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The Implementation of Yogurt-Making Machine in Dairy Product to Support Self-Reliance of Residents in Batujajar Transit Apartment, Bandung

Penerapan Mesin Pembuat Yoghurt pada Produk Olahan Susu untuk Mendukung Kemandirian Warga di Apartemen Transit Batujajar, Bandung

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ABSTRACT

This community service proposes the application of a yogurt-making machine for dairy products as a strategy to support residents' self-reliance at the Batujajar Transit Apartment in Bandung. Through modern technology in the milk production process, this community service aims to increase the added value of local dairy products and encourage the active participation of residents in production activities. Community service methods involve surveys, interviews, and direct observations of apartment residents. The number of participants in this training was 20, dominated by housewives, with 62% being aged 20–25. Based on the analysis, 69.5% of the participants positively assessed this community service activity, including aspects of learning materials, speakers, facilities, satisfaction, and expectations. This implementation also opens up new opportunities for local and regional marketing, increases product competitiveness, and creates an environment that supports economic independence of the farmers. In conclusion, applying a yogurt-making machine for dairy products at the Batujajar Transit Apartment in Bandung is an innovative step toward increasing the economic independence of residents. This community service contributes to developing local products, residents' self-reliance, community empowerment, and regional economic growth.

Keywords: Bandung, community service, dairy processing, yogurt

ABSTRAK

Pengabdian masyarakat ini mengusulkan penerapan mesin pembuat yogurt untuk produk susu sebagai strategi untuk mendukung kemandirian warga di Apartemen Batujajar Transit, Bandung. Melalui teknologi modern pada proses produksi susu, pengabdian masyarakat ini bertujuan untuk meningkatkan nilai tambah produk susu lokal dan mendorong partisipasi aktif warga dalam kegiatan produksi. Metode pengabdian kepada masyarakat berupa survei, wawancara, dan observasi langsung terhadap penghuni apartemen. Jumlah peserta yang mengikuti pelatihan ini sebanyak 20 orang, didominasi oleh ibu rumah tangga dengan 62% berusia 20–25 tahun. Berdasarkan analisis, sebanyak 69,5% peserta menilai positif kegiatan pengabdian masyarakat ini, meliputi aspek materi pembelajaran, narasumber, fasilitas, kepuasan, dan harapan. Penerapan ini juga membuka peluang baru bagi pemasaran lokal dan regional, meningkatkan daya saing produk, dan menciptakan lingkungan yang mendukung kemandirian ekonomi. Kesimpulannya, penerapan mesin pembuat yoghurt untuk produk susu di Apartemen Batujajar Transit, Bandung merupakan langkah inovatif untuk meningkatkan kemandirian ekonomi warga. Pengabdian kepada masyarakat ini berkontribusi terhadap pengembangan produk lokal, kemandirian warga, pemberdayaan masyarakat dan pertumbuhan ekonomi daerah.

Kata kunci: Bandung, pengabdian kepada Masyarakat, pengolahan susu, yogurt

INTRODUCTION

As a primary source of nutrition, milk has been an important part of people's diets for centuries (Michaelidou 2008; Silva and Smetana 2022). Milk contains protein, calcium, vitamin D, and other essential nutrients that support bone growth, maintain healthy teeth, and support overall body function (Woźniak *et al.* 2022). In addition to its nutritional value, milk is known for its versatility in various forms of consumption. It can be consumed fresh or processed into derivative products. In addition to being consumed directly, milk is a basic ingredient in various preparations that enrich culinary variations. In addition, milk and its products not

only provide a delicious taste but also make a valuable contribution to health and well-being of the consumers. Yogurt is a dairy product that is often consumed by people (Farag *et al.* 2022).

Yogurt is a dairy product produced through the fermentation of lactic acid bacteria in milk (Ayivi and Ibrahim 2022). Fermenting milk to make yogurt provides additional benefits in the form of good bacteria or probiotics, which are beneficial for digestive health. This fermentation process involves probiotic bacteria, such as *Lactobacillus bulgaricus* and *Streptococcus thermophilus*, which convert lactose in milk into lactic acid. The result is a thick texture, delicious taste, and distinctive aroma (Castro *et al.* 2023). Yogurt is a good source of protein and contains calcium, B vitamins, and probiotics, which are beneficial for digestive health. The variety of yogurts includes a variety of flavors, from natural to those enriched with fruit, honey, or seeds. In addition to being a delicious and nutritious food, yogurt is often used in various culinary recipes as a base for sauces and dressings or as an addition to smoothies and desserts. Yogurt not only provides health benefits but also adds variety to consumers' daily culinary experiences. The existence of a machine capable of producing quality yogurt is the main factor in the yogurt-making process (Ali *et al.* 2023).

The application of a yogurt-making machine significantly increases production capacity and ensures product hygiene and safety. This machine is important for meeting the market demand for quality yogurt products. As technology advances, today's yogurt-making machines can also be equipped with automatic controls to monitor temperature, fermentation time, and other parameters, ensuring consistent, high-quality results (Lopes *et al.* 2019). Yogurt-making machines also make it possible to process the main ingredients, such as milk, with probiotic bacterial starter cultures in the right proportions. To optimize the production of yogurt and other dairy products, it is necessary to ensure the availability of local resources, including a reliable source of fresh milk. To achieve this, expanding areas around the place of service for dairy farming would allow for a more sustainable supply chain, facilitating access to raw milk and reducing the transportation costs. Furthermore, the yogurt-making machine can be applied on various scales, from industrial to small or home businesses that want to produce yogurt efficiently and consistently. Therefore, applying yogurt-making machines is very suitable for encouraging the progress of Micro, Small and Medium Enterprises (MSMEs), such as in transit apartments.

The Transit Apartment residential development program is an initiative of the West Java Provincial Housing and Settlement Service to provide housing solutions for low-income communities (MBR). This transit apartment concept involves vertical housing with a rental system and residence time limits, making it an affordable alternative to the MBR. Currently, five transit apartment locations are spread across the Bandung and Purwakarta areas: Rancaekek Transit Apartment, Ujung Berung Transit Apartment, Batujajar Transit Apartment, Solokan Jeruk Transit Apartment, and Cibatu Transit Apartment. Each transit apartment location is carefully planned, integrating local economic development with superior entrepreneurial products. For example, the Ujung Berung Transit Apartment emphasizes bakery entrepreneurship as its flagship product, whereas the Solokan Jeruk Transit Apartment focuses on water hyacinth crafts as its flagship product. The Batujajar Transit Apartment plans to add superior products to processed milk (yogurt) and meat (shredded meat, sausages, and beef sei). The existence of this superior product is not only an additional facility but also a significant source of income for every apartment resident.

Therefore, applying a yogurt maker will have a broad beneficial impact on increasing people's income. By gaining skills and knowledge in the yogurt-making process, people can diversify their sources of income through the production and sale of yogurt products (Lie *et al.* 2012). Apart from increasing work capacity and small business management capabilities, this initiative provides opportunities to develop micro and medium businesses in apartment complexes. This increase in income creates financial stability for individuals and families and empowers the community as a whole by strengthening the local economy. In this way, transit apartments not only act as affordable places to live but also as a forum for developing the economic potential of the surrounding communities. Therefore, the main objective of this community service is to provide training on the use of yogurt-making machines to increase the self-reliance of residents of the Batujajar Transit Apartment, Bandung, through the production of processed milk.

METHODS

Location

The main targets for implementing this service are residents, especially homemakers, at the Batujajar Transit Apartment in Bandung (Figure 1). The peak service event is scheduled for 18–19 October 2023, with various preparations and assistance from September to December 2023. This location was selected based on the implementation of a cooperation agreement between the Faculty of Agricultural Industrial Technology, Padjadjaran University, and the West Java Provincial Housing and Settlement Services. The decision to choose the Batujajar Transit Apartment location for community service was based on the potential for developing dairy and meat products as superior products in the area. The Faculty of Agricultural Industrial Technology has many experts in the technology and processes of producing milk and meat, which is an additional reason for selecting this location. In addition, this Faculty aims to improve the agro-industrial sector and support micro, small, and medium enterprises (MSMEs). The parties who attended this service were the academic community of the Faculty of Agricultural Industrial Technology, the West Java Provincial Housing and Settlement Service, and residents of the Batujajar Transit Apartment.

Tools and materials

The tools and materials in this service are used to support a series of counseling sessions and practices. In the counseling session, the service team prepared presentation materials, including general theories of milk processing, yogurt making, storage techniques, and critical aspects of making yogurt. Tools such as TV, sound systems, cameras, writing equipment, laptops, and projectors are used to facilitate material delivery. The tools and materials required for the training activity to apply a yogurt-making machine include a yogurt-making machine (Bear Electric Yogurt Maker with a capacity of 1 L), bottles, thermometers, whole milk, *Lactobacillus bulgaricus, Streptococcus thermophilus* (by Lactina), and granulated sugar. The yogurt-making machine is shown in Figure 2. All tools and materials were integrated to ensure the smooth and successful implementation of outreach and training activities, focusing on understanding and skills related to the yogurt-making process.

Stages of Community Service

- **Pre-activity survey**

Pre-activity surveys in the context of community service are a crucial stage that is carried out before core activities. The main focus is to gather significant information and fully understand the needs and conditions of the community or parties that will be partners in the service project. Coordination between the service team from Padjadjaran University and the Head of the Batujajar Transit Apartment successfully identified the problems faced (Figure 3). The results of this initial survey included an initial description of the apartment residents, implementation targets, the number of participants involved, and a list of tools and materials needed during community service activities.

source: https://p3jb.jabarprov.go.id/

Figure 1 Location of Batujajar Transit Apartment, Bandung

source: https://powerpac.com.sg/

Figure 2 Yogurt-making machine.

Figure 3 Pre-activity survey documentation at the Batujajar Transit Apartment.

- **Internal coordination**

Internal coordination is vital to ensure the smoothness and success of each stage of community service activities. The service team actively coordinates internally as part of the comprehensive preparations. First, regular meetings are held as a platform where each team member shares ideas, strategizes, and identifies their responsibilities. The team also carefully compiled a list of activities to provide clear guidance. This rundown includes the sequence of events, implementation time, roles and responsibilities of each team member, and the creation of flyers.

As further preparation, special training was conducted on using a yogurt-making machine. Team members engage in training sessions to understand how the machine operates, minimize the risk of errors during key activities, and ensure product quality. Furthermore, a yogurt-making exercise was conducted to hone the team's practical skills. In this session, every step of the yogurt-making process was put into practice, allowing the team to understand every technical detail. Through careful internal coordination, the service team ensured that all activity elements were properly calculated and that each team member understood their duties and responsibilities.

- **Implementation**

The implementation of this community service activity involved the residents of the Batujajar Transit Apartment, representatives of the West Java Provincial Housing and Settlement Service, and a community service team consisting of lecturers and students from the Faculty of Agro-Industrial Technology, Padjadjaran University. This training activity was held for two days, on 18–19 October 2023, from 08.00–15.00. The focus of activities on the first and second days was making yogurt using a yogurt maker machine and the yogurt packaging process. Because the process of making yogurt requires 16 h for fermentation, the yogurt products can be evaluated on the second day. In its implementation, participants were divided into four groups, each with a maximum of five people. Each group was accompanied by two students who were tasked with providing technical direction for the training. Participants are expected to carry out activities enthusiastically because the community service team will award groups with the best processes and product results.

- **Evaluation Stage**

Evaluating the implementation of the yogurt-making machine is important to assess the effectiveness, impact, and sustainability of this community service. The evaluation stage was carried out using a questionnaire distributed to all participants after completing the training activities (Nanda *et al.* 2023). The results of this evaluation can be used as an indicator of success in achieving the goals of community service activities or as a consideration for continuing similar activities in the future. As shown in Table 1, a questionnaire was prepared to assess the level of success of this training. This training assesses four main aspects: material, resource persons, facilities, satisfaction, and expectations. Each aspect contains questions that must be answered with justification on a rating scale of 1-5. A rating scale close to 1 indicates low success in this training activity, and vice versa. The higher the score, the more successful the training activity.

Data Analysis

This service applies descriptive analysis methods to summarize, describe, and analyze data in a simpler form. The goal was to provide a general description of the characteristics of a data group without making inferences or generalizations to a larger population. In this service, a questionnaire was administered to all participants after completing the training as an activity evaluation. Next, the data were analyzed by calculating the average value and displayed in graphic form using Microsoft Excel.

Tabel 1 List of questions for evaluating community service activities

Aspect	Brief question	Rating scale
Material	a. Does the material meet the participants' needs? b. Can the training material be understood easily? c. Are the steps in the training material presented sequentially and clearly?	1–5
Speaker	a. Does the speaker master the material presented? b. Does the speaker present the material clearly and sequentially?	
Facility	a. Is the training location comfortable for participants? b. Are the group assistants as expected?	
Satisfaction and expectation	a. How satisfied are the participants with the results or products produced from the training? b. How willing are the participants to open a yogurt business opportunity after training?	

Description: The higher the score, the more successful this community service will be; conversely, the lower the score value, the lower the success rate. The rating scale ranges from 1 (very poor), 2 (poor), 3 (fair), 4 (good) and 5 (very good).

RESULTS AND DISCUSSIONS

Participant Background

In this community service program, the main partners involved are residents of West Bandung Regency, West Java, who live in transit apartments. This program was implemented in collaboration with the West Java Provincial Housing and Settlement Service.

The total number of participants in this training was 20. It is hoped that the participants' active participation will positively impact the spread of knowledge of yogurt-making in the community. All the participants in this training were housewives. This shows that yogurt-making activity is expected to provide them with additional skills and the potential to be developed as an additional source of income. Based on the analysis, 84.6% of the participants had a high school education, indicating that most of them had a high school educational background. This can help ensure their understanding of the technical concepts of yogurt making. In addition, 15.4% of the participants had a junior high school education, indicating that this activity is also open to those with a lower level of education, thereby creating wider opportunities for the local community. All the participants in this training were women. This reflects a focus on women's empowerment, a positive step in supporting women's roles in advancing the household and community economy (Nahar and Mengo 2022).

Regarding age, the majority of participants (62%) were in the 20–25 year age range (Figure 4). Followed by participants aged 26-30 years, reaching 23%, and participants aged 31-35 years, as much as 15%. It is hoped that this yogurt-making training will provide significant benefits for participants in improving their technical skills and the potential for economic improvement through applying the practices learned in this activity.

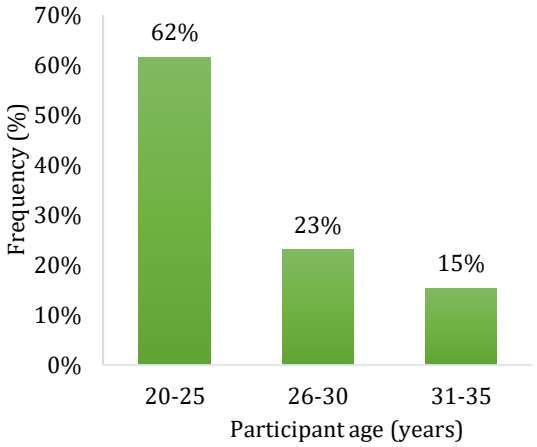

Figure 4 Age distribution of participants in yogurt-making training.

Implementation of Yogurt Making

The implementation of this community service began with the resource person presenting material related to yogurt making. The instructor for this training was a lecturer from Food Industry Technology, Padjadjaran University. The yogurt training lasted for two days and was divided into two training sessions. The first day was related to the yogurt-making process, and the second was related to evaluating the results. The participants received information about yogurt and had the opportunity to make it directly. Participants were also provided knowledge regarding everything related to

yogurt, from how to make it, its benefits, nutritional content, and types, to how to store it properly. In addition, the participants were provided with a yogurt-making tool, which was donated by the Faculty of Agricultural Industrial Technology, Padjadjaran University, as a form of support to the people who live in the Batujajar Transit Apartment. This tool can be used to make yogurt independently, and it is hoped that it can be used to open a business. Apart from the tools, the ingredients used in the yogurt-making demonstration were also available (Figure 5).

This service focuses on making yogurt using basic ingredients such as 1 L of full cream milk, a yogurt starter, and 100 g of granulated sugar. Additional ingredients, such as fresh fruit or fruit aroma syrup, can be added to provide variety, delicious taste, and attractive color appearance. The following is the complete procedure for making the yogurt.

- First, prepare all the necessary tools and materials. Ensure that all the equipment used is clean and sterile to ensure the final product is healthy and delicious yogurt. To sterilize, all utensils were soaked in boiling water for 10–15 minutes, then air-dried in a clean environment before use. This step is essential for eliminating any bacteria or contaminants that could interfere with the fermentation process.
- Liquid milk (1 L) and granulated sugar (100 g) were placed in a pan. The mixture was stirred well until the sugar dissolved in the milk. This process aims to provide softness and moisture to yogurt. The mixture was pasteurized at 90°C while stirring. This is a critical step in eliminating unwanted bacteria and ensuring the safety of the final product. Keep stirring so the mixture was stirred continuously to ensure an even temperature and effective pasteurization. After reaching a temperature of 90°C, the mixture was stirred for 5 min and the stove was turned off. The mixture was cooled to 40°C.
- Yogurt starter (1 g) was added to the mixture. Yogurt starters contain beneficial bacteria that are necessary for fermentation. The mixture was then poured into the yogurt maker container. Ensure that the yogurt maker container is clean and sterile.

The device was closed and connected to a power outlet. The yogurt maker was set for 16 h. This fermentation process produces thick and flavorful yogurt. After the 16-hour process was complete, the yogurt was transferred to a serving bottle. At this stage, fresh fruit or other ingredients can be added according to the taste (optional). The yogurt that has been served is ready to be consumed. This process produces delicious yogurt and provides the flexibility to create various flavors and appearances to suit personal preferences. The results of the yogurt prepared by the participants are shown in Figure 6.

In addition to learning, yogurt training at the Batujajar Transit Apartment can be used as a first step toward starting a yogurt-business. Apart from focusing on making yogurt, there were interactive activities, such as question-and-answer sessions and group discussions regarding the correct process for making yogurt. In addition to providing practical yogurt-making training, the community service team formally recognized the participants by providing certificates. This certificate is a form of appreciation for the

Figure 5 The process of making yogurt at the Batujajar Transit Apartment.

Figure 6 The results of yogurt made by participants in community service activities.

participants' efforts and dedication during training and has strategic value in the current era. The certificates awarded by the community service team reflect the participants' success in completing the yogurt-making training program. In today's conditions, certificates are significant, especially in finding a job or setting up a business related to yogurt products (Wu, 2009). Certificates are important because they serve as formal evidence that can be widely recognized by external parties, such as potential employers or business partners (Pham *et al.* 2015). Participants can more easily convince relevant parties of their competence in producing quality yogurt with a yogurt-making-training certificate. This certificate can also become a capital of trust for potential consumers. Consumers tend to value products produced by individuals or companies with proven qualifications and knowledge through formal certificates.

However, several challenges were encountered during the program's implementation. One of the primary obstacles was the limited availability of fresh milk and essential ingredients for yogurt production, which affected the consistency of the manufacturing process itself. Additionally, the participants initially faced difficulties in operating the yogurt-making machine, particularly in managing the fermentation process and maintaining optimal hygiene. These challenges were addressed through additional training sessions focusing on operational skills and by establishing partnerships with local dairy farmers to secure a stable supply of raw materials. Efforts to ensure the sustainability of this program include continuous monitoring and follow-up training to strengthen participants' skills.

Feedback Evaluation

Feedback evaluation is essential in community service activities (Nanda *et al.* 2022). Good evaluations can provide an in-depth understanding of a program's effectiveness, while feedback can be a valuable source of information for improving the quality of future activities (Craig 2002, Chen 2005). The community service team gathered 20 participants to evaluate all the activities carried out. Various questions related to activity evaluation were prepared. Participants were asked to rate four levels of assessment (very good, good, fair, bad, and very bad) on each aspect, including (a) learning material, (b) speaker, (c) facility, and (d) satisfaction and expectation.

The evaluation of this community service is shown in Figure 8. In the learning material aspect, 62% of participants gave a 'very good' score, 33% a 'good' score, and 5% a 'fair' score regarding this training. In the speaker aspect,

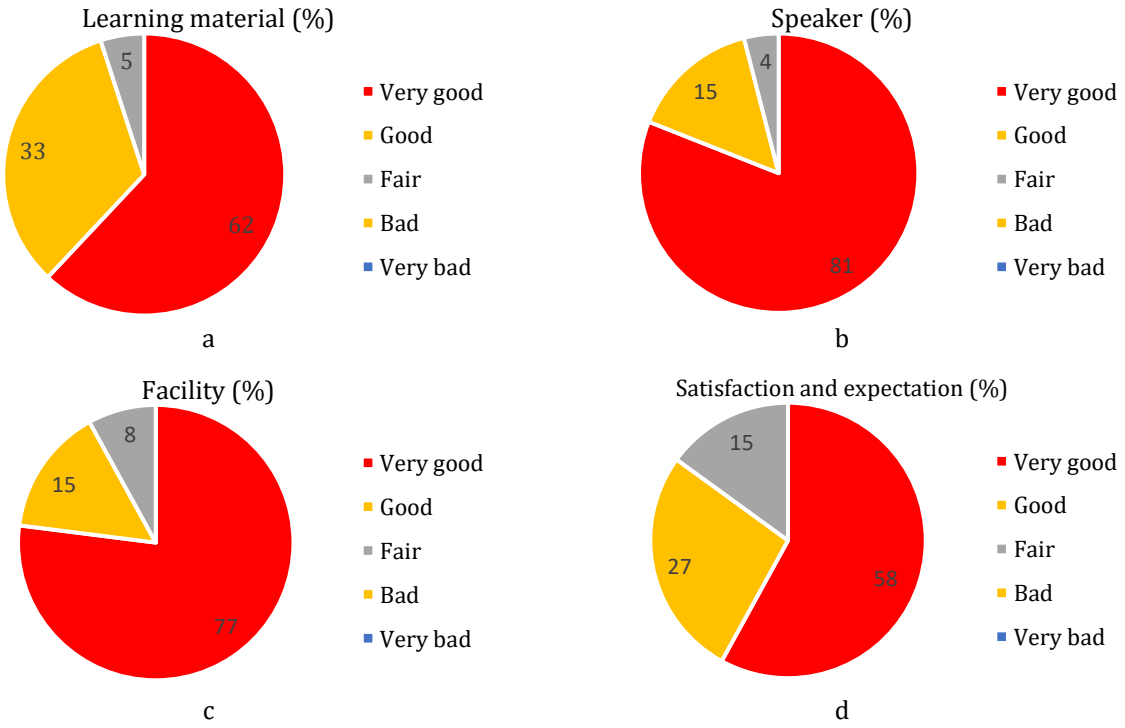

Figure 8 Evaluation of community service activities related to the application of yogurt-making machines.

participants gave very good, good, and fair ratings for service, with percentages of 81%, 15%, and 4%, respectively. In terms of facilities, 77%, 15%, and 8% of participants rated this service as 'very good', 'good', and 'fair', respectively. Regarding satisfaction and expectation, 58% of participants gave a score of 'very good', followed by 27% for a score of 'good', and 15% a score of 'fair' regarding this training. Overall, 69.5% of the participants gave a positive assessment of this community service activity, including aspects of learning material, speaker, facility, satisfaction, and expectation. There is concrete evidence from the evaluation that no participant rated this activity as 'bad' or 'very bad.

CONCLUSION

This community service provides training on the use of yogurt-making machines to increase the self-reliance of Batujajar Transit Apartment, Bandung residents through the production of processed milk products. These transit apartments not only act as affordable places to live, but also as a forum for developing the economic potential of the surrounding community. The number of participants in this training was 20, dominated by homemakers, with 62% being aged 20–25. Based on the analysis, as many as 69.5% of participants positively assessed this community service activity, including aspects of learning materials, speakers, facilities, satisfaction, and expectations. The participants' active participation positively impacted the dissemination of knowledge of yogurt-making in the community, increasing their income and hard skills. This study recommends establishing local dairy farming zones near transit apartments to ensure a sustainable milk supply and reduce production costs.

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