

## Study of food waste of farmers' households in Klaten to support food security

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### ABSTRACT

Food waste is a global issue that has been around for a long time but is unconsciously becoming more serious. This is also experienced by Indonesia, which also contributes to donating food waste. Food waste can occur from upstream to downstream from production to consumption. Farmers as actors in food production are also not spared from food waste behavior. This study aims to determine what factors affect food waste for farmer households in Klaten Regency. In addition, it provides ways of handling non-consumable food and strategic recommendations for the government in responding to the phenomenon of food waste to support food security. The method used in this research is descriptive-analytical. The number of samples used was 30 farmers in Klaten Regency. The selection of Klaten as the research location was determined purposively because this location is the largest rice-producing area in Central Java. The data analysis method used in this research is multiple regression. The results showed that two variables affect food waste: the level of education and the number of family members. The significance value of the two variables is 0.0000, so that the value is less than the alpha value of 0.05. Inadvertently, some households have processed the leftover food, such as making it as organic fertilizer. In addition, several households provide leftover food to livestock. The strategic step that the government must take in tackling this food waste problem is to conduct a massive campaign and, if necessary, implement it in the education system so that people are more aware of food waste.

### Keywords:

Farmer, Food, Food waste, Strategic

### 1. Introduction

Food is an important part of human survival, so that the government focuses on food development from the value of food security indicators. However, these efforts collided with the occurrence of food loss and food wastage. Food waste can occur from upstream to downstream such as from the production process to consumption. Therefore, some regions concentrate on reducing food waste so that the value of food security remains good. Wasted food is generally still fresh.

Food waste behavior is usually explained by antecedent theories that have developed, such as the theory of planned behavior [1]. The theory divides and predicts the assessment of the behavior into three parts, namely attitudes, norms, and control over behavior. The selection of these three aspects is based on the possibility of behavior arising from the interaction and intentions of everyone. This theory is also often associated with the context of environmental discussions [2-4]. Several factors may affect the presence of food waste, namely age, gender, eating habits, and food quality. Age is closely related to food waste; it is based on the aspect of individual sensory sensitivity, which with increasing age, it will decrease, thereby reducing the individual's food intake [5].



Food waste is often interpreted as wasted food due to intentional or unintentional elements starting from the production stage to consumption. The definition also concludes that, essentially, food waste does not count to zero. This is because food is composed of elements that can be eaten or not (skin, spines, bones, and other components). Food waste is also often interpreted as food for human consumption and then leftover and thrown away for various reasons [6]. Food waste is even more. Extremes are explained as food that can be consumed but is thrown away because it is damaged, lost, or consumed by animals, and some parts cannot be eaten [7]. Even today, food waste has become a complex problem that has become a global issue. This issue continues to grow because many countries are affected by the presence of food waste. Indonesia is also experiencing this situation where a lot of food waste is not managed properly, causing ongoing problems on vital aspects of human, environmental, social, and economic aspects. Human behavior often triggers food waste's emergence in daily life [8]. Food waste is starting to become an issue in various countries because of the various impacts it has. Of course, this waste also affects food security because food that can still be consumed would be better for the benefit of other households in need. The data show that approximately 1.3 billion tons of food are not consumed from the production to consumption stages in the food supply chain [9].

Indonesia produced household waste in 2018, reaching 48% of the total waste. Most of the existing waste is based on several locations such as traditional markets, public facilities, and commercial areas. The dominance of waste also comes from organic waste that has not been utilized properly in Indonesia. However, waste comes from several components that are difficult to decompose, such as plastic, paper, metal, rubber, and glass. Data on the percentage of household food waste is still limited in Indonesia, so it is still too difficult to calculate it. On average, everyone in Indonesia produces several types of food waste such as vegetables and fruit in 7.3 kg and 5 kg, followed by rice and confectionary products as much as 2.7 kg and 2.8 kg, respectively. A total of 1.7 kg and 1.6 kg of milk and meat, the remaining 4.7 came from other sources such as nuts, eggs, fish, seafood, and others [10].

The food security of farmer households is largely determined by food availability, access, and utilization, especially for vulnerable groups [11]. The availability of food at the household level directly affects food security at the household level. Food availability refers more to food storage and the availability of staple foods [12]. Three variables affect the food security of farmer households in Klaten Regency with predictors of the share of food expenditure, including income levels, rice prices, and dummy knowledge of nutrition by housewives [13]. Meanwhile, four variables affect the energy adequacy rate of farmer households in the Klaten Regency, namely the education of the head of the household, rice consumption, tempeh consumption, and nutritional knowledge by farmer households [14]. Farm households in Klaten Regency are categorized as food insecure as much as 57.50% of farmer households while the rest are divided into vulnerable, vulnerable, and insecure food categories [15]. The value of food security of farmer households that is already good does not necessarily have a good understanding of food waste. This study aims to determine what factors affect food waste for farmer households in Klaten Regency. In addition, it provides ways of handling non-consumable food and strategic recommendations for the government in responding to the phenomenon of food waste to support food security.

## 2. Materials and Methods

Research with cross-sectional design is used in this study. The use of the independent variable and the dependent variable was measured and carried out at the same time. The selection of the plan is due to the reason that the objectives can be answered accurately, quickly, and simply. Analytical descriptive method is also applied in this research. The respondents used in this study were farmers in Klaten Regency because this location has quite a lot of rice production, and several sub-districts in this location have received several government programs such as food independent villages. The use of primary data in this study was obtained by interviewing farmers directly. Farmers sampled are farmers in Jambakan Village, a village that has received a food-independent village program. According to the village monograph data, it was found that the number of farmers in the village was 155 people. The sample in this study was 30 farmers who fall into the category of sharecroppers. The selection of this number is due to good data or sampling when the sample size is at least 10% of the total population. Sampling in this study using simple random sampling. This study uses multiple regression analysis data analysis. The dependent variable in this study is the food waste of farmers, while the independent variables in this study are farmers' income, number of servings of food, education level, gender, number of family members. The level of food waste in question can be done by calculating how much food is not consumed per capita. Of course, the model used in this study has passed the normality test and the classical assumption test. The following is the regression model carried out in this study:

$$Y = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

Information:

- Y = Food Waste
- $\alpha_0$  = Intercept
- $\beta_1$ -  $\beta_7$  = Regression coefficient (estimate parameter)
- e = Error term (residual)
- X1 = Income Level
- X2 = Number of Food Servings
- X3 = Level of education
- X4 = Gender
- X5 = Number of Family Members

## 3. Results and Discussion

### 3.1. *Factors that Affect Food Waste*

Before performing multiple regression analysis, the data must first go through several tests, such as the normality and classical assumption tests. The data has been tested and has passed the normality test, heteroscedasticity test, and multicollinearity test. The following are the results of multiple regression analysis listed in table 1.

**Table 1. Results of multiple linear analysis of factors affecting farmers' food waste in Klaten District**

| Variable                | Coefficient            | t-Statistic | Sig.   |
|-------------------------|------------------------|-------------|--------|
| C                       | 5.6273                 | 1.8408      | 0.0009 |
| X1                      | -3.4543 <sup>ns</sup>  | -1.0821     | 0.2900 |
| X2                      | 0.1801 <sup>ns</sup>   | 1.6366      | 0.1148 |
| X3                      | -3.9698 <sup>***</sup> | -4.9828     | 0.0000 |
| X4                      | -1.8013 <sup>ns</sup>  | -0.8883     | 0.3832 |
| X5                      | 1.8383 <sup>***</sup>  | 6.4738      | 0.0000 |
| Adjusted R <sup>2</sup> |                        |             | 0.6001 |
| F Statistic             |                        |             | 9.7054 |
| F sig.                  |                        |             | 0.0003 |

Based on table 1, we can see that the adjusted R<sup>2</sup> value is 0.6001 or with a percentage of 60.01. The meaning of the figure explains that 60.01% of the variation of the food waste variable used in this study can be explained by the independent variables in this study: farmers' income, number of servings of food, education level, gender, and number of family members. Apart from this, the remainder of the adjusted R<sup>2</sup> value of 39.99% can still be explained by other variables outside the model under study.

Based on table 1, we can also conclude several statements from the results of the F-test. This is reflected in the significant value of F of 0.0003. This value is less than or less than the 5% alpha value. That way, it can be interpreted that the independent variables in this study are farmers' income, number of servings of food, education level, gender, number of family members together or simultaneously affect food waste.

The partial test results based on table 1 data show that two variables have a significant effect on food waste, namely education level (X3) and Number of Family Members (X5). Both have a probability value of 0.0000, so the number is less than an alpha value of 0.05 so that the two independent variables have an effect. Education level has a negative effect. This is based on the indicator value of the regression coefficient, which shows a value of -3.968. Thus, an increase in the level of education by 1 unit will reduce the value of food waste by 3,968 units. This is by the existing theory that the best relationship exists between education level and food waste behavior. Usually, the higher the education level of an individual, the lower the level of food waste. This is because individuals who are well educated will be more aware of broadening their knowledge about the impact of food waste. That way, the individual will consume food as wisely as possible. The variable number of family members also influences food waste, but the direction is positive. The regression coefficient shows a value of 1.833. This figure means that an increase in the number of family members by 1 unit will increase the value of food waste by 1,822 units. The

greater the number of family members in a farmer's household, it is feared that there will be a lot of food stock that must be prepared, leading to more food waste being wasted. This is also possible because of habits and ethics when eating. This is in line with Hidayat's [16] research which states that eating ethics allows individuals from cultural habits to leave food, sense of reluctance or shyness to finish food when eating.

### 3.2. How to Handle Unconsumed Food

Indirectly, farmer households in Klaten Regency have been processing waste that is not consumed. The activities they do unconsciously can reduce the impact of wasted waste on the environment. The activities carried out by farmer households are usually carried out in two ways: providing food that is not consumed in the household to their livestock and processing the food into organic fertilizer. Households use the following methods in handling non-consumable food, which can be seen in table 2.

**Table 2. Handling of non-consumed food in farmer households in Klaten District**

| No.   | Handling                   | Number of Households | Percentage (%) |
|-------|----------------------------|----------------------|----------------|
| 1     | Used as animal feed        | 13                   | 43.33          |
| 2     | Used as Organic Fertilizer | 5                    | 16.67          |
| 3     | Thrown Into Garbage        | 12                   | 40.00          |
| Total |                            | 30                   | 100.00         |

Based on table 2, we can see together that three groups or parts of farm households make efforts to handle food that is not consumed. As many as 43.33% of farming households in the Klaten Regency tend to give their leftover food to livestock. The livestock in question is chickens and ducks because the two types of poultry consume the remaining rice. The remaining rice can be directly given to livestock or processed traditionally by drying it and then feeding it as animal feed. A small number of farmer households in the Klaten Regency use wasted food waste into organic fertilizer. This step is considered very appropriate to reduce the impact of waste on the environment. However, the number of households that use it as fertilizer is still very small, namely only five people out of a total of 30 respondents in this study. Some households do not use leftover food, which ends up in the disposal process or becomes garbage.

The number of households is about 40% of the total respondents. The reason the household is because they are confused in processing the leftovers and do not have livestock. In addition to the steps already mentioned, there are easy steps to prevent the emergence of food waste by implementing policies or regulations that do not allow household scales to leave food. That can be done by making a list of food needs consumed by households. This anticipation can be done by estimating the amount of food that will be consumed. With these rules and anticipation, household members will only take the portion of food that can be consumed so that the amount of food that is not consumed can be minimized or eliminated [17].

### **3.3. Strategic Recommendations for Government in Responding to the Food Waste Phenomenon to Support Food Security**

Several strategic steps from the government have been carried out, especially for food waste campaigns for the community and businesspeople in the industrial sector. It is also necessary to form a group unit such as a food guard or food bank. That is very important to do, especially when the pandemic is ongoing where many people are panic buying, so it is possible that a lot of food is not consumed and leftover. The next step is to enforce food strategy policies applied to business actors, especially the food and beverage industry so that donations from food waste can be channeled to the food groups to be put to good use. Massive campaigns should be carried out to consume food according to the needs of their families. Campaigns about food waste must also be implemented early, especially in the existing education system. Students who already know the importance of food waste are expected to appreciate food more. It is also necessary to coordinate and cooperate with several existing ministries to campaign for this. The phenomenon of food waste must also be frequently reminded at several important events in Indonesia, for example, on the commemoration of food day on October 16. The purpose of this is to educate the public to consume food wisely and reduce food waste by optimizing the food that has been purchased. The strategies and steps implemented by Indonesia should also refer to several countries that have campaigned for things related to food waste, such as in Australia, which has a food sharing platform, then the Netherlands with the national program "united against food waste" to reduce waste by 50% by 2030. with its platform has an important role in helping to reduce food waste in Indonesia [16].

## **4. Conclusion**

Based on the results of the study, there are two variables that affect food waste, namely the level of education of farmers and the number of family members. The level of education of farmers in Klaten district is not high enough so that they have not been properly educated on food waste. Meanwhile, the more family members in a farmer's household, it is feared that more food will be wasted. Inadvertently, some households have processed the leftover food, such as making it as organic fertilizer. In addition, there are several households that provide leftover food to livestock. There must be intervention from the government to campaign for this food waste, whether it is implanted in the education system or delivered massively to the community.

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