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Strategies to Reduce Food Waste at Household Level

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Abstract: Food waste is a common issue in countries around the world and become the global concern that planned in SDGs (Sustainable Development Goals) Number 12. Huge percentage of food waste discarded and low number of recycled shows that the existing fight is not optimal. This research aims to analyse the influence factors and strategies for reducing food waste from small scope of household level using SWOT analysis. Based on the result, the highest strength is the "Control and management over food needs by family" score of 0.357. The weakness is "No proper planning to process food waste" score of 0.481. The highest opportunity is "Ability to recreate leftover food" score of 0.39. and the highest threat is "Easy to buy food with affordable price" score of 0.496. SWOT analysis shows that the total value of the Strength (S) is lower than Weaknesses (W) with the difference of -0.312. While the total value of the Opportunities (O) is lower than Threats (T) with the difference of -0.125. So, with this unfavored position, the strategy that will be developed to reduce food waste at the household level is a defensive strategy or also called minimizing weakness to survive against threat.

Keywords: Food waste; Strategies; SWOT analysis

Introduction

Food waste has become a major problem in several countries around the world (Nikolaus et al, 2018). SDGs (Sustainable Development Goals) number 12 targeting to reduce food waste in an effort to minimize the volume food waste, starting from food supplier (organizer) to the consumer (users). The goal of reducing food waste is to avoid unconsumed food so that losses can be minimized in the coming 2030. This is predicted to be critical for all people in the world, especially when providing food for 9.1 billion people in 2050 (Abdelradi, 2018).

Meanwhile, according to the Food and Agricultural (FAO) and Economic Intelligent Unit (EIU), Indonesia is in second place in the world as the largest food waste producer in its report of "Food Sustainability Index" in 2017. SIPSN of the Ministry of Environment and Forestry (KLHK) supports the results and states that in 2017 - 2018 the composition of waste produced is in the form of food waste is up to 93%, and in several regions such as in Java, food waste dominates the overall composition of types of waste by 46.75%. The factors that can cause the huge amount of food waste are population, urbanization, cooking processes, community culture of wasting food, purchasing planning, inventory planning, and serving portion (Cahyana, 2022).

The several researches related to food waste has been carried out such as Hidayat, et al., (2020) regarding food waste campaigns, Ramadhita et al., (2021) regarding food waste knowledge of hotel restaurant consumers, and Wulandari & Asih (2020) who doing the literature study of household behavior towards food waste in Indonesia. While research related to strategies for reducing food waste at the household level is still limited, it is necessary to conduct research that analyse the strategies for reducing food waste at the household level.

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Method

Population and Sample

This research located in Pamoyanan, Cicendo Sub-District, Bandung with a population of 8007 people. The sampling method used is non-probability sampling with a purposive sampling technique by determining important key informants from the population as respondents, so the high-quality and reliable data can be collected. The observations were carried out by interviewing and answering the questionnaires. Then the data were analysed by qualitative descriptive.

Data Collection Procedures

In this study, this validity test uses the Pearson Bivariate correlation, also known as the Product of Momentum Pearson. This analysis was carried out by correlating the score of each item with the total score (Priyatno, 2014). The following formula can be used to calculate the item-total correlation coefficient with the Pearson bivariate:

$$\boldsymbol{r} = \frac{\boldsymbol{n}\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{[\boldsymbol{n}\Sigma X^2 - (\Sigma X)^2][\boldsymbol{n}\Sigma Y^2 - (\Sigma Y)^2]}} \quad \textbf{(1)}$$

r : correlation coefficient between X and Y
n : number of subjects
ΣX : number of item score
ΣY : total score of all items
Σ XY : multiplication of x and y
X ² : square of x
Y² : square of y

The reliability test using the Cronbach method, which is commonly used to measure the reliability of instruments with scores that range between several values (not only 0 or 1; but also, yes or no). The range of scores, or scales, used in this study is between 1 and 5. According to Umar (2013), the following formula is used:

$$r_{11} = \left[\frac{k}{k-1}\right]\left[\frac{1 - \Sigma \sigma b^2}{\sigma t^2}\right] \quad (2)$$

r_{11} : instrument reliability
Σ σb² : number of variant items
σt² : total of variant
k : number of questions

Population and Sample

The data analysis is using a qualitative descriptive, which examines the application of the latest ideas in practice and uses SWOT analysis (strengths, weaknesses, opportunities, and threats) to focus the analysis findings. For SWOT analysis, a matrix of External Factor Analysis Summary (EFAS) and Internal Factor Analysis Summary (IFAS) is needed. The stages for determining EFAS and IFAS use the method from Rangkuti (2008). The decision results are obtained after the interaction of IFAS and EFAS, then the greatest value approach is used as a benchmark to optimizing decision.

Result and Discussion

Factor that generates food waste

The object of the research is food waste that generates from the planning process of shopping for groceries or food, storing food material, processing food material, and consuming food. Factors that generate waste categorized into 7 indicators. Recapitulation of data processing on indicators that affect food waste are shown in Table 1.

Table 1. Indicators that affect food waste

Indicator	Actual score	Ideal score	%	Mean Score
Landfill	539	840	64.17	2.57
Cut from the source	1673	2280	73.38	2.94
Food preparation	788	1080	72.96	2.92
Sharing food with others	495	600	82.50	3.3
Industrial use	71	240	29.58	1.18
Composting	178	360	49.44	1.98
Feed to animals	342	600	57.00	2.28

The most influential indicator is "Cut from the source" with an actual score of 1673. Inside, there is one statement which have a highest score, that is refrigerator as an appliance to reduce food waste. This is because the refrigerator is owned by most people and as a practical storage as well as for preserve food.

While the lowest indicator is "Industrial use" which means household does not doing to process the food waste into industrial product such as biogas. Although biogas is the most advanced renewable alternative to replace fossil fuel, where food waste can be one of material. However, this is not efficiently if it done by household, beside they are not capable, it is also more profitable of cost to produce on a large-scale industry.

SWOT analysis

Value of weight and rating given on external and internal factors are based on the result of questionaries and opinion obtained from community and selected key informant such as the Provincial Environmental Service and Development Planning Agency staff. Implementation of strategies to reduce food waste calculated by combining the analysis of internal factors (strengths and weaknesses) and external factors (opportunities and threats) to be SWOT matrix. Based on the analysis above, the calculation of IFAS and EFAS Score are shown at Table 2.

Table 2. IFAS and EFAS Score

SWOT Group	SWOT Factor	Item Weight	Rating	Score
Strength	Sharing food and prohibition to wasting food in religion belief	0.081	4	0.323
	Control and management over food needs by family	0.089	4	0.357
	Most families cook their own food for daily consumption	0.1	3	0.3
	Most families own refrigerator to preserve food	0.098	3	0.293
Total				1.272
Weakness	People often falter with promo and discount	0.152	2	0.304
	Do not have knowledge about food waste	0.161	2	0.323
	No proper planning to process food waste	0.160	3	0.481
	Consumptive lifestyle	0.159	3	0.477
Total				1.584
	Total of internal score			2.857
Opportunities	There are still many people who lack food	0.1	3	0.3
	Utilization of food waste	0.095	2	0.19
	Ability to recreate leftover food	0.098	4	0.39
	Easy access information about food waste management	0.083	3	0.25
Total				1.131
Threats	Food promo are offered with affordable price	0.15	2	0.295
	Easy to buy food with affordable price	0.17	3	0.496
	Penalties for food waste have not been implemented	0.16	2	0.307
	Low knowledge	0.16	1	0.157
Total				1.256
	Total of external score			2.387

The result show that the difference of strength (S) and weakness (W) are -0.312; while difference of opportunities (O) and threats (T) are -0.125. From this identification, it can be seen that the position of the strategy to reduce food waste at the household level by using a SWOT diagram at Figure 1.

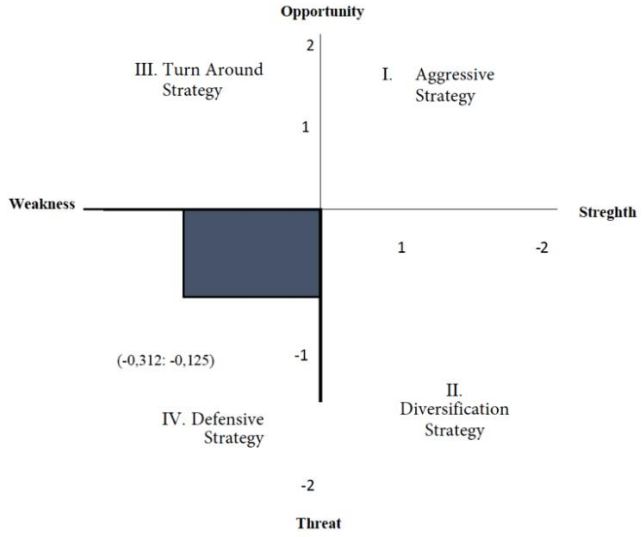

Figure 1. SWOT Diagram

The position in quadrant IV is unfavored and means that the condition has a weak internal environment and unsupportive external environment. Then, strategy that will be developed to overcome the issue is defensive strategy, it also called minimizing weakness to survive against threat.

Formulated strategy generated from SWOT analysis are:

1. SO strategy

This strategy is taking advantage of the strength in order to reveal the opportunity. There are 2 alternatives inside, first educate the society to have a "sharing food" counter. Pellegrini et al., (2019) mentioned that donating food, for example through the social organization evidently decreases the number of food waste. In other way, this certainly help those who cannot buy food as well to rise a sense of empathy to others.

The second is by making daily menu patterns that liked by each family member for certain period. Menu inspiration and assorted food creation can be found on the internet. This is a way to overcome the occurrence of food that is not eaten or reach the expire date.

2. WO strategy

This strategy is implemented when there is an opportunity to overcome the threat to generate food waste. First is plan, purchase and cook the food material wisely as needed, then the second is make a campaign and socialize to society regarding the consequences of food waste. In this technological era, campaigning and socializing the effects of food waste is very easy. It can be done directly or through social media which is easier for the people to access the knowledge about food waste. This will help the community to change household behavior in dealing with food waste, including from a psychological perspective (Schmidt, 2016). Through the food waste campaign, it is hoped that people will be touched, so they can realize and bring up guiltily feeling when they are wasting food (Richter, 2017).

3. ST strategy

This strategy is applied when strength is used to overcome threats that may be generated. First is the promulgation of government regulation regarding food waste. Law enforcement are expected to reduce the volume of food waste, such as reward and punishment. Research in 44 countries with various economic status regarding the impact on regulation of household food waste concluded that the implementation of policy regulation and following strategies is more effective than tax penalties in preventing food waste pile (Secondi, 2015).

As for in Indonesia, there is no government regulation regarding the food waste prevention. There is no strict regulation for household to handle their waste properly. A simple thing to do that can implemented by every household is to separate the organic and non-organic waste, so it does not just mix up, and ends up in a landfill area (TPA). Though, organic and non-organic waste can be reused with proper processing.

The other way is to educate people about the priority between "needs" vs "wants". The priority of food itself must consider the balance nutritional needs for health. Food waste often generates when people taking an excess amount of food (79%), or emotional eating (16%), while for the 5% is because they did not realize and forget that they have the food so that expire, decay, unconsumed then become food waste (Yuliana, 2022). People should be able to control their appetite because sometime human want to eat not because they are hungry but only want to feel pleasant or be happy, which also called emotional eating behavior (Chopra, 2014).

4. WT strategy

This strategy is by looking at what the weakness and threat it has. One thing that can be done is to adopt a culture of not overeating. This is in line with Bozzola et al., (2017) stated that culture is an external factor that also influences to the food waste behavior. Get used to something new is not easy, because establish a culture must be instilled from an early age. But if this consistently implemented, it would become a good habit. Besides, family members play a role in reminding each other to this habit of stop overeating. It can be started by taking enough portion of food, then if still hungry, food can be reloaded, so no food is wasted. Another way is to get used to focus and avoid doing other thing while eating so that every bite can be enjoyed.

Conclusion

The qualitative analysis showed that there were 7 categories of indicator that influence the food waste with the highest of "Cut from the source". The highest Strength is "Control and management over food needs by family" indicator that have the highest score in internal factor. While the "Unproper planning to process food waste" is the weakness that showed that public in general have no idea what to do about food waste processing. But the total score of Strength is lower than Weakness, obtained the difference score of -0.312. The opportunity of "Ability to recreate leftover food" is high and it showed that people is creative to process the leftover food that reduce the waste. But the Threat of "Easy to buy food with affordable price" can influence people to keep going to buy food although the already have enough. The external factor of Opportunity and Threat has the difference score of -0.125. In this condition, the strategy that will be developed to reduce food waste at the household level is a defensive strategy or also called minimizing weakness to survive against threat.

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Author Contributions

All author contributes to the successful of this article. Nunik Gerda Anisa was doing the conceptual research, carry out the sampling and analyse data. Etty Riani and Sadra Sukmaning Adji are supervised the research, data analysis, draft the article and do the finalization. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest

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