A SWOT Analysis of Takakura Compost as a Treatment for Household Food Waste (Case Study in Pondok Labu Urban Village)

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Abstract. An unstable food system will have an impact on ecosystems and the food chain. One proof of this imbalance is the increasing number of food waste. Currently, food waste in households still dominates. One way to manage food waste is the Takakura composting technique. The purpose of this study to analyze the effectiveness of takakura compost in managing food waste among households. This research method uses a qualitative method with several steps, training about making Takakura compost, counting the food waste in the composter, and observing through a focus group discussion with 25 members of the waste bank. The result of this study that an average of 18.9 kg of food waste produces 11.9 kg of household compost. According to the SWOT analysis, Takakura compost could reduce food waste in the household. Takakura compost could provide business opportunities with its own food waste raw materials, but the processing takes a relatively long time during the compost maturation process, this situation could affect the motivation of participants in the future. The conclusion of this study is Takakura compost could effective in managing food waste among households.

1. Introduction
The food system has an important role in the consumption chain. The consumption chain will affect the rate of hunger and the availability of food for human needs [1]. On the other hand, more than 820 million people worldwide are still hungry due to food shortages [2]. European countries are estimated to produce 88 million tonnes of food waste every year [3]. Based on data from the Food Sustainability Index (2019), Indonesia ranks second as a producer of food waste with a percentage of 61.40% of the total waste [4].

Food waste occurs in every line of the food supply chain, and about 35% comes from waste on the consumer side [5]. Food waste at the consumer level is influenced by how consumer behavior could manage food waste and avoid what should be disposed of or not properly. Efforts to reduce food waste need more observation at the consumer level [6]. In addition, according to Steven et al. (2013), other factors related to food waste are influenced by the ability of consumers to control the routine of providing food on a small, scale such as households [7]. Cultural, social, political, economic,
geographic, gender, motivation, and behavior have a relationship with human habits in disposing of food waste [8].

Women tend to feel less guilty about wasting food than men. Therefore, food waste from the household is influenced by the role of housewives [9]. The high level of food waste has led to several environmental movements in various circles [10]. One of the environmental movements that are starting to be known is the Waste Bank [11]. However, this Waste Bank has only been able to solve packaging waste from food products, not food waste itself [12]. There are several composting techniques, for example, hot composting, cold composting, and the trench or pit method. Commonly, relative time for that composting is 1–2 years and needs large space [13]. One of the current ways to manage food waste is to do simple composting [14]. In addition, it is one of the best alternatives for organic waste management. Currently, one of the composting techniques that has been developed is takakura compost.

Takakura Compost is a composting idea that started in 2004 in Surabaya City, at that time, the Kitakyushu International Techno Association (KITA) in the Kitakyushudan City with a local NGO (Non-Governmental Organization) in Surabaya worked together to design a pilot project in Rungkut Lor Village [15]. Based on Rahman et al. (2016), The SWOT (strengths, weaknesses, opportunities, and threats) analysis of the waste processing model in Karang Joang Village, Balikpapan, it could be seen that Takakura compost could be used as an alternative solution, but people tend not to be interested because it has not been integrated into a business scale and this analysis is only based on questionnaires, and interviews [16]. SWOT assessment can be identified by examining internal factors that influence each other. Opportunities and threats are determined by external factors that influence each other. SWOT analysis provides information that helps in analyze the effectiveness of an activity or institution that will be created [17]. Thus, this study analyzes the effectiveness of Takakura as a household-scale food waste treatment involving housewives by doing the Takakura composting process directly.

2. Methods

2.1. Population and Sample
The population in this study were members of the Berseri Waste Bank at Pondok Labu Village in South Jakarta. The study was conducted for five months, from September 2020 until January 2021. The population of the Berseri Waste Bank members is 68 people as active members. However, participants were selected based on the hamlet category with the highest to lowest rank in producing recycled waste based on observations and interviews with the founder of the Berseri Waste Bank. The order is as follows, hamlet 1 is the higher rank, hamlet 3 is the middle rank, and it is the lowest rank the hamlet 2. The sampling technique used is a non-probability saturation technique. Thus a sample of 25 households was obtained from all members of the Berseri Waste Bank in the hamlet 1, 2, 3.

2.2. Data Collection and Analysis
This research data was obtained from the results of several steps in the research. The first step is participants doing takakura compost training. The second step, the researcher will calculate and analyze what food waste is put into the composter and wait for the compost to be ready for harvest. The last step is conducting focus group discussions (FGD) on participants after takakura compost could be used with questionnaires and interviews based on the variables in the study. This study analyzes the effectiveness of Takakura as a household-scale food waste treatment involving housewives who are members of the waste bank. The variable dependent on this research is the effectiveness of takakura compost, while the independent variables are food waste, productivity, motivation, and market share. All variables were calculated using a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of all their statements representing each question regarding the variable.
3. Results and discussion

3.1. Takakura Compost
Takakura composting method was developed from the windrow composting method. The Takakura compost in this study has been modified and adapted to the conditions desired by the researcher. Takakura compost is made using drums of used paint with several steps. The first step is to make a pad of chaff and put it into the composter. The next step is to pour soil, food waste, and dried leaves up to the specified limit into the composter and at last cover the top with a pad of chaff. The types of waste that could be put into the composter are organic waste, for example, fruit, vegetables, rice, processed flour, eggshells, fish, meat, et cetera. However, bones cannot be put into the composter. The composting process is easy. The composting process is carried out for 75 days utilizing aerobic fermentation.

Based on the research results with 25 housewife participants, the amount of food waste put into Takakura compost is around an average of 18.9 kg of food waste produces 11.9 kg of household compost in 7-10 days. The Takakura composting process costs around IDR 39,000. The details of making Takakura compost are in Table 1.

| Materials  | Price/pcs | Amount | Sum       |
|------------|-----------|--------|-----------|
| Drum       | IDR 28,000| 1      | IDR 28,000|
| Chaff      | IDR 10,000| 0.4    | IDR 4,000 |
| Soil       | IDR 10,000| 0.6    | IDR 6,000 |
| Pad pouch  | IDR 500   | 2      | IDR 1,000 |
| Sum        |           |        | IDR 39,000|

3.2. SWOT Analysis on the Effectiveness of Takakura Compost in the Household
SWOT analysis is used to evaluate the effectiveness takakura composting process. The SWOT analysis was carried out by researchers observing the field every time they did waste calculations and talking with participants about the difficulties and conveniences of making Takakura compost. In addition, the data is supported by the questionnaire, also the criticism and suggestions during the FGD process – Analysis SWOT in Table 2.

Based on the SWOT analysis, Takakura compost has more potentials and effectively manages food waste among households. Takakura composting method was developed from the windrow composting method. Windrow composting is best suitable for the tropical climate [18]. Based on data developed from the windrow composting method, the windrow composting method has the advantages of lower operational cost, is not very high technology-oriented, and could be adopted in very small to large scale processing plants [19]. However, due to the lack of support from institutions and training for each individual, this potential is less visible. In addition, the results of this composting process, if managed properly, will produce a high selling value. This research still needs to do an in-depth marketing analysis in order to enter the market share.
Table 2. Strength, Weaknesses, Opportunity, and Threats Analysis.

| Internal Factors | Strength (S) | Weaknesses (W) |
|------------------|-------------|---------------|
| Potential reduction of food waste (S1) | Relatively longer ripening time (W1) |
| Faster decomposition of food waste (S2) | bones or thorns cannot be deciphered (W2) |
| Nutrients in compost are higher and diverse (S3) | Requires a lot of soil and chaff at the beginning processing (W3) |

| External Factors | Opportunity (O) | Threats (T) |
|------------------|-----------------|-------------|
| Low cost composting (O1) | Development of Takakura composting technology on a community scale (SO) | The motivation participants up and down (T1) |
| Raise awareness in reducing food waste (O2) | There is a subsidy for the Takakura composting process (WO) | Placement of a larger composter container (T2) |
| Business opportunity with own food waste raw materials (O3) | Development of special institutions or citizen activities for food waste (ST) | Less control after research (T3) |

4. Conclusion
Takakura compost is quite effective in managing household-scale food waste, and easy and economical techniques. However, further research is needed on analyzing commercial Takakura compost and how to speed up the ripening process at the time of composting.

Acknowledgments
The author would like to contribute to the School of Environmental Science Indonesia University and PUTI Soshum 2020 Grants from Indonesia University that had provided support and fund for the author's research and paper publication.

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