

Utilization of Palm Broom Cutting Waste in Making Briquettes as a Potential Alternative Energy Source

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Article Information	ABSTRACT
Article History Received : October 02, 2024 Revised : December 20, 2024 Published : January 10, 2025	The development of the industry continues to grow and produce products that continue to have useful functions. Production in the manufacture of goods has important industrial problems that must be managed. In the process of producing coconut brooms, there is coconut fiber waste from cutting, where the waste if left alone will become garbage and be thrown away. In the study using quantitative descriptive research methodology, namely by explaining how to make briquettes from coconut broom waste and then calculating the benefits that can be obtained from the waste if used as charcoal briquettes. Coconut broom waste will be used as briquettes that have economic value and can be used as potential economic value for the surrounding community. This study is a continuation of previous studies. This study has a novelty located in the raw material from coconut broom waste where waste that is usually thrown away and becomes unused waste, in this study we utilize it into a material that has economic value, namely made into briquettes. Furthermore, after the briquettes are made, the briquettes will be analyzed by looking at the Economic Feasibility Analysis, namely how much capital is needed and how much profit can be obtained, in this study the profit that can be obtained is IDR. 43,000.00 if we sell 10 packs for IDR. 10,000.00/pack..
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INTRODUCTION

The progress of this industry is like a double-edged sword, because apart from helping a lot of human performance, industrial development also has a negative impact, namely industrial waste. (Izzati, 2022). Many large companies produce waste that is difficult to decompose, such as plastic, styrofoam, etc. (Warlina, 2019). However, the government as a policy maker continues to make efforts to create regulations for waste management and is advised not to dispose of it carelessly, especially B3 waste (Fitriyani, 2017). This has made many companies start to cooperate with parties who have the authority to manage waste in order to reduce pollution. Among the waste management methods is implementing the 3R system (Reduce, Reuse, Recycle) (Nursalim, 2020). Namely by reducing, reusing, and recycling the waste produced (Mukti, 2022).

One of the methods used in waste management in this study is 3R (Reuse, Reduce, Recycle). Where waste from cutting which is usually thrown away or left alone, this time it will be tried to change it into a product with economic value. That way it can reduce environmental pollution, even though the waste produced is organic waste that can be used as alternative energy. (Arisona, 2018). Alternative energy is energy that is developed in the present time and the main problem of the world today (Kholiq, 2015). Every year with the increasing human activity that

uses fuel, especially fuel oil obtained from plant and animal fossils (Sulistyaningkartti, 2017). The depletion of fossil fuel reserves will have an impact on the economy. Fossil fuels have now become a common fuel used to meet energy needs, while users sometimes do not consider that the energy source is non-renewable. (Kholiq I. , Analisis pemanfaatan sumber daya energi alternatif sebagai energi terbarukan untuk mendukung substitusi BBM, 2015).

Briquettes are a type of fuel that contains carbon, has a high calorific value and can burn for a long time. (Allo, 2018). In making briquettes in previous studies, people used additional materials in the form of coconut shells (coconut shells) with a binder made of starch or tapioca flour. The purpose of adding glue is to improve the physical properties of the shell and also to increase the calorific value. (Kapita, 2021). In this study, the manufacture of briquettes in the utilization of waste from the coconut broom production process, there are several problems that have not been solved, one of which is the waste produced from the production process. Although the waste produced is organic waste, if left unmanaged it will accumulate and take up space (Suryati, 2014). Therefore, it would be better if a solution was found in the management of each of these wastes so that they can have economic value. (Khalil, 2021). Some waste can be reused, but there are some parts of waste that are still not managed properly.

The waste from the coconut broom production process that this research will use is the waste from cutting coconut brooms that have carbon fibers that can be used to make charcoal briquettes. Utilization of this waste is one of the very important efforts to be utilized so that it becomes a potential economic value to be utilized by the community. (Nursindi, 2023). This research will later continue into applied research and community service. At this research stage, it begins with preliminary research by directly visiting the coconut broom manufacturing factory, where we will later collect the remaining waste from the coconut broom manufacturing process. After that, we will try to make briquette products from the waste from the coconut broom manufacturing process and analyze its economic feasibility to be a reference for further research to be used as applied research or community service that has economic value for the surrounding community. In previous research, making charcoal briquettes from organic waste from corn cobs determined the right type of adhesive to make charcoal briquettes from corn cobs to produce briquettes with good quality. (Sulistyaningkartti, 2017). Next, we will find out the effect of variations in mold temperature on the characteristics of sengon wood briquettes by testing their physical, chemical and mechanical strength properties. (Satmoko M. E., 2013). The materials used in this study were sengon wood powder obtained from the wood processing industry in Gunung Pati sub-district. (Satmoko M. E., 2013).

In our research in 2023, it was included in the Sinta 4 journal, then this year we hope to continue this research, namely the manufacture of charcoal briquettes from student waste from cutting in making palm fiber brooms. We hope that the next stage of research can be applied research and can be implemented in the community as PKM (Community Service) so that it can be useful for the surrounding community. The novelty of this research is that in this research the briquettes that the researcher made used waste from the palm broom making process to be utilized as a potential energy source, then the quality of the briquettes made from palm broom making waste will be analyzed and its economic feasibility will be analyzed. The research roadmap is as follows:

RESEARCH METHODS

This study will use waste from the palm broom production process, where there are several problems that have not been solved, one of which is the waste produced from the production process. Although the waste produced is organic waste, if left unmanaged it will accumulate and take up space (Mursiti, 2022). Therefore, it would be better if a solution was found in the management of each of these wastes so that they can have economic value. (Kanan, 2021). Some waste can be reused, but there are some parts of waste that are still not managed properly. The following are the research steps that we will take to achieve the targeted output targets, which can be seen in the flow diagram below:

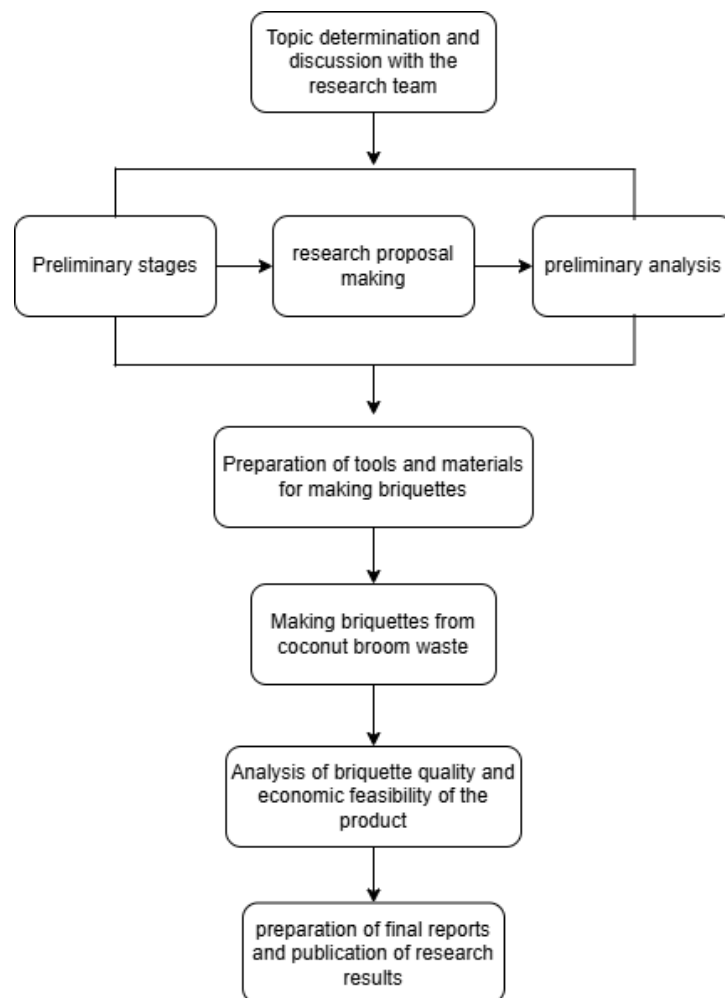


Figure 1. Research Flow Diagram

This study uses a quantitative descriptive research methodology, namely by explaining how to make briquettes from waste from cutting coconut brooms and then calculating the benefits or economic value that can be obtained from the waste if it is made into charcoal briquettes. The novelty of this study is the manufacture of briquettes from coconut broom waste so that in subsequent studies the quality of the briquettes formed can be tested so that the price can be increased again and the economic value increases.

RESULTS AND DISCUSSION

Briquette Making Process

In the production process of coconut brooms, there are several problems that have not been solved, one of which is the waste produced from the production process. Although the waste produced is organic waste, if left unmanaged it will pile up and take up space. Therefore, it would be better if a solution was found in managing each of these wastes so that they can have economic value. Some waste can be reused.

This waste is produced from cutting the tip of the material/coir head with the aim of making the coir even or neat. From 100 kg of material, an average of 4-5 kg of this cut waste will be produced. For this waste, there is no management and utilization, it is only burned and left alone so that the waste can be utilized as follows.



Figure 2. Waste from cutting patterns/cutting and burning

Utilization of coconut broom waste requires coconut broom waste, starch and a press tool. First, the coconut waste is burned with airless combustion to produce imperfect combustion in the drum. The drum is given a small cavity so that the fire does not go out and imperfect combustion continues. The results of the combustion charcoal are mixed with starch flour. The recommended mixture of starch flour is 1:3 with finely ground charcoal. So if there are 3 kg of charcoal produced, 1 kg of starch flour is needed to be used as a mixture with briquette charcoal.



Figure 3. Mixing starch and charcoal grinding



Figure 4. Press and Printing Process

The pressing process uses a PVC pipe and a wooden pusher that is shaped according to the size of the PVC hole. Insert the mixed charcoal mixture then press until it comes out of the PVC. Cut to the desired size.

Economic Feasibility Analysis Calculation

In processing palm fiber waste into charcoal briquettes, capital is very minimal because many tools and materials are used in the area, the details are as follows:

Table 1. Prices of Manufacturing Tools

No	Tools & Materials	Price (Rp)	Amount	Total Price (Rp)
2	Drum	100,000	1 piece	100,000
4	Printing Tools (manual from PVC pipe)	50,000	1 piece	50,000
Total				150,000

Table 2. Price of Manufacturing Materials

No	Tools & Materials	Price (Rp)	Amount	Total Price (Rp)
1	Palm Fiber Waste	0 (Free)	Bag	0
3	Starch	5000/Kg	9 Kg	45,000
5	Plastic packing	200/pcs	10 pcs	2,000
6	Logo Stickers	500/pcs	10 pcs	5,000
Total				57,000

Since the amount of charcoal that has been obtained is 3kg to 4kg, then we take an average estimate of the waste obtained as much as 3kg, then around 9kg of starch is needed to mix 3kg of coconut broom waste to make briquettes. After going through the production and drying process, the charcoal briquettes produced are 10kg to 12kg of briquettes produced. If you look at the market price in several marketplaces such as Shopee, Tokopedia, and Lazada, they sell charcoal briquettes at prices starting from IDR 9,000 / kg - IDR 15,000 / kg. If we try to sell it to the nearest stalls at a price of IDR 10,000 / kg, then the turnover obtained from 10kg is IDR 100,000 / production. The initial capital price for the ingredients is IDR 57,000 so that a profit of 43,000 is obtained for each production.

CONCLUSION

Conclusion

A waste or garbage that was initially looked down upon, by conducting research and the right methods, finally a new product can be created that can be a source of income. In addition to reducing accumulation, waste that has been processed has economic value in this study, the profit obtained can reach Rp. 43,000.00 / production. This will certainly be a new source of income if it is really managed properly. Then from the HR side it also has an influence in managing the waste processing process. By providing education and references from various sources can increase knowledge for employees. So that it can be applied in small and large industries by forming a special management team to manage and distribute it.

Suggestion

Several things that need to be evaluated after processing the waste of coconut fiber into charcoal briquettes. Need to procure serious equipment such as a special shelter. Must create an integrated system so as not to interfere with the broom production process. Need additional human resources if it is really going to be realized and must find a wider market. The conclusion contains a summary of the results of the discussion and generalization of the results of the research conducted. Based on these conclusions, the author can also provide suggestions for practical action, theory development, and further research.

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