Carbon footprint of pesantren: the role of pesantren manager determining the food consumption

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Abstract. Indonesia is a country with a large part of the population being Muslim with the characteristics of Islamic boarding schools. Islamic boarding schools are the oldest informal education institutions in Indonesia that influence the development of Indonesia. Santri, including pesantren people who have a higher mindset in understanding life than non-santri. The spiritual provision of the santri will be applied in the actions and behaviour of daily life starting from the smallest things like eating. Food consumption activities affect the environmental damage with carbon emissions produced. Carbon footprint can be used as a concept to calculate santri’s daily food consumption habits. The analytical method used to read data is the One-way Anova analysis program. Respondents of this research were Semarang Darul Falah Besongo’s Pesantren, who are 100% students of Walisongo State Islamic University Semarang. The spiritual knowledge of santri is the basis for optimally managing food. Pesantren with good food management principles, like food efficiency can minimize carbon emissions that damage the environment. The achievement of food safety will safeguard natural resources so that they remain sustainable.

1. Introduction

Indonesia, with its Islamic population, is identical with its education system as a pesantren. Pesantren in Indonesia is about 25,938 with a total of 3,962,700 students [1] With this large amount, activities can feed the calculation of carbon emissions produced named Carbon Footprint. Carbon Footprint is a CO2 emission or greenhouse gas emission that increases global warming [2]. The effect of global warming is an increase in temperature on earth. Rising temperatures can cause many disasters such as drought, extreme weather, melting of ice in the polar regions of increasing river water, forest fires, floods and others [3].

Carbon Footprint can be used as compensation for greenhouse gas emissions produced. This gas emission calculation is the total value of gas emissions produced from individual, group, diet, production and transportation activities [3]. Including the activities of the Pesantren. Pesantren comes from the word "santri" which gets the prefix "pe" and the suffix "an" which means a place of character education [4]. The term pesantren was first introduced and established in Java by Sheikh Maulana Malik Ibrahim or often referred to as sunan gresik [5]. Pesantren is non-formal educational institutions that teach about religious knowledge [6]. Pesantren’s leader called Kyai. Fatwa’s Kyai is an unwritten
rule for Santri. So, everything the Kyai orders must be obeyed by the santri, in addition to the written religious rules.

Darul Falah Besongo’s Pesantren is one of the Pesantren in Indonesia located in the city of Semarang. All of santri are 161 students of the Walisongo Islamic State University. “Darul Falah” Be Songo’s Pesantren leaders have applied environmental education to santri including the management of pesantren waste, plant seeding and the holding of “Green Deen” book- related to the application of religious values to environmental preservation in the daily activities of santri.

The Kyai of the Darul Falah Besongo’s Pesantren realized the importance of protecting the environment, especially for santri so he guided his santri to care about environmental sustainability starting from the smallest, namely from food. Food waste is indeed a trivial matter, but it will be a big thing if the food waste comes from community waste in the pesantren. this is what causes researchers to be interested in examining the carbon footprint consumption in Pesantren and the extent of the leader's role in determining the food consumption.

The aim of the study was to determine the extent of the students' knowledge and attitudes towards food. The researchers began the study by distributing questionnaires to 100 santri as the research sample. Research data were analyzed using one-way ANOVA analysis.

2. Materials and Methods

2.1. Carbon Footprint
Carbon footprint is a CO₂ emission or greenhouse gas emission that has the potential to increase global warming [2]. Carbon gas emissions can be produced directly or indirectly [7,8]. Carbon gas emissions are indirectly generated from non-renewable use of electricity, industry, transportation and energy use. While the formation of carbon emissions indirectly (secondary footprint) comes from diet, the agricultural sector, and the end result of the production of household goods such as television, furniture and so on [8].

The main cause of global warming is greenhouse gas emissions. The effect of global warming is an increase in temperature on earth. rising temperatures can cause many disasters such as drought, extreme weather, melting of ice in the polar regions so that sea levels rise, forest fires, floods and others [3]. Carbon Footprint can be used as a concept to calculate the amount of greenhouse gas emissions produced [3]. This research method uses descriptive analysis method. The reading of the analysis from the carbon footprint concept came from the distribution of questionnaires to the Mahasantri Darul Falah Be Songo Islamic boarding school which was then analyzed using the One Way ANOVA analysis program.

2.2. Food Efficiency
Food is a primary need for humans to ensure survival [9]. Food is the main energy source in life that contains essential nutrients such as protein, fat, carbohydrates, vitamins [10]. Food demand both nationally and internationally, for industry and basic needs is very high [9]. The incompatibility of market demand with production results can have an impact in the form of economic inequality. So, it is necessary to maintain consumption efficiency in the process of food production and consumption [11].

According to Farrel in Coelli et al. (1998) [12]economic efficiency can be obtained by combining two components of efficiency. The two components of efficiency are technical efficiency and allocative efficiency. Technical efficiency is the ability to obtain maximum output from the number of inputs produced. Meanwhile, allocative efficiency is the ability to use the proportion of inputs optimally. Increased efficiency can be obtained maximally by using new technological breakthroughs [11].
3. Results and Discussion

3.1 Spiritual Knowledge of Santri

Environmental problems have become a concern for all levels including environmental experts, academics, and religious leaders as well as pesantren. Day by day environmental damage is increasingly happening due to lack of knowledge and socialization of society towards environmental care. The negative impact caused by environmental problems is very much including the problem of global warming. Global warming occurs because of the production of carbon gas emissions. Carbon gas emissions are formed because of the wasteful life patterns of people on natural resources such as excessive use of electricity, consumption of food that is not in accordance with needs, waste of water and others. The impact of environmental problems is very detrimental to the community. In this case, the pesantren provides solutions to the handling of environmental problems by instilling the values of Islamic teachings, especially regarding the environment.

Student knowledge about environmental preservation is a theoretical knowledge. While pesantren activities in socialization and handling of the environment are practical awareness that can be used as capital to improve human awareness of their environment. The pesantren education curriculum generally includes three main things, namely knowledge of human relations to God, knowledge of human relations with each other and knowledge of humans and their environment. Three general knowledge applied in pesantren allows students to answer and deal with problems in various aspects. The attitude of santri who have been equipped with spiritual knowledge has different implications for other citizens on the environment. Likewise in terms of food consumption. A santri will appreciate food and tend to consume without leaving it. A santri believes that consuming food without leaving it is a form of respect and gratitude to God and gratitude to all those who have provided and made it. This spiritual attitude not only has an impact on the social sustainability of the community but also can reduce the amount of carbon emissions on earth.

3.2 Role of Santri in Food Consumption Efficiency

Santri become people who have a habit of regular life patterns. Every day-to-day activity of a santri cannot be separated from the rules that are the limits of life. The application of various regulations certainly leads to some good things. Regulations that always keep students’ activities form a wise pattern of life. So the public views that students have regular and polite behavior.

The context of courtesy is not only religious, but rather leads to various areas of life. The politeness of santri has a balance between religious and environment. This means that all actions of students in the activities of daily life are always reminded of spiritual aspects. Islamic environmental experts (Eco-Islamic Scientist) reinforce the importance of an ecological approach in building connectivity between humans and their environment as a fundamental spirituality of human ethics [13]. Ecological spiritual practices have developed among Muslim communities and communities by prioritizing the urgency of environmental education as part of Islamic Education which must be developed in developing a harmonious, friendly and polite attitude towards nature. The importance of Islamic ethics is applied in moral behavior and responsibility as a function of natural spiritual awareness.

The pesantren culture carried out by santri gives more or less a positive influence on the wisdom of the environment. One form of santri’s habit in consuming food is something that needs to be considered. The culture of eating using a tray together has taught various positive halls. The lesson that can be taken from this culture is to strengthen the relationship between each other. Another positive thing is that the santri always spends food and does not die.

Remaining food is now a trend in the community. Like eating in a restaurant, it is thought to be hungry or rural. Even though according to Islam these bad habits include despicable behavior that is letting cooked food ingredients become mubadzir. Ordinary people do not think long when leaving food. The process is very long to be able to serve the food is not considered, ranging from planting food ingredients, cooking food, even how hard farmers and farmers keep food. This trend seems trivial, but it's not just a matter of price, or prestige. The next impact and the resulting carbon outlay
process to present a plate of food is not realized by the general public. Without realizing it, food has contributed to carbon gas emissions, starting from the process of production, distribution, consumption, and waste from these foods. Various processes for preparing a dish produce a carbon footprint, but not just CO₂ but also CH₄ and other gases. The carbon footprint of a food will be excessive when the food ingredients are imported from other countries. As much as 30% of greenhouse gas emissions globally come from the agricultural sector and food production and 80% of that amount comes from agricultural activities [14].

Food wisdom of a santri's food needs to be considered as an example and must be developed by ordinary people. Other habits carried out by santri in the context of food efficiency are not realized by santri and a habit has been formed. Santri usually consume food as needed, namely eating at the right time. The food consumed is of a simple type. All consumption of santri food is delicious because it is covered by the closely related nature of family. So even though the food consumed by the santri is modest, the santri remains grateful by spending food so as not to mubadzir. The habit of santri to fast is also a form of food efficiency. When fasting, students can manage and regulate their passions so that their lust patterns become efficient.

Tabel 1. Mean score and standard deviation: regular diet of santri

| No. | Aspect | Mean | Sd.Deviasi | Sd.Error |
|-----|--------|------|------------|---------|
| 1.  | Good   | 2.03 | 0.115      | 0.026   |
| 2.  | Ebaugh | 3.00 | 0.070      | 0.007   |
| 3.  | Less   | 4.00 | 0.000      | 0.000   |
| 4.  | Bad    | 5.00 | -          | -       |

Food efficiency patterns contained in the pattern of daily life of santri become a wisdom of nature. The table above shows students have a fairly good pattern of food consumption. The average student gets an assessment of adequate food patterns which means that students have a pretty good role in the efficiency of food consumption. Awareness of food consumption must begin to be considered to maintain food security, especially in Indonesia. The attitude of santri in appreciating and grateful for the blessings of Allah SWT needs to be developed to be applied to ordinary people. The impact of food will have optimal benefits when used efficiently so that no food is wasted. The thing that needs to be done is to familiarize yourself to use anything in moderation. This behavior is trivial but has a great influence on world food security.

4. Conclusion

Indonesia is a country with a majority of its population is Muslim which is identical to its education system in the form of pesantren. Pesantren comes from the word "santri" which gets the prefix "pe" and the suffix "an" which means a place of character education [4]. Activities at the pesantren are in the form of regulations that are the limits of life. Santri become people who have a habit of regular life patterns. Every day-to-day activity of a santri cannot be separated from the application of various regulations which certainly leads to some good things. The good thing is one of them is the pattern of efficient food consumption that is applied in the santri. The survey shows that santri have a fairly good awareness and efficient consumption pattern. The pesantren culture carried out by santri gives more or less a positive influence on the wisdom of the environment.
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