4	4	2
Communities	3	9	6
Subdistrict Municipality	2	27	18
District Municipality	5	51	34
City Municipality	5	35	23
Metropolitan Municipality	2	26	17
Total	21	152	100

3.1 Research Questions

To answer the above issues, the study defines the following questions:

1. What are critical success factors for generating positive attitude (e.g. campaign, contest, and promotion) to effective garbage management in city and subdistrict municipality, Provincial Administrative Organizations and Communities in Eastern Province Group?
2. After having campaigns or contests, why stakeholders, in particular, government agencies have not continuously worked out and followed up the above project?
3. What are critical success factors, challenges and constrains for expanding the results of the project in order to effective and sustainable garbage management?

3.2 Research Hypotheses

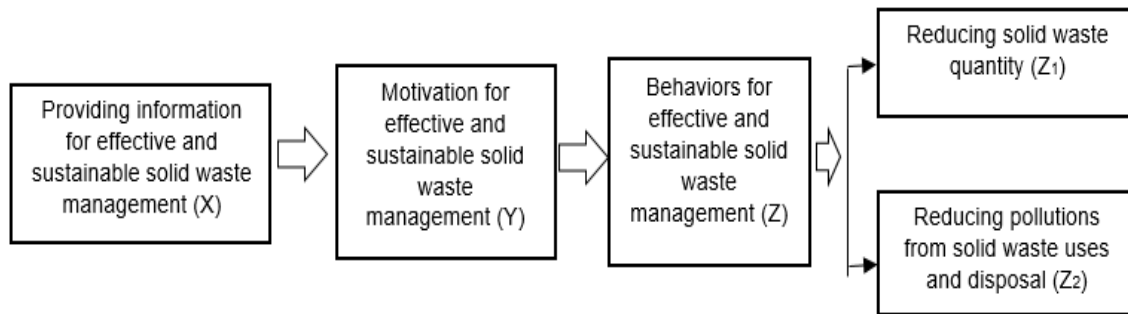


Figure 2: Relationship between Providing Information, Motivation and Behaviors for Effective and Sustainable Solid Waste Management

3.3 Research Hypotheses

Based on these research questions, hypotheses are generated to examine a relationship between providing information, motivation and behaviors for effective and sustainable solid waste management. This study therefore examines a relationship of the variables under following hypotheses.

- H₁ = There is a relationship between providing information for effective and sustainable solid waste management (X) and motivation for effective and sustainable solid waste management (Y);
- H₂ = There is a relationship between motivation for effective and sustainable solid waste management (Y) and behaviors for effective and sustainable solid waste management (Z);
- H₃ = There is a relationship between providing information for effective and sustainable solid waste management (X) and behaviors for effective and sustainable solid waste management (Z).

4. FINDING RESULTS AND DISCUSSIONS

According to the objectives, the paper carries out in two dimensions. First, hypothesis is tested based on hypothesis framework. Second, the research questions are answered.

Table 1: Summary of testing hypothesis and relationship between variables

Variable		Correlation	p-value
Independent	Dependent		
X	Y	0.734	0.000
Y	Z	0.687	0.000
X	Z	0.780	0.000

Table 1 shows summary of hypothesis testing. Under the hypothesis, there is significantly correlation between providing a positive information (i.e. campaigns, contests, activities) related with effective and sustainable solid waste or garbage management would build positive motivation and behaviors for effective and sustainable garbage management.

There is significantly correlation between the result reveals that there is significantly positive relationship between providing information for effective and sustainable solid waste management (X) and motivation for effective and sustainable solid waste management (Y). The study shows that providing more positive information for effective and sustainable solid waste management, creating more positive motivation for effective and sustainable solid waste management.

Furthermore, there is significantly correlation between positive motivation for effective and sustainable garbage management (Y) and behaviors for effective and sustainable solid waste management (Z). It shows that providing more positive motivation for effective and sustainable solid waste management, enhancing more positive behavior for effective and sustainable solid waste management.

Finally, there is significantly correlation between providing positive information for effective and sustainable solid waste management (X) and positive behaviors for effective and sustainable solid waste management (Z). The study shows that providing more positive information for effective and sustainable solid waste management, creating more positive motivation for effective and sustainable solid waste management

4.1 Status of solid waste management in Eastern Province Group

Development of Eastern Province Group (EPG) has officially started in May 2018, the purpose is to facilitate national economic growth. Through past years, with industrial development, multinational companies invest in industries. Also tourism is promoted to boost and generate revenue in community. On the other hand, the development, in turns, generate negative impacts such as pollutions, garbage or solid waste to the EPG. The paper explores status of solid waste management in provinces in EPG.

1. Chonburi and Chachoengsao provinces. The result shows that quantity and growth rate of municipal solid waste is increasingly higher than standard. The reasons cause this province is located for EEC development and higher rate of non-registered population and urban development.
2. Rayong province. The result shows that quantity and growth rate of municipal solid waste is equally standard. Even though Rayong locates for EEC development and higher rate of non-registered population and urban development, but there is readiness of municipal solid waste system.
3. Chanthaburi, Prachinburi, Sa Kaeo provinces. The result shows that quantity and growth rate of solid wastes is being growing. Solid waste management is ignored to continuously implement.
4. Trat province. The study reveals that there is no significantly change for growth rate of quantity for municipal solid waste. Because this province has small area and no business and industrial activities.

The study shows that most of provinces in EPG has quantity and growth rate of municipal solid waste is increasingly higher than standard level, except Rayong province which has standardized garbage disposal plants incinerators.

4.2 Factors influencing to effective and sustainable solid waste management in Eastern Province Group

The paper studies factors influencing to effective and sustainable solid waste management in Eastern Province Group. The results shows that there are factors in policy, tactical and operational levels.

1. Lack of effective public policy design consistent with regional and province group.
2. Enforce and implement rules and laws consistent with area-based.
3. Lack of promotion and supports from stakeholders, especially government agencies.
4. Insufficiency of budget to implement solid waste management projects.
5. Lack of enforcement of rules and laws.

6. Lack of in charge agencies to continuously drive effective and sustainable solid waste management in Eastern Province Group.
7. Solid waste disposal and management is a challenge for effective and sustainable solid waste management in Eastern Province Group

4.3 Purposive Model for effective and sustainable solid waste management in Eastern Province Group

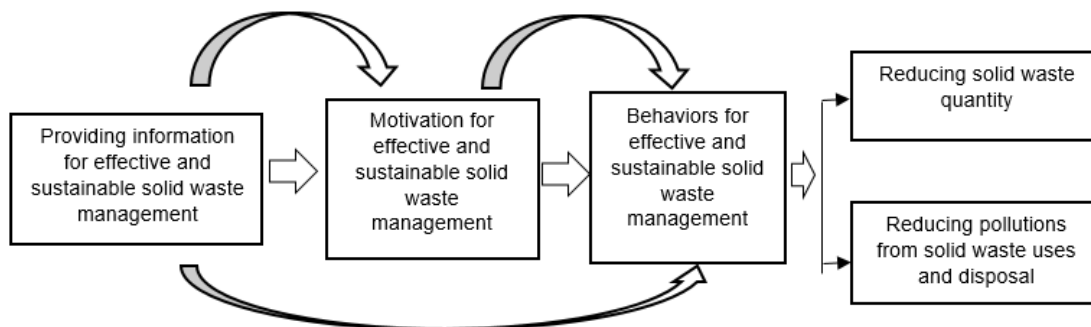


Figure 3: Relationship between providing information, motivation and behaviors for effective and sustainable solid waste management

Figure 3 shows relationship between providing information, motivation and behaviors for effective and sustainable solid waste management. The study reveals that providing positive information for effective and sustainable solid waste management leads to positive motivation and behaviors. Providing positive information for effective and sustainable solid waste management would lead to people's positive motivation and behaviors for effective and sustainable solid waste management. The question is that what kind of information to provide to people, and how is effective pattern of providing information. The kind of information is type and kind of garbage and solid wastes, sources and occurred impacts, awareness and how to make garbage to be higher value. While pattern of providing information can be carried out through learning process, training, campaign, 3R activities.

Furthermore, it also reveals that positive motivation for effective and sustainable solid waste management (Y) can lead to positive behaviors for effective and sustainable solid waste management. To sustainably managing solid wastes, people is a significant role to manage solid wastes. The positive motivation energizes and drives their behaviors in effective solid waste management. Therefore, the programs would initially implement by providing positive information for effective and sustainable solid waste management in order to lead to change their motivation and behaviors for effective and sustainable solid waste management.

5. CONCLUSION AND RECOMMENDATION

The study identifies that public policy, National Strategic Plan, and projects to implement and managing solid wastes in levels: National Agencies, City and Subdistrict Municipality, Provincial Administrative Organizations and communities would design in different contexts both national and area-based. Past decades, solid waste management has been big challenges for provinces, especially in EPG. This research shows that managing efficiently and effectively solid wastes would focus on soft side (by changing people's attitude, motivation and behaviors), more than building hard structure (by garbage disposal plants or landfills).

It recommends that effective management would initially reduce quantity of upstream wastes, including implementing measures of reduce, reuse and recycle (3R) successfully. The purposive model

which designs measures fit with locals or area-based implementation. The study also shows that pattern of public relations, campaign and providing positive information related with upstream, middle stream and downstream management of solid waste would reduce sources and quantity of wastes.

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