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The Relationship between the Application of Sustainable Principles and Students' Waste Segregation Behavior at SMAN 1 Singosari

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Abstract

The principle of sustainability is applied as an effort to preserve the environment, especially the school environment. The application of sustainable principles is related to student behavior in sorting waste in schools. This study aims to determine the relationship between the application of sustainable principles and students' waste sorting behavior in the SMAN 1 Singosari environment. This study used a survey method and sample selection using the purposive sampling technique. Data were obtained through an online questionnaire containing statements related to sustainable principles and waste sorting behavior distributed through Google Form. The data obtained were then analyzed using the Pearson correlation test. The results showed that there was a strong correlation between the application of sustainable principles and students' waste sorting behavior with a Pearson correlation value of 0.689 and the form of the relationship between the two variables, namely positive.

Introduction

Humans cannot be separated from interactions and interdependence relationships with living things and with the environment in an ecosystem balance. The environment as a place to live for living things has a balance that must be maintained (Ratnasari, Asharhani, Sari, Hale, & Pratiwi, 2019). If this balance is disturbed, it will cause environmental problems. This problem can have an impact on the lives of all living things including humans (Singh, Duan, & Tang, 2020). One of the main factors of environmental problems is the problem of waste (Richter, Ng, Karimi, & Chang, 2021).

Garbage is closely related to human life. Garbage is the residue from human activities that are not used and is the final remnant of a process (Kurniaty, Nararaya, Turawan, & Nurmuhamad, 2016). Waste can come from an individual, household, or industrial waste (Zhu, Fan, Luo, Lin, & Zhang, 2020). The increasing number of residents, expansion of residential areas, and economic activities are factors that increase the amount of waste produced (Sanusi, Cahyadi, & Respati, 2016). Garbage needs to be treated properly. Improper waste management can cause pollution and carbon dioxide emissions (Mulasari, Husodo, & Muhadjir, 2016). This results in a high environmental burden that needs to be overcome to avoid human health and environmental problems (Singh et al., 2020).

The application of the behavior of sorting waste according to its type before being disposed of will facilitate the process of waste management to minimize environmental pollution (Wang, Peng, Wei, Qin, & Zhu, 2019). These small habits will later be transmitted in the family and the surrounding community which allows reducing environmental problems caused by waste (Munir, 2016). This is a real step in the practice of managing and utilizing waste according to sustainable principles.

Things that need to be considered in managing natural resources and the environment based on sustainable principles include the rate of disposal or the amount of waste that must be smaller than the environmental assimilation load (Mikulčić, Wang, Duić, & Dewil, 2020). If the environmental quota is exceeded, the basic structure and function of the ecosystem as life support will be damaged and the sustainability of environmental functions will be disrupted (Poluakan, Purwaningrum, & Indrawati, 2018). The principle of sustainability in the context of the environment must be able to maintain stable resources and not exploit nature or the function of environmental assimilation (Mir, Cheema, & Singh, 2021).

The concept of sustainability also includes the maintenance of biodiversity, stable airspace, and other ecosystem functions (Gusti, Isyandi, Bahri, & Afandi, 2015). Environmental resources and sustainable development are very important as basic human needs (Amin, Winarto, & Marlina, 2019). Therefore, care needs to be taken to conserve energy, water, and environmental resources for future generations (Gu et al., 2021). Based on this background, this study aims to determine the relationship between the principle of sustainability and students' waste sorting behavior on the topic of environmental problems at SMAN 1 Singosari.

Methods

This research is comparative causal research (ex post facto) and the method used in this research is a survey. This research was conducted in March 2021 at SMAN 1 Singosari. The population in this study consisted of grade X students at SMAN 1 Singosari even semester in the 2020/2021 academic year. This research was conducted by taking a sample of 103 people from 7 classes. The sample in this study was determined using the nonprobability sampling method with the purposive sampling technique.

The instrument used in this study was an online questionnaire containing statements related to the sustainable principles developed by Ratnasari et al., (2019) and waste sorting behavior developed by Robina-Ramírez et al., (2019) and distributed via Google Form. Calculation of student answers to filling out the questionnaire using a Likert Scale. The data obtained were analyzed by Pearson correlation test.

Results and Discussion

The results of hypothesis testing in this study indicate that there is a strong correlation between the principle of sustainability and waste sorting behavior. The form of the relationship between variables is positive, which means that the higher the student's waste sorting behavior, the higher the application of the sustainable principle by students at school, the results of the analysis can be seen in Table 1. There is a strong relationship between the two variables because the selection of waste based on the type can be effective. and facilitate waste management in schools. Good waste management will be able to reduce the negative impacts caused by waste. The increase in waste that is not managed properly can cause problems for the government, social communities, health, and the environment (Puspawati & Besral, 2008).

Table 1. Hypothesis Test Results (Pearson Correlation Test)

Correlations	Waste Segregation Behavior	Sustainability Principle
Waste Segregation Behavior		
- Pearson Correlation	1	.689
- Sig. (2-tailed)		.000
- N	103	103
Sustainability Principle		
- Pearson Correlation	.689	1
- Sig. (2-tailed)	.000	
- N	103	103

The waste problem is quite complicated because it involves various parties. The waste problem in Indonesia is also experiencing great challenges, especially in the aspect of public awareness regarding the habit of disposing of waste in its place and sorting waste according to its type. The application of segregated waste placement is an effort that can be made to reduce the burden of waste in waste management (Wang

et al., 2019). Waste segregation is the initial stage that makes the waste management system effective (Maulina, 2012), because it facilitates the classification of waste that can be useful, recycled, and that cannot be utilized (Andina, 2019). The behavior of sorting waste instills children's awareness of waste problems, especially in the school environment which is the largest producer of waste in addition to markets, households, industry, and offices (Kurniati et al., 2019).

Waste sorting behavior facilitates the process of further waste management. Processing of organic waste when mixed with inorganic waste will be difficult to decompose and difficult to become compost. Handling organic waste, for example by using the takakura method, namely the shape and type of organic waste when cut into small pieces will facilitate the composting process (Maulina, 2012). Grouping the types of inorganic waste will make it easier to recycle, because a recycling process will produce good results if you have similar materials. Meanwhile, mixed types of waste will delay the management process, and result in unpleasant odors, invite disease, and damage to the surrounding environmental conditions (Paradita, 2018). The selection of waste makes it easier for students to recycle non-biodegradable waste such as plastic bottles to reduce environmental problems. The biodegradation of one bottle of PET (polyethylene terephthalate) left in nature can last about 500 years, causing various environmental problems for both land and sea areas (Orset, Barret, & Lemaire, 2017). Schmidt et al., (2020) evaluated the relationship between recycling rates and environmental problems using the example of plastic packaging waste in Austria. The results show that a high recycling rate has a better impact on the environment.

Reducing environmental problems can help create the principle of sustainability. Environmental resources, as well as multidisciplinary sustainable development, are very important as basic human needs (Mikulčić et al., 2020). Behavior is said to be socially sustainable if it conforms to social norms and does not exceed the limits of tolerance for change (Grilli & Notaro, 2019). Waste management is important to the principle of sustainability to overcome the negative impacts of waste and environmental problems. Waste management by applying sustainable principles is considered effective to reduce the cost of collection, transportation, and management (Apinhapath, 2014).

Things that can help schools fulfill a sustainable environment are by increasing students' skills and knowledge about sustainable development, increasing schools' social responsibility for environmental protection and saving resources, and expanding knowledge about global environmental issues (Ali & Anufriev, 2020). The application of waste sorting behavior will increase if students are given an in-depth understanding of a sustainable environment. Robina-Ramírez et al., (2020) showed that sustainability education and environmental emotions influence students' sustainable behavior in schools. Not only the environmental knowledge that students have but also the emotions that are triggered to influence the behavior of other students. Theoretical and empirical learning related to a sustainable environment contributes to changing students' behavior in the environment (Robina-Ramírez et al., 2020). Environmental attitudes and perceptions, especially in the field of waste management, affect individual behavior towards waste packaging (Escario, Rodriguez-Sanchez, & Casaló, 2020). This is also following (Sánchez-Llorens, 2019) who analyzed the environmental awareness of elementary and junior high school students and that environmental education has succeeded in guiding the community toward sustainable development. Environmental education teaches students attitudes, knowledge, values, and behaviors that support environmental sustainability.

Sustainable waste management for students begins with knowledge, attitudes, and practices. Knowledge refers to students' understanding of the topic of waste selection. Attitude refers to the behavior and feelings of students towards the selection of sustainable waste. Practice refers to the way they apply knowledge in sustainable waste management. Sustainable waste management education can be started in a school environment that is oriented to sustainable principles so that it can become a role model for waste management in the home and community environment. This is also in line with Gusti et al., (2015) whose research states that knowledge has a positive relationship with sustainable waste management behavior.

Conclusions and Recommendations

The results showed that there was a strong correlation between the application of sustainable principles and students' waste sorting behavior with a Pearson correlation value of 0.689 and the form of the relationship between the two variables, namely positive. Researchers suggest that further research can examine the relationship between the two variables in terms of demographics, such as age, gender, and so on.

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