Environmental and waste management based on community empowerment in Surabaya

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Abstract. Surabaya has several productive kampungs known as KampungUnggulan. One of these is Kampung Lontong which provides rice cakes (lontong) for all of Surabaya. However, the existence of home industries, which are typical of this kampung, has made this settlement polluted and disorganized. Specifically, waste from banana leaves, the main type of rice cake packaging, is scattered around the kampung. The decaying waste gives off a stench and is unsightly. The limited availability of land is one of the causes of this waste problem for the kampung. A waste treatment system is needed to accommodate waste production by maximizing available space. This study uses a post-positivist method by identifying and mapping potential and existing problems. The qualitative method used is a SWOT analysis. The study proposes a concept and strategy for managing waste that can optimize the local institutions and the remaining space in the kampung. In addition, the waste management process is carried out by empowering the community via their local institutions, so that the processing of waste can provide additional income for the residents.

1. Introduction

Surabaya has a program that aims to improve the quality of settlements called the Kampung Improvement Program (KIP). After independence, it was known as KIP WR Supratman. Later it was renewed with the first-generation KIP and KIP Comprehensive (2nd generation) programs. Each of these programs has a different emphasis in terms of program content and community involvement. In the latest program, the emphasis was on community empowerment, which prioritized human resources development. The program is known as the Prominent Kampung Program (Program Kampung Unggulan). This program developed various types of Small and Medium Enterprises (home industries) and considered the unique potential and conditions in each kampung. As such, every kampung must have at least one special product as the main livelihood for the community [1].

Kampung Lontong, located in Banyu Urip Kampung, Surabaya is one of the settlements that participate in the Prominent Kampung Program. This kampung is an area for tempeh craftsmen, where many of its residents became tempeh producers and sellers. However, since the last few decades, residents have gradually abandoned the activities of making tempeh and shifted to making lontong (rice cakes covered in banana leaf). The massive demand for lontong from all over Surabaya resulted in the high daily production of lontong. This causes a high production of banana leaf and organic waste in the area. Poor waste management also leads to rubbish heaps to pile up.
everywhere. In addition to causing unsightly scenery, the amount of banana leaf waste also produces an unpleasant odor. This situation shows the necessity of better banana-leaf waste handling and management.

The narrow alleys in the kampung cause difficulties in waste management. Besides this, the public space is also used for the domestic and productive activities of its citizens. Domestic activities include daily activities that fulfill personal needs, such as cooking, looking after children, playing, and receiving guests. Whereas the productive activities carried out in the kampung aisles include making lontong, accepting consumers, preparing sales, etc.

The unsanitary condition in the kampungs due to organic waste calls for a solution in the form of basic infrastructure facilities and settlements improvements. Waste management is necessary to improve public health and environmental quality. Community empowerment in waste management is also needed to increase community involvement in preserving the environment. This study has several objectives, namely identifying problems related to waste management and business activities in Kampung Lontong and developing a method for community involvement in managing and processing banana leaf waste, which can benefit the residents.

2. Literature Review

This section will explain the definition of a house, a productive house, and the principles of sustainable waste management. The following explanations are:

2.1. A Productive House

A house is a space that is affected by its user, location, and development process. It has non-physical and environmental elements aside from physical elements. Turner in [2] stated that housing patterns are created from the process of connecting various elements. A productive house can be defined as a house that can provide opportunities for its inhabitants to develop themselves, their families, and their environment as a community[3]. Productive houses can also be referred to as Home-Based Enterprises (HBE). There are five main characteristics of HBE according to Silas (2000) in [4], namely: (1) The house and household are capitals and the basis of the family’s economic activities; (2) The family is the main force behind HBE, starting from the preparation, running, to controlling of all activities, facilities, and infrastructure; (3) The household is the basis for the establishment and work pattern of HBE; (4) The house is continuously self-adapting to the context of applicable activities, including post-HBE activities; and (5) Various conflicts that arise because of the presence of HBE can be overcome. This includes problems inside the house and in relation to the environment and neighbors who are involved directly or indirectly in various HBE activities. Using their houses for HBEs is the solution for most low-income families to earn extra income while not having to leave their homes[2]. Consequently, domestic household activities and earning income can go hand in hand.

2.2. Sustainable Waste Management

Several aspects need to be considered in sustainable waste management in settlements, including:

1. Environmental aspects, consisting of efficient use of energy and resources; a green design that uses sustainable local materials; adequate sanitation; avoiding the use of hazardous and polluting materials; the use of affordable resources; and improving the resilience of the environment/home.
2. Social aspects, comprising community empowerment and inviting public participation; ensuring health and safety at home/in the neighborhood; creating environmental and community identity; meeting community needs; providing access to infrastructure and public facilities.
3. Cultural aspects, including settlement/housing with a culturally-sensitive design; providing aesthetic elements that reflect local culture; building community creativity.
4. Economic aspects: affordable housing for various social classes; adequate housing that allows the integration of work and productive activities; support for domestic economic activities; home management and maintenance; strengthening the resilience of the home.

In this study, the emphasis is more on the ecological and social aspects of sustainable waste management, namely the method of community empowerment for environmental management by processing waste in an isolated urban location.
2.3. Community Empowerment

Empowerment is an inseparable part of the participation process. Community empowerment is clearly defined as more than participation because community empowerment is a step beyond the process of participation (Somerville, 1998 in [4]). Participation is one way to realize community empowerment. Communities can participate individually or collectively in an activity but that participation will not necessarily give them more control over their lives. Aspects related to community empowerment and community participation include:

1. Improving the quality of life of citizens, especially for disadvantaged citizens (Somerville, 1998 in [4]).
2. Residents can gain more control over their housing conditions or situations.
3. The level of community empowerment is not only seen from the obtained results but is also related to the process of community involvement itself.
4. The idea of community empowerment is important in understanding the development of individuals, organizations, and society.
5. The community empowerment process consists of a conventional/top-down approach and a community-based/bottom-up approach.
6. A common participatory process includes planning, decision-making, implementation, and evaluation (Slamet, 2003 in [5]). Internal factors that influence community participation are gender, age, level of education, level of income, and livelihood (Slamet, 1993 in [6]).

2.4. Literature Review Synthesis

This study will discuss the sustainable waste management in a productive kampong based on community empowerment by considering four aspects, as follows.

| No. | Aspect | Sub-aspect | Topics |
|-----|--------|------------|--------|
| 1   | Environment | - The source of raw materials (local materials)  
- Physical condition  
- Improve environmental resilience | Discussing how to care for the environment (use of local materials, the conditions of the surrounding environment and its effect on activities. |
| 2   | Social | - Community aspects (solidarity, etc.)  
- Local institutions  
- Community empowerment | Discussing the role of community participation, local institutions, social relations, and environmental awareness |
| 3   | Culture | - Community habits  
- Community’s creativity | Emphasizes how community habits will affect existing activities. |
| 4   | Economy | - Customers  
- Workers  
- Products  
- Markets | Explains how kampong conditions can support the economy of the citizens in the kampong |

3. Method

This study uses a qualitative approach that combines research and design. To resolve the problem in kampong lontong, a waste treatment system is needed to accommodate daily waste production by maximizing available space. This study uses a post-positivist method of identifying and mapping potential and existing problems and analyzing and designing waste management systems that are integrated with community activities. This study proposes a waste management system that can optimize the available space in the settlement and make the kampong look neater and more beautiful. In addition to restructuring the area, the waste management process is carried out by empowering the community so that by products from waste processing can provide additional income for the residents.
The research techniques used are qualitative data collection techniques of observation and interviews. Field observations were conducted with direct observations of the study area. This method captures the existing and real conditions of the study area. Some of the items for observation are the physical condition of the kampung and the environment. The method of analysis used is a SWOT analysis which is a qualitative descriptive analysis. The SWOT analysis will identify the various relevant factors in formulating the strategy. This analysis is based on the premise of maximizing strength and opportunities but, at the same time, minimizing the weakness and threats. The concept and design strategy are based on a total score of internal and external factors, by using an Internal-External Matrix Model [7]. This study will analyze the potential problems and use them as a basis for designing concepts later on.

4. Result and Discussion
4.1. General Condition of Study Area
Banyu UripLor is one of the kampungs in Surabaya, which is part of the Prominent Kampung (Kampung Unggulan) program. This Kampung seeks to improve the community’s economy via Home-Based Enterprises or also known as Productive Houses. In this kampung program, almost every inhabitant produces the same product. Banyu Urip Lor or better known as Kampung Lontong provides lontong for all of Surabaya.

Before Banyu Urip Lor became known as Kampung Lontong, it used to produce tempeh. However, the residents gradually began to switch to producing lontong as it is easier to make and generates a higher income. However, the density of buildings in Kampung Lontong is very high so there is no left space that can be used for processing waste from the lontong production. Figure 1 shows the map of Kampung Lontong.

4.2. Existing Management and the Amount of Daily Waste
The existing method of waste management is a traditional one, which meant that waste was discarded in trash bins and then transported. There is no method of processing and if waste transportation is late, the waste can pile up and stink.

A family can sell approximately 700-2000 units of lontong per day IDR 800-2000 per unit of lontong. This means that a family can generate an income between IDR 560.000 to IDR 4.000.000 per day. Yet, the production of lontong causes a major problem, due to the waste of banana leaves – the material for packaging lontong. The residents generate a total of ± 100kg of waste (± 4kg per house) of banana leaves daily. However, the residents cannot handle this waste so they must pay for disposing it to the garbage dumpsite.
4.3. The Potentials of Community Involvement and Local Institutions in Waste Management

The people of Kampung Lontong are open-minded to new ideas which is a potential that can be fostered to support kampung development. This is a potential for lontong production, organic waste management, and tourism. However, this potential comes not only from the local culture but also from the local institutions. Some of the existing local institutions in Kampung Lontong include the Youth Organization, Women Neighborhood Association (known as PKK), and Qur’an recitation groups for children and adults. Not all residents are in the lontong-making business, so those residents can take on other active roles in the kampung via the local institutions.

One aspect that needs to be considered in environmental management is the availability of local institutions that can handle, regulate, and be responsible for waste management. One of the institutions with the potential for managing waste is the Youth Organization. Besides having enough time, members of the Youth Organization need activities that allow them to play an active role in the kampung. Moreover, they can earn extra income from these activities. The Youth Organization group can later be developed into a local institution that manages a variety of tour activities in this kampung. They can take on this role if the kampung later would develop into a tourism kampung to develop a management business. Community readiness certainly needs to be improved, in terms of quality and quantity.

4.4. SWOT Analysis of The Condition and Potential of People Empowerment in Kampung Lontong

To analyze the internal and external factors for waste management in Kampung Lontong, a SWOT analysis was made as described in the following sub-sections.

4.4.1. Internal Factor Analysis at Kampung Lontong. From the discussion regarding sustainable waste management, several internal factors that are found in lontong village are as follows:

1. Environmental aspects in this study area consist of the availability of the raw material (banana leaf), narrow roads and difficult access, as well as the lack of open land for waste processing.
2. Social aspects, such as solidarity and cooperation in the community, an open and forward-looking society, there is a group of youth who can and are willing to contribute to their village.
3. Cultural aspects, including residents using public places to run their businesses, thus, reducing available land for waste management, the habit of letting garbage accumulate so that the environment becomes dirty and smelly.
4. Economic aspects: lontong production is the main livelihood for many families.

Based on the description of the potentials and problems of Kampung Lontong, the internal factors that become the strengths and weaknesses of this kampung for managing lontong packaging waste can be described in the matrix as follows:

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**Table 2. Internal Factor Matrix.**

| Internal Strategic Factor                                      | Weight | Rating | Score |
|---------------------------------------------------------------|--------|--------|-------|
| **STRONG**                                                    |        |        |       |
| 1. Raw material in the form of sufficient supply of banana leaves | 0.10   | 4      | 0.4   |
| 2. Solidarity and cooperation in the community.               | 0.15   | 4      | 0.6   |
| 3. An open and forward-looking society.                       | 0.10   | 3      | 0.3   |
| 4. There is a group of youth who can and are willing to contribute to their village | 0.15   | 3      | 0.45  |
| 5. This activity generates income.                            | 0.10   | 2      | 0.2   |
| **WEAKNESS**                                                  |        |        |       |
| 1. Lack of open land for waste management.                    | 0.1    | 2      | 0.2   |
| 2. The road is narrow, making access difficult.               | 0.1    | 1      | 0.1   |
| 3. Residents use public places to run their businesses, thereby reducing land for waste management. | 0.1    | 2      | 0.2   |
| 4. The residents do not have experience in managing waste around their homes. | 0.05   | 1      | 0.05  |
| 5. The habit of letting garbage accumulate so that the environment becomes dirty and smelly. | 0.05   | 1      | 0.05  |

**TOTAL WEIGHT AND SCORE**  
1 2.55

### 4.4.2. External Factor Analysis at Kampung Lontong

In addition to internal factors, there are five main external factors that can become opportunities and five main factors that pose threats to the waste management plan in Kampung Lontong. The discussion of the external factors for sustainable waste management in Lontong village is as follows:

1. Environmental aspects of this study area comprise a lack of land availability.
2. Social aspects consist of the introduction of the products directly to the public/agencies/community institutions as potential users and products that are not yet known in the community.
3. Cultural aspects: public awareness of the use of organic fertilizers instead of chemical fertilizers is quite good.
4. Economic aspects: there is high demand for rice cakes from all over Surabaya; there is a location where waste processing product can be marketed to; the demand for organic fertilizer is quite high; there still needs to be a cooperation agreement with prospective sellers; relatively low selling price; the quality of fertilizers is not yet tested; the products still need to be tested/promoted to the community. The matrix below analyzes the external factors that pose opportunities and threats.
Table 3. External Factor Matrix.

| External Strategic Factor                                      | Weight | Rating | Score |
|---------------------------------------------------------------|--------|--------|-------|
| **OPPORTUNITIES**                                             |        |        |       |
| 1. High demand for rice cake from all over Surabaya.          | 0.12   | 5      | 0.6   |
| 2. There is a location where waste processing products can be marketed to. | 0.12   | 4      | 0.48  |
| 3. Introduction of products directly to the public/agencies/community institutions as potential users. | 0.05   | 3      | 0.15  |
| 4. The demand for organic fertilizer is quite high.           | 0.1    | 3      | 0.3   |
| 5. Public awareness of the use of organic fertilizers instead of chemical fertilizers is quite good. | 0.1    | 3      | 0.3   |
| **THREATS**                                                   |        |        |       |
| 1. There still needs to be a cooperation agreement with prospective sellers. | 0.12   | 1      | 0.12  |
| 2. The selling price is relatively low.                       | 0.08   | 1      | 0.08  |
| 3. Products that are not yet known in the community.          | 0.1    | 1      | 0.1   |
| 4. The quality of fertilizers still not tested.               | 0.11   | 1      | 0.11  |
| 5. The products still need to be tested/promoted to the community. | 0.1    | 1      | 0.1   |
| **TOTAL WEIGHT AND SCORE**                                    |        |        |       |
|                                                              | 1      |        | 2.34  |

4.4.3. Strategic Plan for WASTE Management in Kampung Lontong. Based on the internal-external matrix, the total internal factor matrix value is 2.55 and the external factor value is 2.34. Thus, the appropriate waste management strategy for Kampung Lontong is the retraction with quadrant divestment strategy 5 which is concentration through horizontal integration or profit stability and strategy [7].

Table 4. Strategic Plan of Waste Management in Kampung Lontong by using External-Internal Matrix

| INTERNAL FACTOR                  | High (3.0 – 4.0) | Medium (2.0-3.0) | Low (1.0- 2.0) |
|----------------------------------|------------------|------------------|----------------|
| 1. GROWTH                        |                  |                  |                |
| 2. GROWTH                        |                  |                  |                |
| 3. RETRENCHMENT                  |                  |                  |                |
| 4. STABILITY                     |                  |                  |                |
| 5. GROWTH                        |                  |                  |                |
| Concentration through horizontal integration or profit stability strategy |                  |                  |                |
| 6. RETRENCHMENT                  |                  |                  |                |
| 7. GROWTH                        |                  |                  |                |
| 8. GROWTH                        |                  |                  |                |
| 9. LIQUIDITY                     |                  |                  |                |

4.5. Concept and Strategy
With the position at point no 5, several of the waste management concepts that can be proposed areas follows:
1. Utilizing the narrow strip of land by managing waste at the side of the kampung road.
2. Making attractive designs.
3. Multi-functional design so that the place can still be used for other purposes.
4. The available open space is used for packing and processing the final product. Some strategies that must be prepared for empowerment and community participation are as follows:
   1. Preparing the community by providing guidance on how to process and make compost from banana leaf waste.
   2. Providing infrastructure to support composting.
   3. Promote and capture marketing opportunities outside the kampung by empowering the community and related stakeholders, even local governments.
   4. Utilizing youth and women’s organizations for the process and marketing products.

The concept for waste management based on community participation can be seen in the following diagram (Figure 2.)

![Figure 2. Conceptual Diagram of Waste Management based on Community Participation](image)

To manage the banana leaves waste there are four types of users with different tasks, such as the kampung dwellers, the youth organization in that kampung, other relevant stakeholders, and the public/consumers. The kampung dwellers should save their banana leaf waste and chop it in the assigned chopping area. It then needs to be composted for ±2 weeks before it can be delivered to the store. The Youth Organization needs to help the kampung dwellers in chopping the leaf wastes. Afterward, they can help the kampung dwellers to package their compost and sell it. The other stakeholders can help to promote the compost and manage the income to distribute the profits to the stakeholders in the kampung. They can also facilitate the recycling of the banana leaf waste, and give donations to support it. The product is targeted for public consumption.

Processing the banana leaf waste makes the environment look tidier and adds income for the kampung dwellers and the young organization. Moreover, leaf waste can be recycled into compost. To manage ±100kg of banana leaf waste per day, a weekly routine schedule is needed for chopping leaf waste, composting it, and delivering it to the store. Every two weeks, the kampung will chop the waste leaves and put it to compost tubes. The scheme of the composting process is shown in Figure 3.

![Figure 3. The scheme of the composting process](image)

5. Conclusion
This study deals with the waste management problem in Kampung Lontong and proposes a strategy to reduce the leaf waste by using a composting system by empowering the community. The inhabitants can participate in the management of the banana leaf waste treatment plan. They can support every stage of the waste treatment process: in the pre-processing (separating the waste), waste processing (composting) and post-processing (selling the product).

The banana-leaf waste problem can be resolved by arranging the stakeholders for waste management. Four types of stakeholders are involved in banana leaf waste management, i.e., the
inhabitants of the village, the local institutions, outside stakeholders (universities, the Surabaya local government), and private companies (using CSR).

Local institutions can also learn about government regulations for home-based enterprises, community empowerment, waste treatment processing, and product marketing. Income generated from selling the waste products can be used to improve the kampung’s facilities and the financial situation of the youth organization. Lastly, information regarding the importance of using organic fertilizer as opposed to chemical fertilizers needs to be disseminated to the public to further increase market demand for organic fertilizer.

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