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The Utilization of Tofu Pulp Waste to Create New Business Opportunities in Cinangka Sawangan Depok

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Abstract

The focus of this activity is to increase the use of tofu pulp waste into products of economic value through innovation in making tofu pulp crackers in Cinangka Village, Sawangan, Depok City. The implementation method uses a participatory approach with stages of initial survey, socialization and education, practical training, and monitoring and evaluation. The target of the activity is PKK women who have the potential to develop local food-based businesses. The results of the activity showed an increase in the knowledge and skills of participants in processing waste into ready-to-sell products, with a success rate of 90%. The tofu dregs cracker products produced have good taste and are suitable for development as a home business. This activity has a positive impact on community economic empowerment and supports the concept of circular economy through environmentally friendly waste management. Thus, this program can be a model of sustainable service that integrates environmental, economic, and social aspects in one community empowerment activity.

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INTRODUCTION

Tofu is one of the sources of vegetable protein that has an important role in fulfilling community nutrition. In addition to its high nutritional content, tofu also has an affordable price, so it can be consumed by people with a middle to lower economic level. Processed tofu products are very diverse, both as an ingredient in soupy dishes and as an alternative side dish. The high demand for tofu-based products encourages producers to continue to increase their production every year. The nutritional content in tofu is also not inferior to animal protein, where in every 100 grams of tofu there are 82.2 grams of water, 80 calories of energy, 10.9 grams of protein, 4.7 grams of fat, and 0.8 grams of carbohydrates (Subamia, Cahyani, Nocianitri, & Permana, 2020).

The tofu industry itself has been found quite a lot in various regions in Indonesia. The leftover product of tofu is commonly known as tofu dregs. Tofu pulp itself has a high content of carbohydrates and proteins because in the process of making tofu not all carbohydrates and proteins in soybeans can be extracted, especially in the process with traditional tools (Korbafo, Naisali, & Metboki, 2022).

Generally, the tofu industry only produces tofu without having skills in processing by-products that produce tofu pulp to be used as a product that can be consumed.

The tofu pulp produced is often not used optimally and is only used as animal feed. For people who do not know the economic value of tofu pulp, they will consider it as waste that smells bad, so it is thrown away which can potentially pollute the environment, as well as the lack of public understanding of the nutritional value of tofu pulp which results in its use being less than optimal. This is what we found in Cinangka village, Sawangan, Depok City, where the potential for waste is high, especially solid waste which reaches 160% of the weight of soybeans used in tofu so that it provides great waste potential.

Efforts to reuse tofu pulp are expected to reduce the amount of tofu pulp that causes environmental pollution. In addition, the optimal use of tofu waste will also have an impact on the community's economy and help to realize an environmentally friendly industry (Arifianto, A'yun, & Murwati, 2021). The use of tofu pulp waste can be carried out in small-scale industries such as the household industry which are able to create new jobs and play an important role in the economic development of the surrounding community. The processing of tofu pulp waste can be processed into tofu pulp crackers which will improve the welfare of the surrounding community. But most people still lack knowledge about the use of tofu pulp. In addition, the delay in processing tofu pulp becomes rotten so that it emits an unpleasant odor and is then only used as animal feed.

Based on these problems, innovations were made in the use of tofu pulp waste that will be processed into crackers. The processing of tofu pulp waste into crackers will then have high economic value. In addition, this product innovation has good market opportunities because crackers themselves have become a snack known to the surrounding community. In addition to being consumed as a snack, crackers can also be consumed as a complement to side dishes. In addition to the easy technique, the raw materials are also cheap and easy to get.

METHOD

The method used in this activity is a participatory approach through systematic stages and involves the community as the main partner, especially PKK women in Cinangka Village, Sawangan, Depok City. The method of implementing the activity consists of four main stages, namely (1) initial survey, (2) socialization and education, (3) implementation of product manufacturing practices, and (4) monitoring and evaluation.

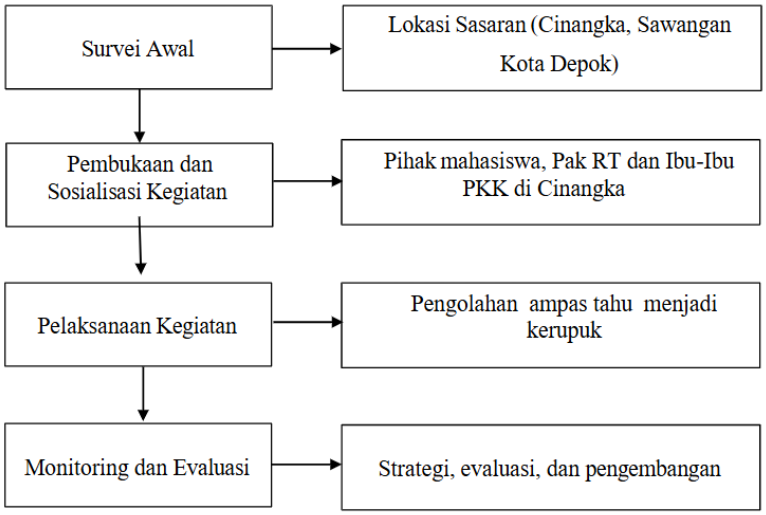

Figure1: Project stages

Initial Survey

The first stage is carried out to identify the potential and problems in the target location, especially related to tofu pulp waste management. Survey activities include interviews with village officials, observations of local tofu industry players, and analysis of environmental conditions. The survey results show that tofu pulp waste has not been utilized optimally and most of it is only used as animal feed.

Socialization and Education

The second stage is socialization of the program to community partners with the aim of introducing the concept of utilizing tofu pulp waste into products with economic value. This activity includes the delivery of material about: 1) The nutritional content of tofu pulp and its economic potential; 2) Principles of circular economy and environmentally friendly waste management, and 3) Introduction to the stages of making processed products in the form of tofu pulp crackers. The target of this activity is a group of PKK women in the Cinangka, Sawangan, Depok area.

Implementation of Activities

This stage is the core of service activities. Participants were given hands-on practical training on making tofu crackers using simple tools and ingredients such as tofu dregs, rice, garlic, salt, and flavorings. The manufacturing process is carried out through several steps:

- Making dough by mixing ingredients according to the measurement,
- Steaming the dough for 30 minutes to remove microbes,
- Grinding and molding the dough into the shape of crackers,
- Dry until completely dry,
- Frying and packaging of products using labeled plastic packaging.

The entire process is carried out with the participants so that they acquire practical skills that can be applied independently.

Monitoring and Evaluation

Evaluations are carried out at the end of the activity to assess the success rate of the program. The instruments used were questionnaires and short interviews with participants. Success indicators include:

- Increasing participants' understanding of the value of using tofu pulp,
- The ability of participants to practice making crackers independently,
- The formation of a post-training small business group initiative.

This service is carried out through several main stages as follows:

Figure 2: Project Timeline

RESULT

This project develops innovations in the use of tofu pulp waste into products of economic value, while reducing the impact of environmental pollution due to tofu pulp waste. Tofu pulp, which has only been considered as waste, still has a high nutritional content and has the potential to be processed into various products such as processed foods, especially crackers.

The scope of this project includes Education and counseling to partners about the use of tofu pulp waste into products that have economic value; The development of tofu pulp-based products; Assessing the impact of this project in reducing tofu pulp waste and community empowerment opportunities through this innovation-based business; Monitoring and evaluation of program sustainability with partners.

Components of this Project include: Provision of tofu pulp waste as the main ingredient in product innovation to be developed; The use of simple or modern technology in developing efficient production methods to process tofu pulp into high-selling value products by considering product quality and durability; The involvement of human resources, namely the surrounding community or PKK women to participate in the innovation and production process to improve product quality; Training and assistance related to the preparation of a sustainability plan so that this project can run in the long term.

Figure 3: Products from Project Results

Tofu pulp waste from tofu production can still be used as culinary products. One of the simple culinary products from the use of tofu pulp waste is crackers. Making these crackers is very simple and can be done on a home scale. This cracker-making training was very conducive both in theory and practice. The delivery of material is carried out during socialization or introduction of the purpose of the first activity.

The second activity of this leadership project is the production of raw crackers. The tools used are basins, boilers, hand plastic, clear plastic and dough grinders. The ingredients used are tofu pulp, crushed garlic, rice, salt and flavorings. Making raw crackers by mixing all ingredients according to the dosage and then the dough is steamed for 30 minutes with the aim of killing the microbes from the tofu pulp. In addition, this steaming also aims to ripen tofu pulp before processing it into crackers. After 30 minutes, the dough is removed and transferred to a basin to be cooled then kneaded using a grinder until it is flattened into crackers. The crackers that have been formed are then dried in the sun until completely dry. Once the crackers are completely dry, the crackers are ready to be fried.

Figure 4: Making cracker dough

The preparation of raw crackers until they enter the drying stage will then be fried. Dried crackers are fried over medium heat to produce optimal crackers. After the crackers are fried, the crackers will be packaged using plastic flip pouch packaging. The packaging is labeled so that the product can be recognized by a wider community. In general, the frying and packaging process is carried out smoothly.

Figure 4: Frying and Packaging of Crackers

Based on the questionnaire distributed after the activity, the results are as much as 90%. Success indicators include 1) the existence of cracker products produced. 2) the level of understanding of classical participants reached 75% with very good and good criteria. During the activity, PKK women enthusiastically followed every stage from making raw crackers, drying, frying to the packaging stage. This enthusiasm is based on the fact (according to them) that the use of tofu pulp waste as food is a new and useful thing.

DISCUSSION

Waste Utilization as an Environmental Management Effort

The results of the activity show that the community is beginning to understand the importance of managing tofu pulp waste productively. This is in line with the concept of the circular economy, which is an economic system that focuses on reusing resources so as not to cause new waste (Macarthur & Heading, 2019). By processing tofu pulp into crackers, the community contributes to reducing environmental pollution while creating added value from organic waste.

Arifianto et al.'s research also supports this result, where training on the use of tofu waste as raw materials for crackers has been proven to be able to reduce the volume of organic waste while opening up new business opportunities for the community around the tofu industry (Arifianto, A'yun, & Murwati, 2021). Thus, this service activity has a dual role: overcoming environmental problems while encouraging community economic empowerment.

Community Empowerment Through a Participatory Approach

The success of this program lies not only in the results of the product, but also in the active participation of the community during the training process. The involvement of PKK women as the main partners shows a community-based development approach, as stated by Campbell, that the success of social development depends on the extent to which the community is involved in the process of planning, implementing, and evaluating programs (Campbell & Vainio, 2003).

In this service activity, tofu pulp is seen not as waste, but as a local asset that can be managed as a new economic source. The collaborative training process strengthens the community's sense of ownership of the results of the activities, so that the opportunities for program sustainability are greater.

Skill Enhancement and Product Innovation

Training in making tofu dregs crackers has succeeded in improving people's skills in processing alternative food ingredients. These findings reinforce the results of Korbafo et al.'s research which shows that training in processing tofu waste into *kipaste chips* improves the technical ability of the community in innovating local food products (Korbafo, Naisali, & Metboki, 2022).

This activity reflects the application of an experiential learning approach, where participants not only receive theoretical material but directly practice making products. Learning that involves hands-on experience can improve knowledge retention and form practical competencies. As a result, participants were able to master processing, packaging, and product hygiene techniques independently.

Economic and Social Impact

The impact of this activity is also seen in increasing motivation and awareness of entrepreneurship. The emergence of new post-training business group initiatives shows that this service can drive socio-economic transformation at the local level. According to Hatu, community empowerment not only aims to create economic independence, but also fosters confidence, social solidarity, and collective ability to manage existing resources (Hatu, 2010). With new skills and understanding, the community has the potential to develop local food-based micro-businesses. This is in line with the findings of Arifianto et al. that processing tofu waste into high-selling value products can create jobs and increase household income, especially for productive women. (Arifianto, A'yun, & Murwati, 2021).

Program Sustainability and Recommendations

Based on the results of the evaluation, this service activity managed to achieve a success indicator of 90% in terms of understanding and skills. However, to ensure the sustainability of the program, it is necessary to provide further assistance in the aspects of business management, marketing, and professional product packaging. Support from local governments or higher education institutions can strengthen the local business ecosystem through advanced training and access to digital markets.

The sustainability of the program is also in line with the concept of sustainable empowerment, which is a process that continuously increases the capacity of individuals and communities to manage their resources independently. Thus, this activity does not stop at knowledge transfer but has the potential to create sustainable and environmentally friendly local economic innovations.

CONCLUSION

This service activity succeeded in increasing the awareness, knowledge, and skills of PKK women in Cinangka Village, Sawangan, Depok City in processing waste into products of economic value. Through participatory training, participants can produce tofu pulp crackers independently so that new business opportunities are created that support the family economy while reducing environmental pollution. The results of this activity also prove that the circular economy concept is effective in empowering the community and encouraging the formation of sustainable small enterprises based on environmentally friendly waste management.

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