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THE EFFECTIVENESS OF WOMEN'S EMPOWERMENT IN AEROBIC COMPOSTING

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Abstract

This study aimed to identify the level of effectiveness of women's empowerment in household waste management based on the use of aerobic composting in environmental management. The data analysis included importance performance analysis (IPA) to describe the levels of satisfaction, productivity, and expectations of the community about the use of aerobic composting to evaluate the effectiveness of the activity. The results show that the productivity and importance level of aerobic composting activity was in Quadrant I (keep up the good work and maintain achievement). It is expected that the performance of waste management activities using aerobic composting systems will be maintained by empowering the community, especially the role of women. Thus, an activity that involves the active role of women in implementation shows high results regarding effectiveness, with the direct utilization of waste from the source, i.e., household waste, and this could reduce household waste generation.

Keywords: aerobic composter domestic waste, empowerment of women, environment, waste management

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1. Introduction

In the current global situation, environmental issues are very important to be discussed. One of them is the substantial waste issues that have consistently been a significant factor in various regions. In particular, the level of environmental pollution is very alarming. Ministry of Environment and Forestry data show that total solid waste in Indonesia has reached 187.2 million tons per year. The increase of population density and limited land to accommodate leftovers and midden are among the factors causing the increase of volume of solid waste (Lirofiatillah et al., 2018; Ulman and Dobay, 2020). The stable waste generation of East Java in 2016 amounted to 17,394,879.20 kg/day or 6,349,130,908 tons/year, assuming 60% of the organic waste composition and 14% of plastic waste (EAEJP, 2016). The population of East Java comprises 38,847,561 persons, with 12.93% are classified as poor residents. An increase in population has directly affected the amount of stable waste, as well as the expansion of the amount of substantial waste that is not supported by environmentally friendly management. This will ultimately cause environmental destruction and pollution.

To ensure healthy living conditions and prosperity in society in the future, it is necessary to have a healthy environment. According to National

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Law Number 18/2008 regarding waste management in Indonesia, waste is a national issue so its handling is necessary to be done comprehensively and integrated from upstream to downstream in order to provide economic benefits, be healthy for the community, be safe for the environment, and can change the community behavior (Dobiki, 2018). To attain the effectiveness and high efficiency in stable waste handling, its management should be entirely feasible regarding its application. It is expected to have an advantage. This can be achieved by selecting the appropriate ways of handling the waste and technology, socializing to the community (as the source of such solid waste) and cooperating with the government.

Based on the origin, solid waste can be classified into two categories: (i) organic waste is generated from biological materials that can be degraded by microbes; (ii) inorganic waste is generated from non-biological materials (Abdel-Shafy and Mansour, 2018). The presence of organic waste is inevitable in the community environment. However, an increase in the amount of solid waste without processing can have an adverse impact on the environment. Organic waste can decompose and break down into smaller and odorless material (often called compost) (Ayilara et al., 2020). One of the efforts in controlling the volume of solid waste that is usually carried out on the household scale is the utilization of organic waste as compost.

Composting is one method that has long been used to manage solid organic waste, especially from household activities, with the primary target of producing organic fertilizer in the form of compost (Yu et al., 2019). There are various types of composting that can be used by the community. One such composting that is easy to manufacture at low cost is the barrel-based composting. It can be made by storing organic waste in a barrel until it is full and then stored for more than 6 months (Mulyani, 2014). To reduce composting time, the development of a composting model, which is essentially an improvement in composting and composter processing is required. This research will develop an aerobic composting model and design a simple composter that can be effective for the aerobic process. This aerobic composting is odorless, fast composting time, and the compost is more hygienic (CPIS in Rochaeni et al., 2003). The composting method developed will be done easily by non-academic people. It will be simple, lessen the measuring instruments but have high effectiveness (Gonawala and Jardosh, 2018).

The participation of the community in solid waste management can increase the public awareness of the importance of a green, clean, and hygienic environment, and also strengthen the community initiatives in implementing, maintaining and improving the environmental functions. The participation of the community in solid waste management entails the active involvement of the community in the process of waste management, including its disposal and transport, as well as fostering a sense of awareness and responsibility to achieve a clean and healthy environment.

In many previous studies, solid waste management has only employed the principles of reducing, reuse, and recycle (3Rs) (Asteria and Heruman, 2016). In contrast, this study uses a process of review, implementation, and public education for the implementation and development of solid waste management using aerobic composting constructed by means of the participation-emancipator method.

The emphasis in this study and its novelty is the focus on community empowerment in solid waste management, in particular, its gender perspective, i.e., women. Considering the role of women is essential regarding social capital. Women can mobilize individuals and the community to participate and be active in environmental management (Blocker and Eckberg, 1997).

The background described above makes this an essential study. This research aims to identify the effectiveness of women's empowerment in household waste management based on the use of aerobic composting in the framework of settlement environment management, as well as efforts to reduce stable waste generation by processing it to provide something that is of economic value and beneficial to the community.

2. Material and methods

2.1. Study design

The study is quantitative and descriptive. According to Sugiyono (2006), the definition of quantitative research is that it employs methods based on a positivist philosophy, and it is used to examine a specific population or sample. The sampling techniques were generally performed randomly and data collection used specific research instruments. Data analysis is quantitative, or statistical, with the purpose of testing a predefined hypothesis or hypotheses. Quantitative research aims to provide a reasonably clear picture of the issues examined. In this study, the researchers obtained data using close-ended items in a questionnaire, yielding values to be calculated statistically.

The data types and sources were primary and secondary data. Primary data were directly obtained from the data source at the study location and the study object, while the secondary data sources were obtained from another source (Bungin, 2008). The data collection included observation, interviews, a questionnaire, and documentation.

2.2. Population and samples

The population in this study comprised Kedawung Kulon Village, Sumber Agung Village, Ranu Klindungan Village, and Sumber Dawesari Village, in the Grati sub-district, Pasuruan District, East Java Province. Non-probability sampling was employed. It means that the sampling technique did

not provide the same opportunities for each member of the population to be selected for the sample and the results are thus only a rough approximation of the situation.

Quota sampling was used, i.e., considering members of the population with specific characteristics until the amount (quota) that has been set or desired was reached. The sample was set at 60 respondents, incorporating the provisions that all those sampled were females of various ages involved in the implementation of waste management based on the use of an aerobic composting in Kedawung Kulon Village, Sumber Agung Village, Ranu Klindungan Village, and Sumber Dawesari Village, in the Gratis sub- district, Pasuruan District, East Java Province.

2.3. The target of activity area

The target area regarding study location encompassed Kedawung Kulon Village, Sumber Agung Village, Ranu Klindungan Village, and Sumber Dawesari Village, in the Grati sub-district, Pasuruan District, East Java Province. The Grati sub-district comprises lowland up to a highland area with a slightly oblique ground surface to the east and north of 0–3%. The administrative boundaries of the district are Rejoso sub-district and Lekok sub-district in the northern, Nguling sub-district in the eastern, Rejoso sub-district in the western, and Lumbang sub-district in the southern.

2.4. Flowchart of the activity

The study of the effectiveness of women's empowerment in household waste management based on aerobic composting is described on Fig. 1.

2.5. Implementation stages

The implementation of the waste management involved the formation of environmental groups from local environmental groups and non-governmental organizations (NGOs), environmental cadres, youth organizations, family welfare organizations, and LPM villages (Kedawung Kulon Village, Sumber Agung Village, Ranu Klindungan Village, and Sumber Dawesari Village) in the Grati sub-district, Pasuruan District, East Java Province. Socialization which consists of counseling and training in each village related to the activities and implementation process entailed in aerobic composting was then conducted, focusing on the positive impact.

The implementation of the activity of waste management using aerobic composting was undertaken through women's empowerment among the residents of Kedawung Kulon Village, Sumber Agung Village, Ranu Klindungan Village, and Sumber Dawesari Village, in the Grati sub-district, Pasuruan District, East Java Province. In this process, each environmental group sorted organic and inorganic waste then collected the organic waste.

The community, accompanied by counseling workers, installed aerobic composting barrels in each village, which were then filled with the organic waste collected and divided. Communities were invited to participate directly in the implementation process of aerobic composter activities.

2.6. Data analysis

Descriptive analysis was employed as a quantitative technique. This is the most basic type of statistical analysis used to describe the state of data in general. The researchers analyzed the data from each instrument, i.e., observation and interviews, to describe the reality of the field. Also, importance-performance analysis (IPA) was employed to describe the levels of satisfaction about expectations on the part of the community about aerobic composting activities to determine the effectiveness of household waste management based on aerobic composting activities through women's empowerment.

IPA is an analytical method that combines aspects of importance and perceptions of quality or the condition of an object in a two-dimensional form.

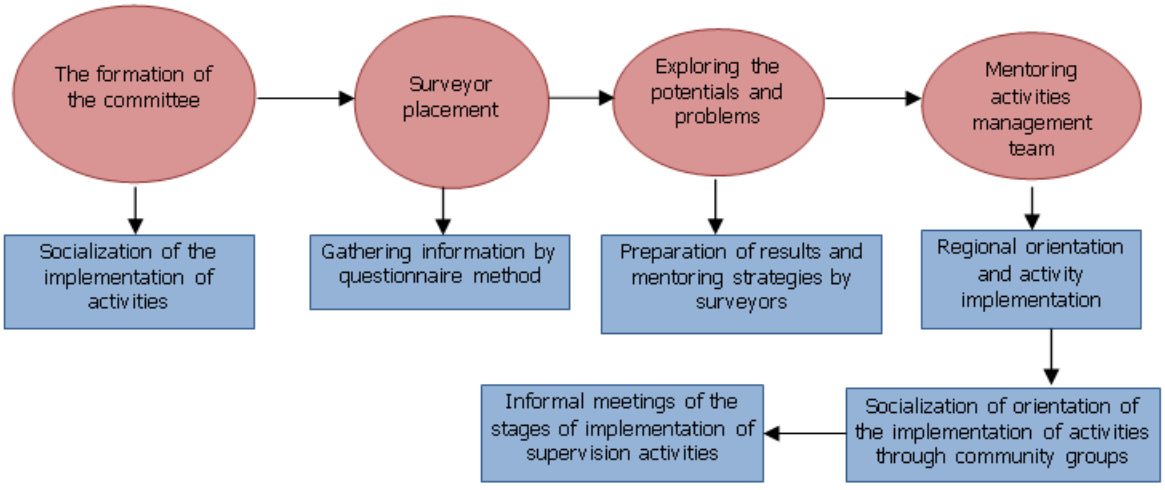

Fig. 1. Scheme of research activity

The IPA model, first introduced by Martilla and James (1977), aims to measure the relationship between perceptions and improvements regarding priority. The results of the assessment of perception of importance and performance will produce a calculation of the level of conformity regarding importance and level of implementation. There are two parameters in this analysis, represented by the *X* and *Y* axes, where the *X*- axis denotes perceptions, not in favor of the productivity of aerobic composting activities in the territory of the village regarding providing satisfaction to the community, while the *Y*-axis denotes the importance of aerobic composting activities. The importance level, in this case, represents the importance according to the community concerning aerobic composting activities for household waste management. The IPA results obtained from questionnaires distributed to research area were tabulated based on the answers provided by all of respondents. The steps carried out in the IPA analysis were as follows. This study used a five-point Likert-type scale, as commonly used in the research that involves the measurement of attitudes, beliefs, values, and opinions of users/consumers concerning object conditions. The scales used in this study were:

- fundamentally "essential/very satisfied" (=5),
- "important/satisfied" (=4),
- "neutral/hesitant" (=3),
- "unimportant/dissatisfied" (=2),
- "very unimportant/very dissatisfied" (=1).

The values for each item were processed and the means calculated to obtain the level of importance and the quality of the attributes used for the analysis of satisfaction and importance related to the productivity and importance of aerobic composting activities (Table 1).

2.7. Tabulation

The answers of all respondents in the questionnaires distributed were tabulated based on the following steps:

- Performing a comparison of the average performance value and the average importance value. This was obtained by dividing the total value of performance/importance by the number of respondents. The total value of performance/importance was obtained by summing the values for each component making up the performance/importance according to all responses.
- Calculating the conformity level based on comparing the level of importance/expectations (importance) with the performance level (performance). The level of conformity will determine the order of priority of improvement factors that may affect the quality of service. The formula used is shown below (Eq. 1).

$$TKI = \frac{\sum Yi}{\sum Xi} \quad (1)$$

where: *TKI* denotes the level of the respondent's suitability, *Xi* denotes the performance appraisal scores, *Yi* denotes the scores for respondents' expectations.

Regarding testing criteria:

- *TKI*<100% means the service has not been satisfactory.
- *TKI*=100% means the service has been satisfactory.
- *TKI*>100% means the service is very satisfactory.

The hypothesis was that the average value of performance would be above the average value of importance/expectations, and the level of compliance above 100% (*TKI*>100%). Hypothesis testing was undertaken using the above IPA calculation and the Cartesian diagram and was carried out by calculating the average value of performance/importance per service quality variable, obtained from the total average performance/importance according to the assessment respondents divided by the items/attributes in the questionnaire per service quality variable.

Table 1. Attributes of satisfaction and importance related to the productivity and importance of aerobic composter activity

No	*Attributes name*
1	The effectiveness of aerobic composter socialization and workshops
2	The ability of aerobic composter material presenters
3	Ease and clarity of aerobic composter material delivery
4	Suitability of socialization and workshop materials about aerobic composter application techniques
5	Ease of communication in responding to questions/obstacles within the community in aerobic composter application
6	Convenient examples of composting practice provided
7	The team provides comprehensive and thorough service in aerobic composter practice
8	Complete aerobic composter facilities provided
9	Ease of use of tools and equipment
10	Ease of implementation of the aerobic composter
11	The effectiveness of using the aerobic composter in organic waste management
12	The effectiveness of organic waste reduction
13	Community participation level in aerobic composter activities
14	Benefit value of aerobic composter activities
15	The willingness of the community to care for the aerobic composter

The average performance/importance value per service variable is shown in the Cartesian diagram presented in Fig. 2.

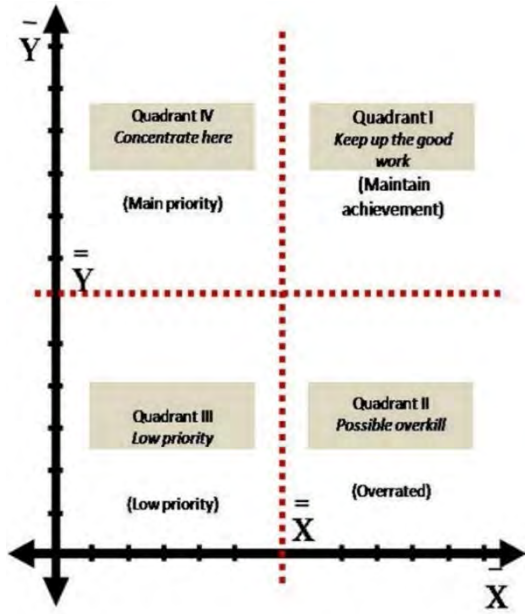

Fig. 2. Importance-performance analysis (IPA)

The average value of importance and performance level is used to determine the points in the quadrant. The next interpretation is a combination of the values of importance and quality levels for each attribute. The interpretation of the quadrant as follows:

I. Keep up The Good Work

In this quadrant, there are factors that are considered important and are expected to be a supporting factor of community satisfaction so that the implementer of the activities is obliged to maintain the performance achievements.

II. Possibly Overkill

In this quadrant there are factors that are considered not too important and not too expected by the community so that the implementer of the activity is better to allocate the resources associated with these factors to other factors that have a higher priority level.

III. Low Priority

In this quadrant there are factors that are considered to have a low level of perception or actual performance and are not too important and or not very expected by the community so that the implementer of the activity does not need to prioritize or pay more attention to these factors.

IV. Top Priority (Concentrate Here)

In this quadrant there are factors considered important and or expected by the community but the performance of the project implementers is considered to be unsatisfactory, so the activity implementers need to concentrate on allocating their resources to improve the performance entered into this quadrant.

3. Results and discussion

3.1. Regional overview

Grati sub-district in Pasuruan District is located between the Rejoso, Lekok, Nguling, Winongan, and Lumbang sub- districts. It is bordered by the Nguling sub-district to the southern by Lumbang sub-district. The area comprises lowland to highland with an altitude ranging from 0 m to 100 m above sea level, with slightly sloping ground from the east to the north of 0–3%. A general description of the region regarding population characteristics in the four villages is given in Table 2. Those 4 villages were chosen because they have had solid waste management activities and the community has a high interest in waste management.

Table 2 shows that the village with the highest population is Sumber Dawesari, with 9,235 souls, but it has the lowest population density of 1,516.17 inghabitants/ha due to covering the most extensive area compared to other villages; the village with the lowest population is Sumber Agung, with 3,607 inhabitants, but it has the highest population density of 2,730.51 inhabitants/ha. The population data for the four locations of activities based on gender are given in Table 3. This Table shows that two villages have a higher male population than female, i.e., Kedawung Kulon and Sumber Dawesari, while the two other villages have higher a female population than male. The gender of the populations in the four locations influences societal participation in carrying household waste management. Women were more dominant in waste management activities entailing composting, sorting organic and inorganic waste generated by daily household activities. Women's participation in domestic waste management is needed to create good environmental quality (Chaesfa and Pandjaitan, 2013).

High community participation can encourage a paradigmatic change related to waste, and can have economic value and encourage the community to maintain a healthy and hygienic settlement environment.

Table 2. Village size, total population, and population density in 2014

Village	*Area (×10 km^2)*	*Total population*	*Population density (per Ha)*
Kedawung Kulon	2.85	6,202	2,173
Sumber Agung	1.32	3,607	2,730
Ranu Klindungan	1.70	3,953	2,328
Sumber Dawesari	6.09	9,235	1,516

Table 3. Number of households and population by gender per village

No	*Village*	*Number of households*	*Total population male*	*Female*	*Total*
1	Kedawung Kulon	1,099	3,189	3,013	6,202
2	Sumber Agung	988	1,785	1,822	3,607
3	Ranu Klindungan	1,083	1,933	2,020	3,953
4	Sumber Dawesari	2,530	4,717	4,518	9,235

3.2. Existing condition of waste system

At the various locations, the dominant source of waste is solid waste originating from the village settlement and roadsides, including garbage generated from kitchens, tree waste in yards, and waste generated by other household activity. These waste products were then processed using aerobic composting systems in each village location employing up to two aerobic composting barrels thus, management comprised a standard or environmental unit, inviting the community to work together in processing waste. The process of waste management in Kedawung Kulon, Sumber Agung, Ranu Klindungan, and Sumber Dawesari continued predominantly in the traditional manner, either burning garbage or collecting it to be transported to temporary dump site for final transportation to the landfill. This results in sizable budgetary expenditure require a vast uptake of land and entail high environmental pollution. The flow process of such waste management is portrayed in Fig. 3.

However, in Sumber Dawesari, some hamlets/neighborhoods conducted waste management using the composting system in several environmental units and employed the Takakura system in each house, carried out by the housewife. Thus, the Sumber Dawesari community performed the sorting of organic and inorganic waste, contributing to reductions in the amount of organic waste. Sumber Dawesari also has an environmental park and plant nursery, the latter located at the former largest temporary dump site (TDS), where there was often substantial waste dumping, causing an unpleasant odor from solid waste, pollution of the environment, and soiling of the environmental aesthetics. With the active participation of local women aimed at improving the TDS environment, the plant nursery was created, and the community was forbidden from disposing of waste in that location. The community plays an active role in growing various types of crops, including toga plants (family medicinal plants/physic garden), vegetable crops, fruit crops, and others, which are then distributed in several environmental units to be developed and maintained by the community. Regarding the environmental park located in Sumber Dawesari, there are also some good crops of the toga, vegetables, and fruit that are sold to the surrounding community, with the sales contributing to environmental funds. Thus, in Sumber Dawesari there is already proper environmental management with women playing a high influential role.

Sumber Dawesari is also actively participating in environmental competitions and has won several. It is expected to be an example in the future and to mobilize other regional communities to play an active role in the environment by starting to undertake waste management. Waste management in the community can be started by sorting household waste into the rotting garbage (organic waste), and garbage that does not decompose (inorganic waste), especially with the application of aerobic composting for reuse. In principle, the source approach means reduced waste products are delivered to the final processing site. Thus, there can be reductions in waste through waste sorting and the application of 3R principles (reduce, reuse, recycle) (Nizaar et al., 2020).

3.3. Stage of implementation

The communities of Kedawung Kulon, Sumber Agung, Ranu Klindungan, and Sumber Dawesari participated actively in the socialization process and workshops concerning the use of aerobic composting. The participants were predominantly housewives and women of the family welfare organization. In the socialization sessions and workshops, counseling workers explained the techniques for using the aerobic composting barrels given to each village (Fig. 4).

The community directly practices the composting techniques based on the socialization and workshops provided. The community was given plant seeds and manure for greening the environment. The activity is shown in Fig. 5. The activity included workshop participant took plant seeds and compost fertilizer per village, (b) workshop participants took plant seeds and compost fertilizer per village and (c) community practiced composting with aerobic composting fertilizer.

The next step is practice performed directly in each village in the use of the aerobic composting barrels provided, accompanied directly by the Aerobic Composting team. This is undertaken to ensure that the application of aerobic composting is according to prescribed procedures and that they can be implemented by the community for composting. Very high levels of public participation in the program of aerobic composting activities increase community spirit in protecting the environment through waste management. There were some village areas that directly practice composting by utilizing kitchen waste from household activities and employ manure owned by community residents processed in aerobic composting vats. Thus, it is expected that the use of aerobic composting can be sustainable and used as functionally as intended. Direct assistance is provided by the Aerobic Composting team in the installation of aerobic composting device, as shown in Fig. 6.

Fig. 3. Waste management in Kedawung Kulon, Sumber Agung, Ranu Klindungan, and Sumber Dawesari

Fig. 4. The presentation of composting techniques using aerobic composter

Fig. 5. The active role of the community in practicing aerobe composting: a) Workshop participant took plant seeds and compost fertilizer per village, b) Workshop participants took plant seeds and compost fertilizer per village and c) Community practiced composting with aerobic composting fertilizer

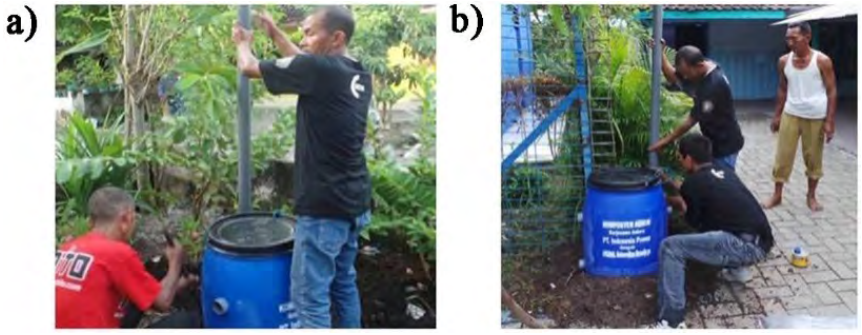

Fig. 6. a) Installation of an aerobic composting in Kedawung Kulon
b) Installation of an aerobic composting device in Sumber Agung

Table 3 shows the calculations of the average values of perceptions concerning the productivity of aerobic composting activity and the average level of importance of aerobic composting activity for each quadrant. The results are shown in the form of two kinds of IPA graphics. The first graph uses the average value on a scale measuring the perception level against the productivity of aerobic composting activity and the importance level of aerobic composting activity as the dividing line between the quadrants. The next step is to perform an attribute translation based on an IPA diagram or Cartesian diagram. IPA was obtained from the results of the questionnaire distributed to the villagers of the planning area by tabulating answers to all respondents from Kedawung Kulon Village, Sumber Agung Village, Ranu Klindungan Village and

Sumber Dawesari Village. The results of IPA as follows.

Tables 4 and 5 show the results of the average value of perception of aerobic composter activity productivity and the average importance level of aerobic composter activity for each quadrant. The calculation results are displayed in the form of two kinds of science charts. The first graph uses the average value on the scale of measurement of the level of perception of the productivity of aerobic composter activities and the level of importance of aerobic composter activities as a dividing line between quadrants. The next step is to elaborate the attributes based on the Importance Performance Analysis diagram or Cartesian diagram.

The Cartesian diagram is a structure that is divided into four sections bounded by two lines intersecting the X and Y axes, where X is the average score for the implementation level of all factors and Y is the average score for the importance of all factors that affect customer satisfaction (Supranto, 2001). The assessment of expectations concerning aerobic composting activities and perceptions of their productivity in each location is presented in the Cartesian diagram in Fig. 7.

The Cartesian diagram in Fig. 7 shows that the results for the productivity and importance of aerobic composting activity in Kedawung Kulon, Sumber Agung, Ranu Klindungan, and Sumber Dawesari are in Quadrant I, i.e., "keep up the good work" (maintain achievement). The calculation shows that Quadrant II (possibly overkill), Quadrant III (low priority), and Quadrant IV (concentrate here) did not meet the actual condition of this community. Meanwhile, Quadrant I most fulfills the expectations of the community. It also explains that the attributes in the assessment of IPA were in accordance with the perceived and actual factors considered essential in supporting community satisfaction, so it is expected that the performance of waste management activities through composting using the aerobic composting system will be maintained as a form of community empowerment.

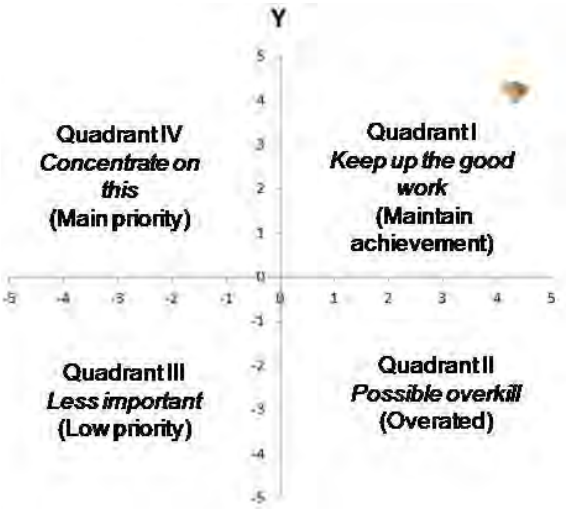

Fig. 7. Cartesian diagram of productivity and satisfaction from aerobic composting activity

Table 4. Results of performance appraisals of aerobics composter activity and satisfaction

No	*Attribute*	*Xi*			
		Ranuklindungan Village	*Sumber Dawesari Village*	*Sumber Agung Village*	*Kedawung Kulon Village*
1	Effectiveness of aerobic composter socialization activities and workshops	4.47	4.47	4.27	4.47
2	The ability to present aerobic composter material	4.47	4.47	4.33	4.47
3	Ease and clarity of delivery of aerobic composter material	4.40	4.40	4.20	4.40
4	The suitability of the socialization and workshop materials with the technique of applying aerobic composter	4.53	4.53	4.53	4.53
5	Ease of communication in responding to questions / constraints of society in the application of aerobic composter	4.53	4.53	4.40	4.53
6	Ease of examples of composting practice given	4.47	4.47	4.47	4.47
7	The team provides a comprehensive and thorough service in the practice of aerobic composter	4.13	4.13	3.87	4.13
8	Aerobic composter equipment facilities are provided	4.20	4.20	4.13	4.20
9	Ease of use of tools and equipment	4.40	4.40	4.27	4.40
10	Ease of implementing aerobic composter	4.27	4.27	4.27	4.27
11	Effectiveness of the use of aerobic composter in the management of organic waste	4.33	4.33	4.33	4.33
12	Effectiveness of reducing organic waste	4.27	4.27	4.27	4.27
13	The level of community participation in aerobic composter activities	4.33	4.33	4.20	4.33
14	Value of benefits from aerobic composter activities	4.27	4.27	4.27	4.27
15	Willingness of the community in treating aerobic composter	4.40	4.40	4.40	4.40
Average		**4.36**	**4.36**	**4.28**	**4.36**

Table 5. Results of the assessment of the importance of aerobic composter activity

No	*Attribute*	*Yi*			
		Ranuklindungan Village	*Sumber Dawesari Village*	*Sumber Agung Village*	*Kedawung Kulon Village*
1	Effectiveness of aerobic composter socialization activities and workshops	4.27	4.13	3.87	4.40
2	The ability to present aerobic composter material	4.53	4.20	4.13	4.27
3	Ease and clarity of delivery of aerobic composter material	4.40	4.40	4.27	4.33
4	The suitability of the socialization and workshop materials with the technique of applying aerobic composter	4.07	4.27	4.27	4.27
5	Ease of communication in responding to questions / constraints of society in the application of aerobic composter	4.53	4.33	4.33	4.33
6	Ease of examples of composting practice given	4.33	4.27	4.20	4.27
7	The team provides a comprehensive and thorough service in the practice of aerobic composter	4.40	4.33	4.53	4.40
8	Aerobic composter equipment facilities are provided	4.07	4.27	4.40	4.47
9	Ease of use of tools and equipment	4.40	4.40	3.87	4.47
10	Ease of implementing aerobic composter	4.33	4.40	4.13	4.40
11	Effectiveness of the use of aerobic composter in the management of organic waste	4.20	4.53	4.27	4.53
12	Effectiveness of reducing organic waste	4.33	4.53	4.27	4.53
13	The level of community participation in aerobic composter activities	4.27	4.47	4.33	4.47
14	Value of benefits from aerobic composter activities	4.33	4.13	4.27	4.13
15	Willingness of the community in treating aerobic composter	4.33	4.27	4.33	4.20
Average		**4.32**	**4.33**	**4.23**	**4.36**

Thus, the attributes as in Tables 4 and Table 5 are important factors in solid waste management at the location of the activity and the executor of the activity can maintain the existing waste management activities. Also, the management are better developed with diverse innovations in processing waste for the creation of a clean and healthy residential environment.

As noted by Budianto (2013), the perspective of consumers shows that the product attributes are highly significant in determining levels of satisfaction. Thus, the company has to employ these attributes to maintain its position as they attract the consumers in the first place. In this study, the location of the four areas of activity in Quadrant 1 shows the same assessment, reflecting the same level of participation of all communities in aerobic composting.

Thus, household waste management based on aerobic composting presents highly effective results. Indeed, waste management activities that utilize direct waste from the source, i.e., household waste sorted with the involvement of women or housewives, can contribute to the reduction of household waste generation, and ensure the role of women in maintaining and managing their settlement environment.

One of the critical roles of women's participation in society can be seen in the management of their environment (Chaesfa and Pandjaitan, 2013). Women can participate in the reduction of environmental pollution by deciding to use environmentally friendly household products. Suprapto (1990) points out that women can also participate as "clean environment" agents by providing education and insight to families, especially children, about the environment. Such education can be a lesson for them not to litter. Dana also argues that women can become environmental educators. Women, especially mothers, are the first educational media for children (Dana, 2009). Through the mother, education and awareness about environmental concerns can be instilled in children from an early age.

Through the application of waste management patterns and the selection of environmentally friendly products used by the family, children will become used to protecting the environment. If such habits and environmental consciousness are instilled in the children, a generation will be created that cares about the environment.

4. Conclusions

Some people already have been undertaken the sorting of waste and processing in aerobic composting employing the Takakura system at the household level. These conditions are expected to develop further and more widely throughout communities. Women are dominant in waste management, sorting organic and inorganic waste from daily household activities and determining those materials to be composted in

aerobic composting with barrels-based. The presence of environmental cadres in villages, predominantly formed of women, can help the community manage aerobic composting, and foster yet more environmental cadres within the environment in the process of capacity building that presents rewards for undertaking environmentally based activities independently.

In this study, the IPA results showed that the importance and productivity of aerobic composting activities in Kedawung Kulon and Sumber Dawesari were evaluated as placed in Quadrant I (keep up the excellent work: maintain achievements). Empowering women to participate in waste management actively through the establishment of aerobic composting units fosters capacity building among citizens, encouraging independence and self-reliance through enhanced awareness, knowledge, and ability. This encourages participation in managing the environment in their community.

Especially for women citizens, knowledge and skills in managing waste stimulate its processing.

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