Utilization of Coconut Shell Waste into Energy: Training for Small and Medium Enterprises" in Pasar Minggu Area, South Jakarta

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Abstract.

Indonesia is a tropical country with a wealth of coconut trees widespread in almost all of its territory, from Sumatra to Papua. This coconut tree has great potential that has not been fully utilized until now. Although almost all parts of the coconut have been utilized, most coconut fibers and shells are still wasted. This program aims to encourage sustainable and productive waste utilization and support the creation of independent and productive local entrepreneurs. With a focus on empowering SMEs based on local resources, this program is also expected to be able to contribute to improving the local economy and expanding employment. So that partner SMEs can produce high-quality coconut shell charcoal briquettes that are ready to be marketed and Increase the knowledge and technical skills of the trainees in processing coconut shell waste. The method of implementing the PKM program is carried out systematically through several stages to overcome the main problems faced by small and medium enterprises (SMEs) in Pasar Minggu, South Jakarta in the field of production, management, and marketing of briquette products from coconut shell waste. The implementation of this PKM program proves that with the right training, the community can be invited to utilize organic waste in products with economic value. One of the key aspects of the success of this program is involving the community in every stage of the activity. Thus, the community not only becomes passive beneficiaries but also plays an active role in the development of solutions that are by field conditions. Improving business management knowledge and skills is also an important point. The training conducted not only focused on the technical aspects of making briquettes but also on how to manage small businesses effectively with business management, as well as product marketing.

Keywords: *Renewable Energy; Briquettes and Waste.*

1. INTRODUCTION

Indonesia is a tropical country with a wealth of coconut trees widespread in almost all of its territory, from Sumatra to Papua. This coconut tree has great potential that has not been fully utilized until now. [1] . Although almost all parts of the coconut have been utilized, most of the coconut fibers and shells are still wasted as waste [2]. Coconut shells can be processed into charcoal which is then processed into briquettes. Coconut shell charcoal briquettes are used by the community for household, business, and industrial needs [3].

Today, the main use of briquettes is as fuel for barbeques, while the smoke is used in shisha. Barbeque is a method of cooking meat on a grill using briquettes as fuel, while sisha is a device that emits smoke with water as a filter. Briquettes for barbeque and sisha are widely exported outside Indonesia [1]. The process of making coconut shell charcoal briquettes includes several stages. The coconut shell is first cleaned of the remaining fibers, then dried in the sun or heated until dry. After that, the dry shell is heated in a pyrolysis process at 100–150 °C for about 6 hours until the smoke no longer escapes. The resulting charcoal is then ground into a fine powder, then filtered to obtain

uniform-sized particles. This charcoal powder is mixed with adhesive and molded, then dried in the sun or an oven at 100 °C [5].

The use of briquettes from coconut shell waste is in line with the need for alternative fuels as fossil energy sources continue to decrease. The increase in the world's population and economy also increases energy needs. Indonesia, through the National Energy Management Blueprint 2006–2025 issued by the Ministry of Energy and Mineral Resources, targets a reduction in the use of petroleum to 26.2% by 2025, as well as an increase in the contribution of natural gas, coal, geothermal, and other renewable energy to reach 15% [6].

Coconut shell briquettes are one example of a new energy that is currently trending in the management of alternative energy in the community [5] Briquettes are solid fuel blocks used to light and maintain flames. Briquettes from coconut shells are classified as biomass briquettes, which are a source of renewable energy and have great potential as an alternative fuel. [8] Coconut shell briquettes have many advantages over other types of briquettes such as wood powder or rice husks. With a higher calorific value, these briquettes can produce stable and long-lasting heat, as well as produce less smoke and odor, making them ideal for indoor use. Coconut shell briquettes are also more dense, durable, and easy to store without being easily destroyed compared to other biomass materials. In addition, the abundant coconut shell waste in Indonesia makes it environmentally friendly and has high export potential for barbeque and shisha. With little ash residue, these briquettes are practical and efficient, making them a superior alternative fuel option and economic opportunity for society. For this reason, there needs to be an effort to increase public understanding of the importance of making and using coconut shell charcoal briquettes as an alternative fuel

II. METHODS

The method of implementing the PKM program is carried out systematically through several stages to overcome the main problems faced by small and medium enterprises (SMEs) in Pasar Minggu, South Jakarta in the field of production, management, and marketing of briquette products from coconut shell waste. This program aims to support SMEs in managing coconut shell waste into products with economic value, especially as an alternative fuel. Implementation involves the active participation of SME partners with periodic evaluations to ensure the sustainability of the program.

Implementation Stages in the first stage of socialization and training on Processing Coconut Shell Waste into Briquettes to SMEs in Pasar Minggu regarding techniques for processing coconut shell waste into briquettes with economic and environmentally friendly value. Socialization and utilization began with an opening from representatives of local SMEs and PKM team leaders. The material is given through presentations that cover the benefits, concepts, and steps of making coconut shell briquettes. Before the activity, the PKM team distributed an initial questionnaire to find out the participants' level of knowledge related to alternative energy and the potential for coconut shell waste as fuel. This data is used to adjust PKM materials to be more relevant and useful for participants.

The next stage of Briquette Production Skills Improvement was continued with a direct demonstration of manufacturing techniques, from cleaning coconut shells, pyrolysis processes to produce charcoal, to briquette printing. This demonstration aims to make it easier for SMEs to understand the practical manufacturing process, ranging from simple techniques that are easy to apply, to efficient drying methods.

The next stage is Strengthening Business Management through Financial Training and Price Calculation This program also provides simple business management training, such as financial recording and product selling prices. SMEs will learn how to record expenses and income, calculate cost of production, and set competitive selling prices. This training aims to equip SMEs with basic skills, so that businesses can run sustainably and efficiently.

The next stage is Marketing Development through Digital Marketing Socialization. Given the importance of market access, the next stage is digital marketing training that covers how to leverage

social media and e-commerce platforms. SMEs will study promotional strategies to expand the marketing reach of briquette products, both inside and outside the Pasar Minggu area. With this training, it is hoped that SMEs will be able to introduce their products to a wider market and increase competitiveness.

The next stage is the Focused Group Discussion (FGD). After the socialization and training materials, the PKM team held an FGD as a forum for discussion and open consultation. In this FGD, participants can ask questions related to obstacles or challenges that they may face during the production and marketing process. This forum provides an opportunity for the public to share ideas, opinions, and experiences, as well as get solutions from the PKM team and other fellow participants.

The next stage is Activity Evaluation through Questionnaires and Observations at the end of the program, the PKM team distributes evaluation questionnaires to measure participants' understanding of the material and the impact of the training. In addition, the PKM team will hold direct observations to assess the results of the briquette production practices that have been carried out by the participants. This evaluation ensures the effectiveness of implementation methods and provides insights into the results achieved by partner SMEs.

The participation Partners and SMEs in Pasar Minggu are actively involved in all stages of the program, ranging from socialization, and training, to FGD. Each member is expected to follow all activities and apply the skills learned in their business.

Program Evaluation and Sustainability is conducted through questionnaires and FGDs, which aim to measure the understanding and skills gained by partners after participating in activities. Periodic evaluations will be carried out to monitor the development of community businesses and the sustainability of the program. The PKM team also provides an ongoing consultation forum so that partners can continue to receive guidance related to the management of the briquette business.

Students involved in this program will gain practical experience in managing community service activities, which can be recognized as credit recognition. Their involvement in the delivery of materials, community assistance, and evaluation of program results provides added value in the development of soft skills and their understanding of the implementation of solutions based on community needs.

III. RESULT AND DISCUSSION

The Community Service Program (PKM) in Pasar Minggu, South Jakarta, has been implemented by the plan and stages set, and the results show significant things in its implementation where the training on the Processing of Coconut Shell Waste into Briquettes has succeeded in increasing the knowledge of the local community, the results of the initial questionnaire and evaluation showed a good improvement in the participants' knowledge about the process of making briquettes and Improvement Briquette Production Skills. Participants also gained new knowledge related to coconut shell waste management through presentations and discussions that helped them understand important aspects of running a small and medium-sized business with economic and environmentally friendly-value

The response of partners has been overwhelmingly positive, with many participants expressing interest in trying to develop briquette products. This enthusiasm was reflected in very active discussions and question-and-answer sessions during the program. Through the Focused Group Discussion (FGD), various obstacles and challenges in processing coconut shell waste into briquettes can be identified. Some of the obstacles faced by the community include a lack of access to processing equipment, business capital, and technical knowledge. The proposed solutions include ongoing mentoring, the provision of advanced training, and equipment assistance.

The implementation of this PKM program proves that with the right training, the community can be invited to utilize organic waste in products with economic value. One of the key aspects of the success of this program is involving the community in every stage of the activity. Thus, the

community not only becomes passive beneficiaries but also plays an active role in the development of solutions that are by field conditions. Improving business management knowledge and skills is also an important point. The training conducted not only focused on the technical aspects of making briquettes but also on how to manage small businesses effectively with business management, as well as product marketing. This is crucial to ensure the sustainability of newly formed businesses, especially in the face of market competition and economic challenges. However, the success of the program also points to some areas that need further attention. Obstacles such as limited access to equipment and business capital require assistance from relevant parties, including the government. Support in the form of funding and provision of facilities can be key to sustainably accelerating the goals of PKM.

Overall, the PKM program has succeeded in achieving the program's goal of encouraging sustainable and productive waste utilization and supporting the creation of independent and productive local entrepreneurs. With a focus on empowering SMEs based on local resources, this program is also expected to be able to contribute to improving the local economy and expanding employment.

Fig 1. participants and community service team

Fig 2. Discussion and Q&A of community service participants

Fig 3. Presentation and training of Community Service material

IV. CONCLUSION

The Community Service Program (PKM) in Pasar Minggu, South Jakarta, has succeeded in achieving its goal of increasing community knowledge and skills related to the use of coconut shell waste in briquettes. The socialization and training carried out showed an increase in participants' knowledge about the briquette-making process. In addition, participants gained new knowledge about business management which is important to run small and medium businesses into products of economic value.

The positive response from the community, accompanied by interest in producing briquettes independently, indicates that the participatory and educational approach in this program has succeeded in mobilizing community interest and involvement. Focused Group Discussion (FGD) successfully identified the obstacles faced, such as lack of access to equipment and venture capital, and provided relevant solutions to overcome these challenges. The success of this program confirms the importance of support from various parties, including the government to ensure the sustainability and development of renewable energy-based businesses. The PKM program also shows great potential regarding similar problems in other areas with comparable conditions, so a comprehensive strategy is needed to facilitate training. Additional support in the form of funding, training, and facility provision will go a long way in accelerating the success of organic waste-based businesses in the future.

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