Kasetsart Journal of Social Sciences 42 (2021) 810–816

Kasetsart Journal of Social Sciences

journal homepage: http://kjss.kasetsart.org

The making of a sustainable self-managed community: A study of Si-Mum-Muang Market community's waste management and a model for applying in other communities

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Article Info

Article history:
Received 22 April 2020
Revised 19 December 2020
Accepted 28 December 2020
Available online 3 December 2021

Keywords:
circular economy,
cooperation of public, private, and community sectors,
participatory action research,
sustainable self-managed,
waste management

Abstract

With a population of approximately 40,000 and a circulation of 6,000 tons of fruit and vegetables, Si-Mum-Muang Market community generates 200 tons of waste per day. This waste is composed of 80 percent organic waste, 10 percent recycle waste, and 10 percent general waste. In short, there is a massive waste disposal problem at this business market. This research is ultimately aimed at finding sustainable waste management. It draws on Participatory Action Research (PAR) including in-depth interviews, questionnaires, and group discussions to examine the waste management process at this location. The waste management process reflected the cooperation of public, private, and community sectors under the economic, social, cultural, and environmental dimensions for suitable forms of waste management practices. The study revealed that the average score for waste management practice given by the community's stakeholders was 3.35 (moderate level). The key to successful waste disposal is waste separation at source and waste utilization. A new innovative-alternative for reinforcing a sustainable self-management community is achievable by co-establishing waste management constitutions by stakeholders in the community, also relying on the development of that community's sustainable self-management constitution and its measuring index. This can be applicable to other communities. The circular economy is applied here in terms of recycled materials and organic waste, increasing the hiring of direct labor and indirect labor in recycle business and related business.

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Introduction

Nowadays, the private sector must be able to manage waste generated in its area with proper solutions instead of disposing of it in other provinces. This is true especially for food waste, which has been recorded as more than 1,300 million tons per year, equivalent to one third of the total world food production from humans. This generates

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https://doi.org/10.34044/j.kjss.2021.42.4.14
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3.3 gigatons of carbon dioxide and plays a role in worsening global warming (Food and Agriculture Organization of United Nations [FAO], 2013, 2017). An example of a community facing such a problem is the well-known Si-Mum-Muang Market. Located in the north of Bangkok, Thailand, it was established in 1983 with support from the Ministry of Commerce to be a centre for vegetable and fruit distribution. It is about 3.0 kilometers from Don-Muang International Airport. The enormous waste produced was forcing the Market to manage its waste more successfully thereby benefiting community stakeholders' sustainably.

In addition, waste management approach has constructively shifted from "waste collection and treatment" to "waste separation and management" in order that the process can utilize organic waste and recycle waste generate income as profit center instead of cost center from waste dumping, as in the past.

The knowledge and practical experiences of any community in how waste management is constructively conducted for its sustainability must therefore be studied and applied to other areas so as to become valuable to public policy purpose and improvement.

Thus, research with the following objectives is worthwhile; to find out, evaluate and reconstruct waste management processes and methods in Si-Mum-Muang Market as an exemplary model of community's waste management with contributions from the public sector, private sector, and community sector, and to propose policy options, models and activities along with waste management as well as conducting waste management innovation to build a sustainable community, waste management constitution and community sustainability index.

Literature Review

So as to resolve community waste management problems, a self-management community is needed, one which can evaluate and reconstruct waste management processes and methods. A number of key related works are highlighted here.

The Department of Environment, Bangkok Metropolitan Administration (2003) remarked that the problems from garbage were becoming critical, affecting the environment and increasingly the lives of people around the urban location. BMA still faces the problem of mixed waste transportation in that it can't promote community participation to separate various waste at source successfully.

During the past 20 years, there have been increasing numbers of community waste management studies worldwide relating to the right way to involve the community itself with other stakeholders. Petts (1995) presented findings in Hampshire, UK, that the effectiveness of a more proactive community involvement program is a kind of public involvement in waste management strategy development and the potential effectiveness through consensus-building approaches. Srivastava, Kulshreshtha, Mohanty, Pushpangadan, and Singh (2005) found that successful waste management in Northern India derived through a strategic action plan by a cooperation of the stakeholders including community and municipality. In Thailand, a study by Mongkolnchaiarunya (2005) made clear how garbage reduction could be done by community empowerment through self-reliance, establishing new relationships of more equality and less dependence, between poor communities and the municipal administration.

The self-organizing or self-management community thus tends to be a prime factor for the success of waste management. It consists of (1) The meaning of self-organization (Robert & Lucas, 1998); (2) Reasons to be a self-organizing community; (3) Self-organizing community's principles (Phongphit, 2009); (4) Waste management in community; (5) Processes to become self-organizing community; and (6) Self-organizing mechanism. According to Margaret (1996), self-organization is defined through its applied systems. Ideally the system should be flexible and easily revertible, especially in local communities where people are self-learners and have their own local knowledge.

Learning from the previous studies which have given importance to community involvement and cooperation among concerning stakeholders, this research has tried to use benefits from former empirical knowledge but goes beyond those studies. Hence, the research put emphasis on self-management community in cooperation with the state and private agencies to find an innovation of waste management concerning income of community members and building of community constitution and indicators, and suggestions for practical guidelines of the community sustainable self-management for waste management (Smith & Frank, 1999) from which any community can apply.

Theoretical Framework

Comprehensive research work is required in order to create practical knowledge of how to address problems of community waste management and this article aims to serve such purpose.

A group of theoretical concepts was used; the System Theory (Katz & Kahn, 1978), Community Economic Life Plan (Phongphit, 2007), and Waste and Environment Management Format in Community (Department of Environment, Bangkok Metropolitan Administration, 2003) in creating a sustainable self-management community model through collaboration between the public sector, private sector and community sector using Si-Mum-Mueang Market community as a case study.

A sustainable community model needs good environmental management, coexisting harmoniously and creating economic stability through activity management processes, which consist of community mechanism management and collaboration development, as shown in Figure 1.

The theoretical frame above is focused on the community background or characteristics, which are local knowledge, social capital, resources capital, economic capital, and cultural capital. The key inputs to the community are the private sector, farm vendors, buyers, and workers. Agriculture goods are the key exchange medium for creating capital for the community.

Methodology

The research method was mixed-methodology; with qualitative lead method, supplemented with the quantitative, as detailed:

1. Qualitative data collection: (1) Document reviews of various sources of data from public, private and community sectors, (2) In-depth interview with 10 experts from public, private and community sectors, (3) Participatory Action Research (PAR) including two focus group conferences
2. Quantitative data collection to get opinions from stakeholders involving waste management

The primary methodology achieving the objectives of this study was qualitative methodology of collaborative action research or Participatory Action Research (PAR). PAR is a democratic process since it involves all stakeholders and benefit groups. This will contribute to the success in self-management in terms of economics, the social aspect and the environmental aspect; all contribute to and recognize the collaborative cultural identity of the community, development, and cooperation between

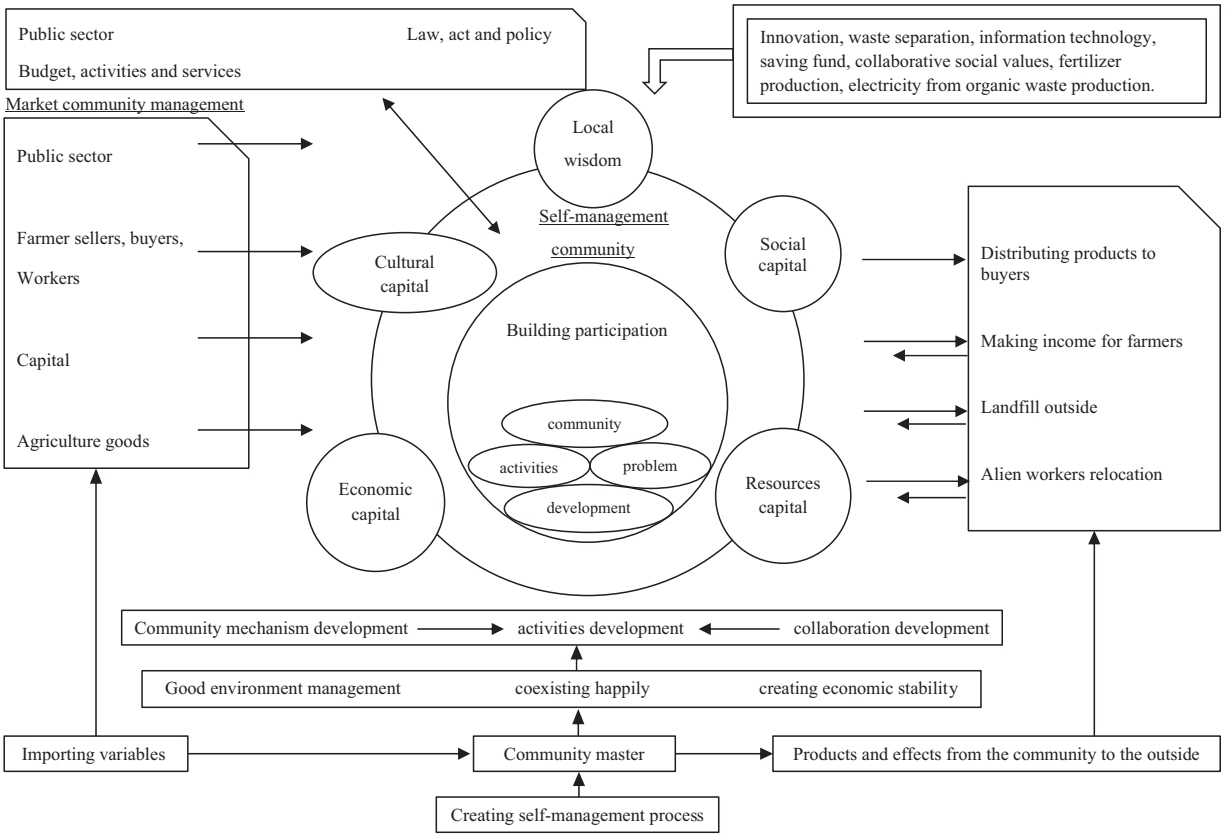


Figure 1 A model for the creating of a sustainable self-management community by the collaboration between the public sector, private sector and community sector: Si Mum Muang case study

public sector, private sector, and community sector (Robert, 2007). It also contributes to resolving the current waste problem and to further developing new policy, model actions, and new innovation to eventually create successful results. These outcomes may then be applicable to other community areas (See details in Figure 2).

A quantitative method (questionnaire) was additionally employed in order to obtain stakeholders' opinions. The average score of various opinions from different stakeholders is used to identify preferred views on the future of waste management and so on.

The overall research process of field data collection was divided into three phases.

Phase 1: In-depth-interviews of 10 experts from different sectors; 3 from academics, 3 from government, 2 from private and 2 from community sectors to reveal the key issues. These were then compared with the results from focus group discussions. This combination of methods will lead to the community's waste problem resolution.

Phase 2: Conducting a survey by using a questionnaire to obtain the opinions of representatives from different interest groups. According to the formula presented by Yamane (1973) for data collection, 200 correspondents

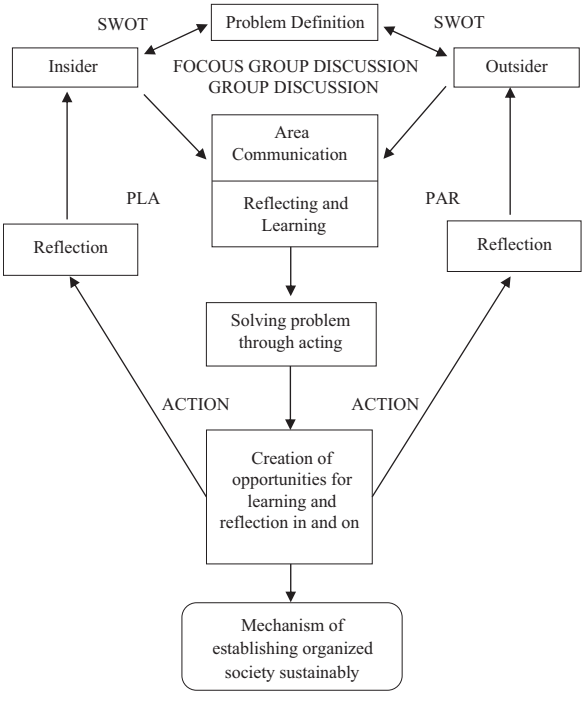


Figure 2 Participatory Action Research Model for Waste Management of Community
Source: modified from Davydd and Morten (1998)

responded from 321 samples of 40,000 population of 10 occupational groups, plus 108 samples from 152 population by questionnaires according to 76 operators representing local government promotion staff, and 76 regulators representing provincial natural and environmental resources. The main points of the survey were (1) the problems of waste management; (2) supporting and evaluating the past experience of the establishment and running of Staff Saving Fund in solving the huge amount of waste since 2008; (3) how to redesign and improve the procedure of community mechanism development, cooperative development and apply to activities development (Featherstone, 1992).

Phase 3: Consisting of two rounds of focus group discussions: (1) First focus group discussion focused on community development via problem solving and brain storming in relation to actual waste disposal practices. 30 participants from 10 occupational groups participated in the discussion. (2) Second focus group discussion aimed at identifying knowledge that could be applied to other communities. This group had also 30 participants but representing 10 public sector staff, 5 private sector staff, and 15 community sector members. The focus group discussions had three agendas: (1) To clarify the problems with waste management, (2) To regulate the rules about waste management, (3) To create the community constitution of waste management in the Si-Mum-Muang Market community, and to explore the potential application to other communities. Within this phase, the community constitution for waste management and its index were created as the most important mechanism for sustainable future of the Si-Mum-Muang Market Community and stakeholders.

Results and Discussion

The data collected were evaluated and analyzed according to the key research objectives and divided into four major findings. Analysis from quantitative supporting data will firstly be used to inform the qualitative data findings as follows.

The Situation and Problems of Si-Mum-Muang Market (SMM) and Community Members from 200 Correspondences out of 321 Samples

Score level was 1.00–5.00, when the lowest level of agreement was 1.00 and highest level was 5.00. The interpretation of the practices was weighted as score counted respectively that: 1.00–1.50 = very low, 1.51–2.50 = low, 2.51–3.50 = moderate, 3.51–4.50 = high, and 4.51–5.00 = very high.

The average score of the main ten items of the community waste management practices was 3.35, and they were ordered from high to low as follows.

1. Community has high environmental care as an indicator of the community's progress (score = 3.65).
2. The community highly demands cooperation with the private sector for sustainable self-management (score = 3.65).
3. There is a high cooperation between public, private, and community sectors in the area of SMM Market (score = 3.53).
4. The indirect effect of waste separation is that it highly generates incomes for labourer in the community, especially those with low income (score = 3.53).
5. The SMM Community has a high awareness of and abides by the rules (score = 3.51).
6. The community moderately demands cooperation with the public sector for sustainable self-management (score = 3.39).
7. Community members cooperate moderately in waste and wastewater management (score = 3.22).
8. The government sector has moderate budget for sustainable self-management (score = 3.16).
9. Members are willing moderately to pay for wastewater treatment according to the amount of the cause (score = 3.07).
10. Community members collect lowly rain water to reduce tap water usage and reduce flooding from rain (score = 2.82).

Past Experiencing of Procedures and Methods of Community Waste Management with Cooperation of Public, Private, and Community Sectors

Since 2008, the researcher, in accordance with Participatory Action Research (PAR), a member of staff of Si-mum Muang Market, has acquired extensive experience in community waste management and in terms of transforming waste into income. The waste management system adopted used information technology to deal with vegetable hand truck workers to collect and recyclable the waste and then sell it to the "Vegetable Hand Truck Workers Savings Fund" or "Waste Not Truth Fund" of the Si-Mum-Muang Market Office. Workers received income from collecting and selling organic and non-organic waste. In evaluating the past experience of waste management, the 8-year-experience from 2009 to 2017 resulted the Si-Mum-Muang Market community improving its learning processes and development of waste management. Efficient waste sorting was exemplified by the separation of organic waste according to the type of organic waste that is disposed of by market trade zones. This allows organic waste to be used separately for products plus adding value to organic waste such as vegetable leaves for sale to fish ponds, and corn bark mixed with pineapple cork for sale to cattle farms. Creating a fund for workers from income generated from collecting and selling waste was a successful innovation, though there needs to be improvement by fund members in using the money saved.

Constructing the Community Constitution and Index for Waste Management

The key principles for the community constitution of waste management:

1. The committee of the constitution consists of 9–11 members from the market representatives and occupational groups. Five committee members must be changed annually.
2. Change in the community constitution must be done in such a way as to ensure it serves the need of each group of members.
3. In making benefit from the organic trash in the Si-Mum-Muang Market community, special attention needs to be paid to sorting and utilization.
4. Every household in the Si-Mum-Muang Market community needs to sort fresh garbage and organic garbage so that it can be commercially utilized along with organic garbage.
5. There should be collaborative action between the public and the private sectors for establishing the process and methods of waste management. The activities should connect with economic, social, cultural and environmental issues, especially in technology and exchange in knowledge.
6. The campaign of sorting waste from the source should be done frequency and continuously in the Si-Mum-Muang Market community.
7. Problems in waste and polluted water management which can affect neighboring communities must be prevented.

The key community index for waste management according to the constitution:

1. The Key Performance Index (KPI) must match the United Nations' Sustainable Development Goals (SDGs).
2. Waste management performance must be indexed through financially quantitative measurements such as number of members in saving fund, amount of savings, loans, bad debts.
3. Waste management performance must also be indexed via qualitative measurements such as quality of members' life in term of economic, social, cultural and environmental dimensions.

Opportunity for Expansion of the Research Results into Other Community Areas

Following on the two focus group conferences, the results were positive and suggested the waste management model of sustainable community could be transferred into other communities (Erwin, 1976).

The research results deriving from both quantitative and qualitative methods are mutually supportive in that both lead to a common future management approach beyond Si-Mum-Muang Market Community.

Conclusion and Recommendation

The community waste management system can thus create the waste management innovation to set up their self-solution (Ferdinand, 2001) appropriate to each area context but with the cooperation of the public and private sectors. As shown, for example, waste and materials from recycled waste management has brought income to community members and the establishment of the recycle saving fund, which can be utilized for community welfare.

Si-Mum-Muang Market Community's waste management model has developed suitable methods of waste sorting at source; consisting of organic waste, recyclable waste that is utilized and produced for animal feed (Guijt, 1998), and the sale of reusable-waste products to shops and factories. The remainder of the waste will be transported to landfill, though our target is zero waste. How to analyse waste utilization is clarified into three flows: (1) Financial Flow is cash flow including cash received by the collector and seller of recycled waste and cash paid by recycle waste purchaser. Cash received would contribute to Recycle Saving Fund; also, a loan fund for members. (2) Product Flow is organic waste and recycled waste distributed to fish ponds, cattle farms and recycling factory. (3) Information Flow is information and communication technology to be used for SWOT analysis for the improvement of waste management. All of these matters were used for community constitution for waste management as community participation rules.

This study also advances our existing knowledge, leading to the reconstruction of a practical model of community waste management (Agranoff & McGuire, 2003). It is the model which can be managed and utilized with the suggested community constitution and its indicators for community waste management and applied to other communities, as shown in Figure 3.

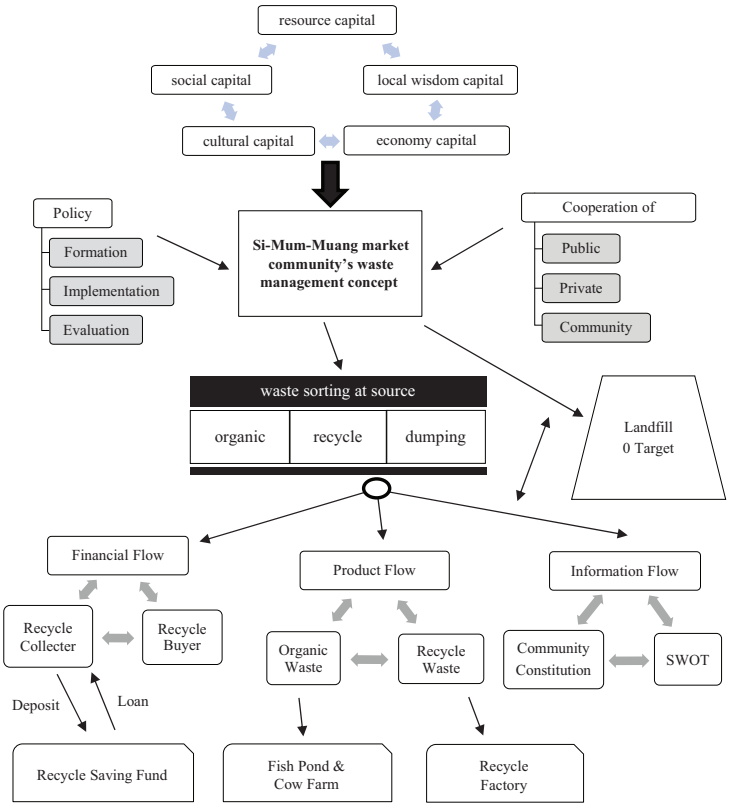


Figure 3 The reconstructed practical model of community waste management for making sustainable self-management in Si-Mum-Muang Market community

An Explanation of the Reconstructed Practical Model of Community Waste Management for Sustainable Development

Waste management in each community can be developed depending on resource capital and other managed variables all aimed at maximizing utilization for the financial benefit of the local community. A fund could be developed to become a great financial support for the community; both as a long term saving fund and a lending fund for its members. An added benefit is that this will help reduce community members falling into the hands of loan sharks. This sustainable and profitable waste management system reinforces the Circular Economy in terms of reuse and recycling, both of recyclable waste and organic waste. Finally, it creates a new business section and increased employment by networking business.

Future research should cover cases of small communities with limited funds as to how they could sustain waste management units. The cooperation between small communities may be their common solutions to share resources, funding, especially in local public sector. The economy of scale for small communities will help each small community to run its waste management, and they can learn and share such knowledge and experiences.

Conflict of Interest

There is no conflict of interest.

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