



## Development of a Sustainable Community Environmental Management Model by Using the Process Engage Educational Institutions and Communities

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### Abstract

**Background and Aims:** The amount of municipal solid waste generated tended to increase during the year 2017-2019 and there is more reuse of municipal solid waste, in which incorrect disposal tends to decrease, but with the situation of the spread of the coronavirus disease 2019 since the beginning of March 2020, and continued until a new wave of outbreaks in late 2020 and early 2021. The problem of solid waste is increasing, the Local authorities will collect and transport waste, which the municipality will do by itself, but some hire private companies to carry out the collection in the area for waste management problems that are mostly found as residual waste. Thus, this research was; (1) to study the problems and needs of sustainable community environmental management. (2) To find a model and develop a sustainable community environmental management model by using the participation process of educational institutions and communities.

**Materials and Methods:** This research was a qualitative study in Kaeng Loengchan Sub-district, Mueang District, Maha Sarakham Province. The research tools were semi-structured, observational, and recording interviews with a target population of 30 participants. Use content analysis.

**Results:** The results showed that; (1) The community environmental problem that is currently facing is the continuous increase of solid waste from consumption and household consumption which, if not properly managed, will cause chronic problems. (2) Sustainable community environmental management model found that (1) the implementation of the 5R principles in the household, (2) the establishment of a community waste bank, and (3) the use of an application system to help collect solid waste management data.

**Conclusion:** The local government should develop further by incorporating them into local ordinances to develop and support the budget for expanding the results to other areas. And the development of a sustainable community environmental management model by using the participation process of educational institutions and communities.

**Keywords:** Development; Sustainable Community; Environmental Management

### Introduction

The amount of municipal solid waste generated tends to increase during the year 2017-2019 and there is an increase in the use of municipal solid waste, which inappropriate disposal tends to decrease, but with the spread of situation Coronavirus disease 2019 epidemic since early March 2020, and continued until the new wave of outbreaks in late 2020 and early 2021 found that some local governments and some districts in Bangkok have reduced municipal solid waste, due to the control of the travel of foreign tourists to Thailand, together with the measure to require more work from home (Work From Home). But if considering the rate of solid waste production within the country, it was found that the rate of waste production tends to increase from 0.8 kg per person per day to 1.0 kg per person per day. Compared to the amount of solid waste in the year 2019, in the year 2020 there was approximately 25.37 million tons of municipal solid waste, which municipal solid waste will be sorted at source and reused for 8.36 million tons (33%), with 9.13 million tons of municipal solid waste properly disposed of (36%), as a result, approximately 7.88 million tons of municipal solid waste were





incorrectly disposed of (16%). As for the disposal of solid waste, it was found that in 2020 there were 2,305 municipal solid waste disposal sites operating, and 28 municipal solid waste transfer stations. When considering the operating solid waste disposal sites, it was found that the operating solid waste disposal sites were: A total of 357 landfills, semi-aerobic landfills, energy generation incinerators, air pollution treatment incinerators, composting, and solid waste fuel (RDF) production were 357. There were 1,948 invalid waste disposal sites such as bulk dumping, outdoor incineration, and incinerators without air pollution treatment systems. (Pollution Control Department, 2021; Hayim, T., Pokateerakul, P., Pakdeejit, R., & Yodsurang, S., 2022: 432-433).

The development of Maha Sarakham Province under the provincial strategy aims to promote creative tourism and eco-friendly culture, which this issue is considered to be of great importance. Because Maha Sarakham Province is a city of education, also known as the "Taksila of Isan" where there will be a large number of people coming to live and study each year. And many tourists travel to travel as well. However, what is a problem that is like a shadow, is the problem of solid waste that is increasing as well, according to the latest information, Maha Sarakham Province is one of the 20 provinces that have a critical problem in waste management according to the Pollution Control Department's report. Local authorities will collect and transport waste, which the municipality will do by itself, but some hire private companies to carry out the collection in the area for waste management problems that are mostly found as residual waste. In communities that have problems such as stealing and dumping garbage in community forests, public forests, on the side of the road, on roadsides, in vacant areas, or others, etc.

From the development strategy of Maha Sarakham Province, which is attached to the problem of increasing solid waste in the local community, in line with the study of preliminary data in the research area, it was found that the Local communities in Kaeng Loeng Chan Sub-district, Mueang District, Maha Sarakham Province are community areas surrounding some parts of the city, most of the population are engaged in agriculture, followed by general employment, which general employment is a profession that people come to hire as employees. In the city, and when after work, people will take back garbage such as food plastic bags, consumer waste, etc. Along with the policy of local government agencies such as the Kaeng Loeng Chan Subdistrict Administrative Organization, which has a policy for people to manage household waste by themselves, people in the local community have to find a place to dump or dispose of their waste, such as disposing of waste in their rice fields, secretly dumping garbage in community forests, public forests, on the side of the road, or along roads around creek areas, canals, etc.

However, the paper reviewing found that many papers found how to manage Solid Waste namely; Mongkolnchiarunya, J., (2005) found that Yala is a city of some 80,000 people in southern Thailand, and is well known for tidiness and clean conditions. However, it has experienced problems in waste disposal and has sought ways of addressing these through alternative techniques, including recycling. A package of new practices was introduced, one of which ("Garbage for Eggs") is described here. Residents were encouraged to bring recyclable material to exchange for eggs, at monthly exchanges in local communities, with an emphasis on poorer communities. The project aimed not only at garbage reduction but also at community empowerment through self-reliance, establishing new relationships of more equality and less dependence, between poor communities and the municipal administration. The project succeeded initially in promoting clearance of a backlog of discarded items, especially glass, thus improving the environment of the communities; but the quantities brought for exchange then reduced steadily over a year of monitoring, to much lower levels. Various factors accounting for this are discussed, and the impacts of the exchange practice on other poor groups, such as waste buyers, are analyzed. Hayim, T., Pokateerakul, P., Pakdeejit, R., & Yodsurang, S., (2022) found the Environmental Pollution Management of Solid Waste in the Community of Local Administrative Organizations Should rely on the 3R principles, namely, use less (or reduce use: Reduce), reuse (or recycle: Recycle) because the 3R principle is a simple waste management method that can be done by everyone, all genders, age and can be practiced in daily life. Poolsub, R., & Poolsub, R., (2022) found the communities have contributed to brainstorming for a new recycle waste management system as merit junk waste but general waste management and harmful waste, all communities have provided a waste location for assembly in the village then local authorities, they properly in charge for waste disposal. Wongmoolithikorn, N., Mekkaphat, S., Sribun, P., Kamboonruang, C., & Hnorcome, R., (2022) found that there should educate people in the community regarding the habit and discipline of sustainable waste sorting. So that there might be an input into the elementary school curriculum, to build awareness during childhood. The policy proposal for local administrative organizations is to integrate waste management into local development plans, to continuously and sustainably create encouragement and





support waste management from all relevant dimensions. Salangam, A., & et al (2019) found that the community should participate in solid waste management following the sanitary solid waste management principle for sustainable management. In addition, Gallagher, L., Ferreira, S., & Convery, F., (2009) found the distance proxies expectations of environmental risk in communities with no experience of living with landfill infrastructure. Community consultations by authorities are consistently important, even after a landfill has been in operation for several years. This suggests that policymakers consult thoroughly and adequately before pursuing compensation policies.

Therefore, from the importance and problems mentioned above, it is considered a good opportunity for researchers as academics and researchers to integrate knowledge, concepts, and experiences into driving solutions with local communities, and Kaeng Loengchan Subdistrict Administrative Organization through the research topic on the development of a sustainable community environmental management model by using the participation process of educational institutions and communities.

## Objectives

This research aims to (1) study the problems and needs of community environmental management, (2) find a model of sustainable community environmental management using participatory processes, and (3) develop a sustainable community environmental management model by using the participation process of educational institutions and communities.

## Literature review

### 1. Balanced growth theory

Meier & Baldwin (1957) viewed it as a long-term real income increase process. and the rate of income increase is higher than the rate of population growth. The subsequent development of the economy means reducing and eliminating poverty. inequality in income distribution and unemployment under a growth economy. Economic growth can be said to mean an increase in a country's gross national product or when a country's production capacity increases. The concept of economic growth may be analyzed using the production probability curve. Whether increasing income and domestic productivity an increase in productivity, inputs, and production efficiency. expansion of all products and services or the fact that goods and services are almost all related to the economy. Although various schools of thought have argued and proposed many ideas about economic development and growth. But in the reflected image, there will be development in 2 levels, the macro level, and the micro level. which the Keynes office Focus on microeconomic problems and beliefs about a liberal economic system (Laissez-faire) until the global economic problems. Therefore, it can be concluded that There are various measures to solve the problem. increase government expenditures which will lead the economy to grow further. (Ngamlamom, W., 2015)

### 2. Participation concept

Participation of people as members of society, whether in the context of social, economic, political, or cultural development. It is something that shows the development of awareness. and the wisdom of self-determination of one's life, management, and control of the use and distribution of available resources for the benefit of economic and social living. As necessary with dignity. In addition, people or communities develop their abilities to manage and control the use of resources. control the distribution of available resources for the benefit of economic and social livelihoods, people can develop awareness and wisdom. Which is expressed in the form of decision-making (Department of Health, Ministry of Public Health, 2017) Participation has played an important role in the development of local communities. Since the Fifth National Economic and Social Development Plan, which has focused on people rather than economic growth, efforts have been made to change the development approach from the (top-down) comes from the bottom-up (Bottom-up).

## Research Conceptual Framework

The Research title "Development of a Sustainable Community Environmental Management Model by Using the Process Engage Educational Institutions and Communities", it was designed as follow;



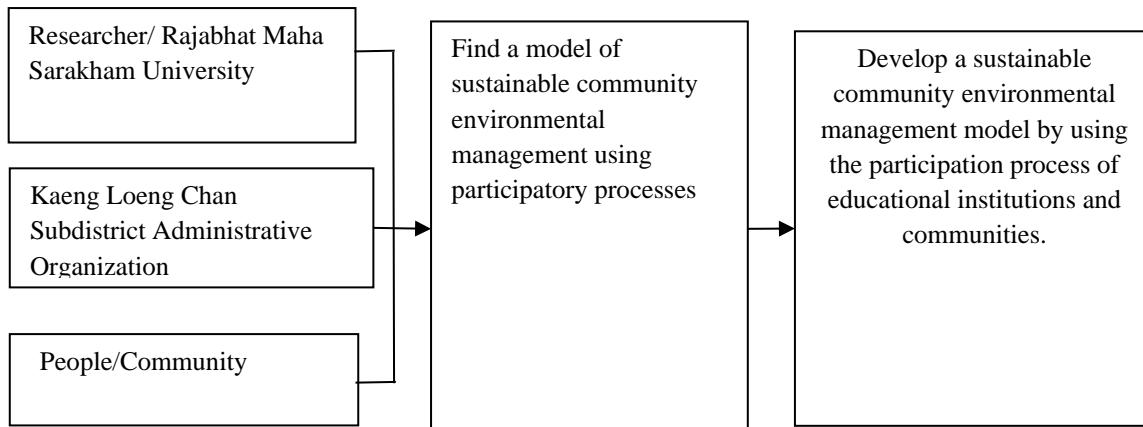


Figure 1 Research Conceptual Framework

## Methodology

This research is qualitative with the following research methods.

1. Research target group: consisting of 30 local administrators, citizens, and related stakeholders by purposive sampling.

2. Research tools: Including an interview (Interview), consisting of 3 parts, namely; Part 1 : Personal information of the interviewee. Part 2 : To study the problems and needs of sustainable community environmental management in the Kaeng Loengchan Sub-district and search for a model for sustainable community environmental management by using the participation process of educational institutions and communities. And part 3, other opinions and suggestions are open-ended.

3 . Data Collection: Collection of data from: (1) Primary Data is information obtained from in-depth interviews with the target group, and (2) Secondary Data is the data obtained from the collection of various documents (Document Research) such as books, textbooks, academic documents, research papers, and related electronic media, etc.

4 . Data analysis: qualitative data analysis by using data obtained from in-depth interviews with target groups and gathering various document data for content analysis (Content Analysis).

## Results

In this research, the researcher can classify the research results as follows:

### 1. Problems and needs for sustainable community environment management as follows:

1.1 Community environmental problems found that the community is facing a growing problem of solid waste in the community with this increasing solid waste all coming from solid waste that has been consumed and consumed by households. From observational surveys and interviews with target groups such as community leaders, citizens, and related parties, information has been obtained that the increasing waste problem, the community does not have a model/guideline/innovation in household waste management that is correct, appropriate methods or principles. Currently, most people or villagers have a simple and convenient way to manage such as bringing solid waste to pile up together and set fire to, collecting it in bags or sacks, and smuggling it to dump in the community forest, on the side of the road, or the side of the road, farm fields, rivers, canals, public places of the community and Digging landfills, etc. If communities and people do not manage solid waste properly according to appropriate principles, it will become a chronic problem. For example, it may be a breeding ground for pathogens, polluting the environment in water, soil, and air. In addition, from the data collection area, it was found that the solid waste that existed in the community was both (1) Wet waste including food scraps, vegetables, and fruit peels, etc. (2) Dry waste including plastic bags, rubber scraps, paper, glass, metal, rags, wood, etc. And (3) Hazardous wastes including chemical cans, batteries, light bulbs, etc. Therefore, from the above information, the researcher can classify the community solid waste problems as follows;

1.1.1 Air pollution is that most people or villagers tend to dispose of solid waste in communities and households by piling up and setting fires. Therefore, causing smoke and airborne toxins that deteriorate air quality and emit a foul smell, etc. From the interviews with the target group,



it was found that solid waste will be burned such as in front of the house, beside the road, in public areas, or in the garden. Incinerated waste includes food packaging or plastic bags, chemical cans, batteries, light bulbs, glass bottles, and wood chips. Pollutants resulting from combustion will float in the atmosphere around the house or community without filtration and settle to the ground or water sources, accumulating in the general environment in the community. Most people who burn plastic waste do not understand the dangers it poses to their health and the environment. The information from the Department of Health, Ministry of Public Health (2017) It has been found that pollution from the incineration of household waste has a profound effect on the health of residents by raising the risk of respiratory heart diseases such as asthma, allergies, headaches, damage to the nervous system, kidneys, and lungs. In addition, the burning of polystyrene, polymers, such as foam packaging, meat boxes, egg crates, and yogurt milk bottles, polystyrene can pass through. Entering the skin and lungs in high doses, these substances can damage the eyes and nervous system resulting in headaches, tiredness, and weakness, which can accumulate over a long time and spread into the food chain, will affect the disease of both people and animals, etc.

1.1.2 Water pollution is when people or villagers will pile solid waste on the ground both in front of the house, along the road, along the drainage canal in front of the house, etc. When the rain falls on the pile of garbage, the rain will wash away causing wastewater or dirty water, wastewater from the garbage pile, is highly dirty, acidic, with germs. If the water from the waste leaks into the river and canals, the water will become rotten and result in the death of living organisms such as shrimp, shellfish, crabs, fish, frogs, aquatic plants, or the ecosystem in Deteriorated water sources, etc.

1.1.3 Soil pollution is when people or villagers tend to choose to dispose of household waste by digging and landfilling. Hazardous waste types such as batteries, batteries, electric bulbs, and chemical cans. These wastes will affect the number of heavy metals such as mercury, cadmium, and lead, which will negatively affect the ecosystem in the country.

1.2 The need for community environmental management was found that the process of small group meetings, problems should be developed to create a prototype community area or be piloted first by selecting problem areas and appropriateness in line with the target group interviews. I would like to develop a pilot area, a sample area, or a prototype area to be a guideline for the community in Kaeng Loeng Chan Subdistrict. Therefore, 3 villages were selected, namely Don Tum Village, Moo 1, Moo 16, and Kut Peng Village, Moo 12, as a model community area for community environmental management, etc.

**2. Sustainable community environmental management model using the participation process of educational institutions and communities found that it was appropriate and compatible with the integration process with Kaeng Loeng Chan Subdistrict Administrative Organization in the following 3 forms:**

2.1 Model 1 Implementation of 5R principles in households found that people or villagers in the community need to implement 5R principles in households by 5R principles, details are as follows.

2.1.1R1 (Reduce) refers to the principle of reducing the amount of solid waste. People or communities want to reduce solid waste by reducing the use of plastic bags, such as using cloth bags / using baskets / or other containers that can be put in instead of plastic bags. When going to buy consumer goods and consume from stores or markets within the community, as well as wet garbage such as food scraps, fruit, and vegetable scraps of each household, originally dumped together with other types of waste in the trash cans in front of their homes. Next, it will be made into compost and used as animal feed to reduce waste and use in agriculture, horticulture, field crops, etc.

2.1.1R2 (Reuse) refers to the principle of reusing solid waste, or is it reusing again? People or communities will have to check and analyze the existing or used solid waste to see if it is qualified to be reused or reused again or not, such as plastic water bottles, soda bottles, and used glass bottles, can be reused to fill water for drinking, etc.

2.1.3 R3 (Repair) refers to the principle of bringing solid waste back to improve. In this principle, people or communities will pay attention to materials that are not very damaged, then consider whether there should be improvements, repairs, or additions to be able to extend their service life or to Reduce the amount of garbage or waste disposal, etc.

2.1.4 R4 (Recycle) refers to the principles of solid waste processing. In this principle, people or communities will jointly transfer wisdom or knowledge that they already have to transfer, exchange with each other about processing, invention, and modification to increase the value of waste to be valuable or to be able to improve and change to bring Can be circulated and used again such as the invention of a mobile phone made from coffee straws, drinking straws, plastic water bottles, the





invention of plants from car tires, the invention of energy drink bottles, coffee cans to decorate the fence in front of the house, etc.

2.1.5 R5 (Reject) refers to the principle of avoiding solid waste types that are difficult to destroy or use once and then discard this principle, the people or the community will jointly reduce, or create good behaviors about rejecting waste that is toxic to the environment such as foam boxes, etc.

2.1 Model 2 Establishing a community waste bank is the establishment of a community waste bank as a model and one of the operating principles to promote household and community waste segregation. The people or communities have the desire to create or have a system for the exchange of solid waste purchase, solid waste collection, and solid waste sorting by establishing a “community solid waste bank”. There is a systematic process and mechanism, for example, having a household/voluntary requirement, applying for membership, having a structured executive committee, having a revenue collection system or an accounting system that can reveal verifiable information, there is a place to set up a bank or office, and there are measures that have clear requirements and methodologies, etc.’

2.3 Model 3 of the solid waste management data collection application system found that Kaeng Loeng Chan Sub-District Administrative Organization has implemented a policy to drive to solve the waste management problem in the pilot community, or the model community by allowing the pilot community to establish a community waste bank in the Don Tum village community, Moo 1, Moo 16, and the village of Kut Peng Moo 12 already. Therefore, the research team has jointly developed further by introducing an application system for collecting waste management data, etc.

**3. Sustainable community environmental management model using educational institutions and community participation process** found that there is a sustainable community environmental management model, by using the participation process of educational institutions and communities that are appropriate and compatible with the integration process with Kaeng Loeng Chan Subdistrict Administrative Organization is the “Solid waste management data collection application system model”, the details of the table are as follows;

Table 1 Structure and function of solid waste management storage application system

No.	Work system/Application	Functionality
1	Member	<ul style="list-style-type: none"><li>- Report the amount of waste disposal.</li><li>-Report the total amount to be paid*</li><li>-Report the amount to be paid additionally**</li><li>-Statistical report of waste dumping/weekly/monthly</li></ul>
2.	village headman	<ul style="list-style-type: none"><li>- Report the amount of garbage in the overview of the village.</li><li>-Report the amount to be paid in the overview of the village.</li><li>- Report the amount to be paid per member.</li><li>-Statistical report of waste dumping in overview / weekly/monthly</li><li>-Statistical report of garbage dumping by member</li></ul>
3.	Public Health Volunteers/Village (Support more than 1 user)	<ul style="list-style-type: none"><li>- Manage members' trash dumping information</li><li>-Manage member payment information</li><li>- Report the amount to be paid in the village overview.</li><li>-Member payment report</li><li>- Report the total amount of garbage dumping in the village.</li><li>-Statistical report of waste dumping in overview / weekly/monthly</li><li>-Statistical report of garbage dumping by member</li></ul>
4.	Subdistrict Administrative Organization / Center (Support more than 1 user)	<ul style="list-style-type: none"><li>- Set the price for the amount of garbage dumped by the village.</li><li>- Set the price for overdue trash dumping.</li><li>- Manage the waste dumping information of the village.</li><li>-Manage village payment information</li><li>- View the overall waste dumping report for each village / weekly / monthly.</li><li>- View reports on the amount of garbage dumping in the overview of the district / weekly / monthly.</li><li>- Village payment report</li></ul>

## Discussion

In this research, the researcher can discuss the research results as follows:

The study found that most people or villagers have simple and convenient management methods, such as piling up solid waste and setting fire to collect bags or sacks and then smuggled into the community forest, on the side of the road, or the side of the road, farm fields, rivers, canals, public places of the community, and the excavation of landfills, etc. If the community and people do not manage solid waste properly according to appropriate principles, it will cause a chronic problem. For example, it may be a breeding ground for pathogens, polluting the environment in water, soil, and air. From the data collection area, it was also found that the solid waste that existed in the community was both; (1) Wet waste including food scraps, vegetables, and fruit peels, etc. (2) Dry wastes including plastic bags, rubber scraps, paper, glass, metal, rags, wood, etc. (3) Hazardous wastes include chemical cans, batteries, light bulbs, etc. These results are consistent with the research of Jindamongkol, K., (2015: 115-116) who has studied environmental management of Muang Nga Sub-district Municipality, Mueang Lamphun District, Lamphun Province with the process of public participation, has been able to find a way to solve environmental problems to achieve results in environmental management by using the public participation process according to the opinions, and the needs of the people, it was found that the people want to participate and pay attention to the management of environmental problems systematically and seriously, implement solutions and persuade campaigns for people to participate more to solve problems together, both maintenance and conservation control. natural resources and environment, and it is also in line with the research on community members' participation in environmental management in Tha Mai Municipality, Tha Mai District, Chanthaburi Province., and Yotaga, B., (2013) It was found that the aspect of receiving benefits was at the highest level, community members were able to apply the knowledge gained from participating in the environmental training in their daily lives and have more environmental knowledge through participation in environmental management, in line with the concept of Boonlue, N., (2018: 17) It concluded that decisions related to fiscal policy, which affect large numbers of people, need to emphasize the people's role in participating in activities. The community has a forum for villagers to consider project proposals for environmental management in the community and consider making decisions on implementing projects in the community that are necessary with participation from all sectors in the community. Make the budget process more legitimate and support a greater proportion of the people, and the implementation will be more collaborative because people in the community participated in the budgetary process despite the voices of dissent, but when the majority voted together, the unsupported vote would agree on the outcome of the consideration as a direct participatory democracy. Under the concept of state-society in environmental management in the Rung Rueng Villa village community, it is in line with the concept of state-society in the form of authoritarianism or the state, Sornmanee, C. (2018: 19) commented that one of the shortcomings of the bureaucratic system stems from strict adherence to rules and a refusal to be flexible when setting any rules that must always be followed. Anything that is suspected of going against the rules will not do anything that does not have regulations indicating that it is their responsibility to throw it to other agencies or throwing to senior supervisors to consider not using common sense in work causing the work to be delayed.

## Recommendation

**1. Policy recommendations:** Tambon Administrative Organizations should develop further by incorporating them into local ordinances to develop and support the budget for expanding the results to other areas.

**2. Academic recommendations:** There should be further research on the development of a sustainable community environmental management model by using the participation process of educational institutions and communities in Kaeng Loengchan Sub-district, Mueang District, Maha Sarakham Province to other communities.

**3. Suggestions for further research:** When collecting data with the target group each time, the researcher must explain to clarify the understanding and strictly control the data collection because sometimes the target group may not cooperate in filling out the actual information, which may prevent



the researcher from receiving genuine research data. And there should be promotion and support for area-based research continuously because it will make us aware of the situation, problems, conditions, and needs of the area promptly, etc.

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