

Creativity in Utilizing Waste into Functional Products as the College Students' Concern toward the Environment

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Abstract

This research presents the creativity of the college students of Biology Education Study Program of Universitas Tanjungpura in processing and utilizing both the organic and inorganic waste into several functional products. The type of this research is qualitative research with a descriptive approach to describe the types of useful products from waste made by the college students of Biology Education Study Program. The product assessment is carried out by 3 validators, who are 2 lecturers at IKIP PGRI Pontianak and 1 lecturer at the Faculty of Education and teachers training (FKIP) of Universitas Tanjungpura. The creativity of the college students in utilizing waste into functional products produces several products in the form of foods and crafts. Moreover, the food products include Empek-empek mackerel fish bones, chicken intestine nuggets, avocado seed cookies, watermelon skin sweetmeat, jackfruit seed chips, and fluffy mini pancake banana peel. Then, the handicraft products include piggy banks made from used bottles, bags made of jerry cans and patchwork, miniature of trees with lights and electrical terminals made from old newspapers and old tires, and the bracelet friendship summer. Finally, the validator's assessment of the food products is in the range of 2 - 5, while for the handicraft products is in the range of 2 - 4.5.

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Introduction

According to Peraturan Pemerintah (Government Regulation) No. 85 of 1999, waste is the residue from a business or activity which can be in the form of solid, liquid, or gas. It can be whether either including B3 or not including B3. In addition, according to UU no. 18 of 2008, residual or garbage from human activity can also be called waste (Hendri et al, 2017). Somehow, the increasing number of people in Indonesia can have an impact on the high volume of household waste that will be generated (Hasibuan, 2016). In general, the higher the level of waste formed, the higher level of production and consumption by the community. Therefore, this makes cities that have a high standard of living will produce more waste compared to cities that have a low standard of living (Sidik, Konety, & Aditiany, 2018). In addition, the condition of increasing waste is feared to cause a decrease in the quality of the environment (Prajoko, 2017).

The increase in the productive rate of waste or garbage is not only in line with the population growth, but also with the increasing consumption pattern of the community. In addition, the capacity for handling waste by the community and the local government has not been optimal (Putra, Setyowati, & Apriyanto, 2019). Somehow, the environment and the health of the community can be affected by waste that is not

managed properly. Currently, social and society awareness in keeping the environment is still relatively low. This is known by their daily life that produce much larger amounts of household waste than industrial waste (Sidik, Konety, & Aditiany, 2018).

The impact caused by waste can be minimized by making some efforts including increasing public awareness about the importance of caring attitudes and behaviors towards the environment. Basically, humans have knowledge, attitudes, and skills about how to think and act intelligently towards the environment (Muhaimin, 2015; Kurniasih et al., 2022). In addition, the community is an important resource for the environmental management goals (Krisyanti, Sirumeang, & Priliantini, 2020). Therefore, the acts of environmental conservation and related support are needed to reduce the amount of waste. One of these supports can be as utilizing waste both organic and inorganic into several functional products.

An example of the waste management in Pontianak city, Kalimantan, Indonesia has been carried out by a home industry that produces tofu, which are managing tofu waste into tempeh. Then, the processed tempeh made from tofu dregs can be resold. However, not all home industries know the optimal processing process. Somehow, there are still some tofu home industries that cause environmental pollution by simply disposing of waste or tofu dregs (Rahayu et al: 2016). That is why processing both organic and inorganic waste into functional products is expected to increase students' awareness toward the environment.

The college students of the Biology Education Study Program of FKIP Universitas Tanjungpura as part of the community are expected to also be involved and actively participate in the processing of both organic and inorganic waste into some products that have useful values. So that they can further increase the students' awareness toward the environment. Therefore, research was carried out on the creativity of the college students of the Biology Education Study Program of FKIP Universitas Tanjungpura to find out the types of useful products from waste in the entrepreneurship college course that could be produced. Moreover, this research is also expected to foster a sense of care for college students of the Biology Education Study Program of FKIP Universitas Tanjungpura toward the surrounding environment and minimize the waste heaps.

Methods

This research was conducted in July using a qualitative research type with a descriptive approach. Somehow, the descriptive approach used in this research is intended to describe the creativity of college students of the biology education study program of Universitas Tanjungpura in managing waste into products that have useful values, to know, and to describe the types of useful products from the waste. Moreover, the data collection techniques used include observation and documentation. Then, the data collected is analyzed, interpreted, and described. The analysis was done with the following steps:

- a. Recapping the questionnaire data / product assessment sheet in the form of a scale of 1 to 5,
- b. Summing up the scores for each aspect of the college students' creativity, and
- c. Calculating the average for each indicator (Riduwan, 2010).

The product assessment was carried out by 3 validators, who are 2 lecturers at IKIP PGRI Pontianak and 1 lecturer at the Faculty of Education and teachers training (FKIP) of Universitas Tanjungpura. The product assessment sheet is based on Ansori (2017), which are:

- a. Management skills, which are the ability to choose themes, find information, and complete products.
- b. Relevance, which considers aspects of knowledge and skills based on conformity with the college courses and themes.
- c. Authenticity, which the product considers the contribution of the lecturer by giving the instructions and support for the completion of the products produced by the college students. However, it must be their own work.
- d. Innovation and creativity, which the products produced by the college students contain new or current elements and something that is unique or different from usual.

Then, the results of the product assessment were obtained by finding the average scores of the assessment by the 3 validators from each aspect of the assessment.

Results and Discussion

Creativity of the college students in utilizing waste into functional products produces several products in the form of foods and crafts. First, the food products include *Empek-empek* mackerel fish bones, chicken intestine nuggets, avocado seed cookies, watermelon skin sweetmeat, jackfruit seed chips, and fluffy mini pancake banana peel. Next, the handicraft products include piggy banks made from used bottles, bags made of jerry cans and patchwork, miniature of trees with lights and electrical terminals made from

old newspapers and old tires, and the bracelet friendship summer. The results of waste processing products into functional products can be seen in the figure 1 below:

The Food Products



(a)



(b)



(c)



(d)



(e)



(f)

The Handicraft Products



(g)



(h)



(i)



(j)

Figure 1. Processed waste products into several functional products (a) *Empek-empek* mackerel fish bones, (b) chicken intestine nuggets, (c) avocado seed cookies, (d) watermelon skin sweetmeat, (e) jackfruit seed chips, (f) Fluffy Mini Pancake Banana Peel, (g) piggy banks made from used bottles, (h) bags made of jerry cans and patchwork, (i) miniature of trees made from old newspapers and old tires, and (j) Bracelet Friendship Summer.

The results of the assessments of the 3 validators for the products above can be seen in table 1 below which is based on the assessment intervals by Riduwan (2010) and Ansori (2017) as follows:

Table 1. The Assessment Results of Functional Products from Waste

Aspect	Products									
	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4
Theme Suitability	4	5	4,5	4,5	5	4	4,5	4	4	3,5
Product Authenticity (Creation and Innovation)	3,5	4	4	4	4,5	4	3,5	4	3,5	3,5
Taste	2,5	3,5	4,5	4	4,5	4				
Color	2,5	3,5	4	4,5	4	3	4	3	3,5	2,5
Aroma	3	3,5	4	3,4	4	3				
Texture/Looks	3,5	3,5	4,5	4	4,5	3	4	3,5	3,5	2,5
Function	4	3,5	4	4	4	3,5	3,5	3,5	3,5	2,5
Physical Form/Packaging	4	3,5	4,5	4	4,5	2	3,5	3	4	2,5
Total	3,4	3,75	4,25	4,06	4,375	3,3	3,8	3,5	3,6	2,8

Notes:

A1 = *Empek-empek* mackerel fish bones

A2 = Chicken intestine nuggets

A3 = Avocado seed cookies

A4 = Watermelon skin sweetmeat

A5 = Jackfruit seed chips

A6 = Fluffy Mini Pancake Banana Peel

B1 = Piggy banks made from used bottles

B2 = Bags made of jerry cans and patchwork

B3 = Miniature of trees made from old

newspapers and old tires

B4 = Bracelet Friendship Summer

Instead of providing an assessment in the form of numbers, related to the functional products that are produced, there are also product-related descriptions. The description of the results can be seen in the table 2 as follows.

Table 2. The Results Description of the Functional Products from Waste

Product	The Description Results
<i>Empek-empek</i> mackerel fish bones	<ol style="list-style-type: none"> 1. Maximum utilization of the mackerel fish bones as the basic ingredient of the processed foods. 2. The need of technological aids to grind the bones
Chicken intestine nuggets	<ol style="list-style-type: none"> 1. The utilization of chicken intestines to produce nuggets is maximized. 2. The taste of the nugget that is made is almost the same with the original one. However, it just needs ways about how to get rid of the smell and mucus
Avocado seed cookies	It displays cookies products with different ingredients from the usual products on the market
Watermelon skin sweetmeat	The idea comes up about the creativity of utilizing watermelon skin which was considered as a trash.
Jackfruit seed chips	Introducing to the public about other benefits of jackfruit seeds for processed food products that are different from the previous ones.
Fluffy Mini Pancake Banana Peel	Banana peels that were considered as a trash can be transform into good food.
Piggy banks made from used bottles	<ol style="list-style-type: none"> 1. Utilizing the unused plastic bottles, so that it can reduce pollution. 2. Variations in adding accessories to the piggy bank can increase to the beauty value of the product.
Bags made of jerry cans and patchwork	The idea comes up about the creativity of utilizing some jerry cans for containers
Miniature of trees made from old newspapers and old tires	Utilizing used wood and old newspapers as the main ingredients for the craft products
Bracelet Friendship Summer	Utilizing the solid waste of shellfish which are produced in large quantities.

Making functional products from waste can be a real experience for college students in realizing their care toward the environment because they did and went through the process of sorting waste and utilizing

the waste directly into the products. Then, based on the results of the study, it is found that the products produced by the college students were divided into food products and handicraft products. First, the food products include *Empek-empek* mackerel fish bones, chicken intestine nuggets, avocado seed cookies, watermelon skin sweetmeat, jackfruit seed chips, and fluffy mini pancake banana peel. In addition, from the food products except chicken intestine nuggets, the others have been developed as the recycled and reprocessed waste products. Next, the handicraft products include piggy banks made from used bottles, bags made of jerry cans and patchwork, miniature of trees made from old newspapers and old tires, and the bracelet friendship summer.

There are several aspects of assessment for each product produced by the college students. In the aspect of theme suitability of the 10 products, the range of score is 3.5 - 5. This score illustrates that there are still some products that do not match with the theme related to the use of waste as a functional product as a concern for the environment. Moreover, In the aspect of product authenticity related to creation and innovation, the score ranges from 3.5 to 4.5. Then, in the aspect of food taste for the food products, the score ranges from 2.5 to 4.5. Next, the color aspect score ranges from 2.5 to 4.5. Then, the aspect of aroma for the food products gets the range score of 3 - 4. Moreover, the texture / looks aspect gets the score ranges from 2.5 to 4.5. Next, the function aspect gets the range of score from 2.5 to 4. Then, aspect of physical form / packaging gets the score ranges from 2.5 - 4.5. Finally, the packaging aspect gets the score range of 2 - 4.5. However, some aspects still don't get perfect scores because there are still some points that can still be improved more and more. This can be seen in the products description table, for example in the chicken intestine nuggets, the score is 3.5 out of 5 on the taste and aroma aspects with the description of the taste that are made like the original ones, and it just needs ways about how to get rid of the smell and mucus of the chicken intestines that will be processed.

The product processing by utilizing waste can be seen from the basic materials used to process the functional products. *Empek-empek* mackerel fish bones is a food product that is made of mackerel fish bones. According to Putri & Nugroho (2019), until now fish bones have not been optimally processed and utilized and only become the residual of ground fish. Next, Chicken intestine nuggets processes chicken intestines which have so far been used as intestine satay. Somehow, it is only around Java area (Tasse, Fitriyaningsih, & Sutopo, 2019). Therefore, it is very possible to process these chicken intestines into various other food products. Next, Avocado seed cookies processes avocado seeds which were only used as waste due to lack of knowledge to process them (Halimah, Istiqomah, & Rohmah, 2014). Next, Watermelon skin sweetmeat processes the part of the watermelon that cannot be consumed. Therefore, it can be processed into watermelon sweetmeat (Sukarno, Safii, & Chasanah, 2020). Next, Jackfruit seed chips process jackfruit seeds which were waste for the consumers of jackfruit (Handayani, 2016). Next, Fluffy mini pancake banana peel processes banana peel waste that is widely available in Indonesia. However, it is still less attractive for industries. That is why, there is a huge amount of banana peel accumulation (Anwar, Septiani, & Nurhayati, 2021). Next, Piggy banks made from used bottles utilize the used goods into handicrafts as a solution to convert waste which is the used bottle into useful goods (Khalil et al, 2021). Next, Bags made of jerry cans and patchwork utilize jerry cans and patchwork which were generally waste which might be problems and might lead to environmental pollution (Mulyani et al, 2021). Next, Miniature of trees made from old newspapers and old tires that use old newspapers and old tires to minimize inorganic waste (Suprihatin & Susilowati, 2021). Last, Bracelet Friendship Summer utilizes solid waste which is shells that are produced in large quantities (Agustini et al., 2011). Somehow, efforts are required to make the shells become useful and reduce bad impacts for humans and the environment.

The manufacture of products using basic products from waste aims to at least reduce environmental problems such as waste / garbage which is constantly increasing more and more over time. Then, this effort was carried out by reusing and reprocessing materials that might have the potential to cause waste and have a negative impact on the environment by recycling organic waste (food residual / leftovers, vegetables, and fruits) or inorganic waste (glass pieces, used or old tires, newspaper, plastic, and rubber). The food products used the organic waste, which is an action of utilizing waste, especially as an alternative to have new food sources. Then, the handicraft products used inorganic waste as the basic materials which are difficult to biodegrade. Therefore, they were used as useful or functional products by processing or recycling them (Ridwan, Nurfaida, & Mantja, 2016). Last but not least, managing waste / garbage basically requires an active role from the community, especially to reduce the amount of waste heaps by sorting out the types of waste to try to make waste becomes more useful (Sidabalok, Kasirang, & Suriani, 2014).

Conclusions and Recommendations

From the research results of processing waste into functional / effective products to reduce environmental problems, the college students of the Biology Education Study Program of FKIP Universitas Tanjungpura produced two types of products. They are food products made from organic waste and handicraft products made from inorganic waste which are attractive and worth it for sale. Moreover, this research is expected to contribute and educate the community, especially other college students, so that they can process and utilize waste with the aim of reducing the impact of environmental damages. Then, for further research, it is expected to be able to provide new innovations to reprocess materials / waste more creatively and innovatively.

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