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Making Environmentally Friendly Handsoap using Anti-Microbial Strawberry as A Step in Preparing Independent Entrepreneurship for Students of SMAN 2 Rangkas Bitung

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Abstrak

SMAN 2 Rangkas Bitung memiliki potensi yang signifikan, sehingga membutuhkan dukungan dari berbagai pihak dalam pengembangannya. Tujuan dari kegiatan pengabdian kepada masyarakat (PKM) ini adalah untuk membekali siswa dengan keterampilan kewirausahaan berbasis sains terapan melalui pelatihan pembuatan sabun cuci tangan ramah lingkungan berbahan dasar stroberi dengan sifat antimikroba. Selain meningkatkan kesadaran akan pentingnya sanitasi, kegiatan ini juga bertujuan untuk menumbuhkan jiwa kewirausahaan sejak dini dengan memanfaatkan bahan-bahan lokal yang mudah didapat. Metode pelaksanaannya meliputi penyuluhan dan edukasi, demonstrasi produk, serta sesi praktik dan evaluasi. Hasil dari kegiatan ini adalah terciptanya produk sabun cuci tangan ramah lingkungan berbahan dasar stroberi dengan sifat antimikroba alami. Produk ini dihasilkan melalui serangkaian kegiatan praktik yang melibatkan siswa secara aktif, mulai dari ekstraksi bahan alami dan formulasi larutan sabun hingga pengemasan dan pengujian. Berdasarkan hasil evaluasi kuesioner yang disebarkan, rata-rata skor pemahaman peserta adalah 74 persen, yang menunjukkan respons positif terhadap pelatihan. Kegiatan ini menunjukkan bahwa kolaborasi antar berbagai pihak dapat menciptakan inovasi sederhana namun berdampak untuk memberdayakan generasi muda.

Kata Kunci: *Sabun Cuci Tangan, Strawberry, Antimikroba, Kewirausahaan Mandiri, Siswa SMAN 2 Rangkas Bitung.*

Abstract

SMAN 2 Rangkas Bitung possesses significant potential, requiring support from various parties in its development. The purpose of this community service (PKM) activity is to equip students with applied science-based entrepreneurial skills through training in the production of environmentally friendly hand soap made from strawberries with antimicrobial properties. In addition to raising awareness of the importance of sanitation, this activity also aims to foster an entrepreneurial spirit from an early age by utilizing readily available local materials. The implementation method included counseling and education, product demonstrations, and practical and evaluation sessions. The outcome of this activity was the creation of an environmentally friendly hand soap product made from strawberries with natural antimicrobial properties. This product was produced through a series of practical activities that actively involved students, from the extraction of natural ingredients and the formulation of the soap solution

to packaging and testing. Based on the evaluation results of the distributed questionnaires, the average understanding score for participants was 74 percent, indicating a positive response to the training. This activity demonstrates that collaboration between various parties can create simple yet impactful innovations for empowering the younger generation.

***Keywords**: Handsoap, Strawberry, Antimicrobial, Independent Entrepreneurship, SMAN 2 Rangkas Bitung Students.*

Introduction

Hand hygiene is a fundamental aspect of maintaining health, particularly in preventing the spread of infectious diseases. Since the COVID-19 pandemic, public awareness of the importance of handwashing has increased sharply and become part of everyday lifestyle (Putri, A. E., 2021). However, the use of conventional hand soaps, which generally contain synthetic chemicals such as parabens, sulfates, and artificial colors, raises new concerns. These substances not only have the potential to cause skin irritation but can also pollute the environment and disrupt the balance of aquatic ecosystems (Nicolosi et al., 2020). As an alternative, eco-friendly hand soaps are a safer and more sustainable option. These products generally use natural, biodegradable ingredients and are free from harmful chemical compounds (Wang et al., 2021). One local ingredient with high potential for development as a base for natural hand soap is strawberries. In addition to their refreshing aroma and attractive shape, strawberries are known to contain phenolic compounds and xylitol, which have antimicrobial properties (Mayer et al., 2019). This compound can inhibit the growth of bacteria, such as Streptococcus mutans and Salmonella enterica, making strawberries an effective natural ingredient for maintaining hand hygiene (Kuo et al., 2018).

Unfortunately, many teenagers, including high school students, are still unaware of the entrepreneurial potential of this natural hand soap product. Recognizing this challenge, this Community Service (PkM) activity was designed as a form of education and empowerment, with the goal of providing students with training in producing strawberry-based hand soap. This program not only emphasizes the importance of sanitation but also aims to foster an entrepreneurial spirit based on local wisdom and an environmentally friendly approach.

The growing awareness of the importance of environmentally friendly, natural-based products is increasingly relevant to global trends regarding sustainability and wise consumption. Research conducted by Prabowo et al. (2022) shows that consumption of environmentally friendly products in Indonesia is increasing, especially among young people who are increasingly concerned about environmental issues. Furthermore, research conducted by Surya et al. (2020) reveals that Indonesia's younger generation has significant potential for innovation, including in the development of nature-based products, which can be turned into business opportunities that support local economic development. This entrepreneurship training is expected to not only improve students' skills but also make a positive contribution to the local economy through the development of businesses based on local and environmentally friendly products.

This initiative also aligns with efforts to achieve the Sustainable Development Goals (SDGs), particularly in the areas of health, quality education, and inclusive economic growth. Instilling entrepreneurial values based on natural and environmentally friendly products is expected to create a broad social impact, not only improving the quality of life for individuals but also contributing to more sustainable economic development in the future.

Partner Problems

The main problem students face in using hand soap often arises from a lack of awareness of the importance of hand hygiene, especially in the school environment. Many students prioritize other needs, such as playing or talking with friends, over proper handwashing. Furthermore, inadequate facilities, such as limited availability of hand soap or unclean handwashing stations, also present obstacles. Educational factors and home habits also influence this behavior pattern, with students who are not accustomed to maintaining hand hygiene tend to pay less attention to the importance of washing their hands with soap. This can increase the risk of spreading diseases, such as diarrhea or respiratory infections, which directly impact students' health and learning. Therefore, ongoing education and the provision of adequate facilities are needed to instill the habit of handwashing with hand soap as a priority. Hand soap use is often linked to a lack of awareness of the importance of choosing safe and environmentally friendly products. Many hand soaps available on the market contain synthetic chemicals such as parabens, sulfates, and artificial fragrances, which can cause skin irritation, allergies, and even long-term health problems with continued use (Nicolosi et al., 2020). Unfortunately, students tend to choose hand soap based on factors such as low price or attractive scent without considering its impact on their health. Excessive use of chemical-based hand soap can disrupt the balance of the skin's microbiota, especially for students who frequently wash their hands due to their daily activities (Nicolosi et al., 2020). Therefore, it is important to increase student education about choosing hand soap made from natural ingredients or those formulated with environmentally friendly ingredients to maintain healthy skin and support environmental sustainability (Adhan et al., 2022; Hidayat & Sutrisno, 2022; Sultan & Zikri, 2021).

The COVID-19 pandemic has created a new awareness among students, namely the culture of handwashing, which of course requires natural-based hand soap. Lack of student awareness of the importance of washing hands using environmentally friendly hand soap is a major problem faced by many parties, including schools. Therefore, through this community service, the theme was taken training on making environmentally friendly hand soap using strawberries as the basic ingredient. The second problem is the lack of entrepreneurship training for grade XII students, the curriculum at SMAN 2 Rangkasbitung does not yet have an Entrepreneurship Subject. Where entrepreneurship is quite important for students in preparing themselves after graduation so they can become entrepreneurs. Making hand soap using natural ingredients not only meets the school's need for environmentally friendly products but also serves as a learning tool for students to increase creativity (Rahayu, P, et al 2025).

Implementation Method

The Community Service Program (PKM) was conducted offline for one day at SMAN 2 Rangkas Bitung, involving a team of university administrators, supervising teachers, and eleventh-grade students. The methods used included:

1. Counseling and Education
   Material on the importance of hand sanitization, the benefits of natural ingredients in hygiene products, and business opportunities from environmentally friendly products was presented through interactive lectures and group discussions.
2. Strawberry Hand Soap Making Practice
   Participants were guided in making liquid soap using strawberry extract, natural thickening agents, and other complementary ingredients such as essential oils. This process was carried out in groups to encourage active engagement.
3. Product Marketing Simulation
   This session aimed to provide a practical overview of branding, product packaging,

pricing, and simple promotional strategies, particularly through social media.

4. Impact Evaluation and Measurement
   A questionnaire was administered after the PKM activity to measure increased knowledge, skills, and interest in entrepreneurship, as well as participant satisfaction with the material presented. The average score for the post-activity questionnaire was 74 percent.

Table 1. Partner Problems

No	Problem Aspects	Problem Description	Impact	Solution
1	Knowledge and Skills	Partners do not yet have knowledge of the formulation for making hand soap based on natural strawberry ingredients.	Partners do not yet have knowledge of the formulation for making hand soap based on natural strawberry ingredients.	Training on making effective and hygienic strawberry-based hand soap
2	Lack of entrepreneurial skills	Students do not yet have practical experience in making and selling independent products.	Students are not ready to become entrepreneurs, lose local economic potential, and have low business sustainability.	Basic entrepreneurship training, business simulations, and direct sales practice
3	Dependence on chemical products	There are no alternative natural hand sanitizer products developed independently.	Dependence on commercial chemical products that are less environmentally friendly and have a negative impact on health.	Natural product manufacturing training, education about the dangers of chemical products and the benefits of local ingredients
4	Product Marketing	Partners do not yet have a digital-based marketing strategy and environmentally friendly product branding.	Products are less well known to the general public and sales are limited	Digital marketing training, eco-friendly packaging and natural product certification
5	Business Management	Partners do not yet understand financial management, distribution, and planning for MSME-based businesses.	High business risk and difficult to develop into an independent entrepreneur	Small business management workshop, creating simple financial reports
6	Legality and Certification	Does not yet have a distribution permit (PIRT/household product certification) or an environmentally friendly label	The product cannot be officially sold in the retail market.	Assistance in process permits and certification organic/environmentally friendly products

Results and Discussion

Results

The community service team provided training on creating environmentally friendly handshops using antimicrobial strawberries. The training participants were students of SMAN 2 Rangkas Bitung. The training aimed to prepare students for independent entrepreneurship. The training proceeded smoothly and received a positive response from participants. This was reflected in the high level of student participation and enthusiasm throughout the training, from the presentation of the environmentally friendly handshop training material by Dr. I Gusti Ayu Arwati, MT, to hands-on practice using production machines and product packaging.

Figure 1. Speech by the Head of the Education and Culture Office of Lebak Regency, Gugun Nugraha, S.PD., M.Pd

Figure 2. Dr. I Gusti Ayu Arwati, MT in the presentation of training materials on making environmentally friendly cleaners and Handshops

Figure 3. Environmentally friendly cleaning and Handshop manufacturing practices

Figure 4. The process of inserting handshop into the jerry can and attaching the sticker

Figure 5. Eco-friendly Handshop products

The Community Service Program (PKM) activities produced several concrete outcomes, namely:

1. Activity Video
   Video documentation has been published on YouTube as a means of disseminating and promoting the activity widely to the public and other

stakeholders.

2. Mass Media Publication
   Articles about this activity have been published in local media, showcasing the process and students' enthusiasm for participating in the training.
3. Scientific Publication (Submitted)
   A scientific article containing a study of the activity results has been compiled and submitted to an accredited national journal.
4. Intellectual Property Rights Registration
   The innovation of making strawberry hand soap has been registered with the Directorate General of Intellectual Property as a form of protection for the creative results of this activity.

Discussion

This activity also aligns with the needs of partner schools who want to strengthen students' capacities in environmental-based entrepreneurship. Evaluation results revealed a 74% participant satisfaction rate with the training, indicating that the training materials and methods were well-received. This activity not only provides practical skills but is also relevant to school learning, particularly in entrepreneurship and applied science subjects.

Table 2. PKM Questionnaire Results

	Problem solving	Appropriate technology	Development of Science	Enrichment of Teaching Materials	Increased Income	Increased knowledge	Increased Production	Behavioral Change	Environmental Quality Improvement
Jumlah	176	177	181	173	172	183	169	183	180
Skor Maksimal	240	240	240	240	240	240	240	240	240
%	73.33	73.75	75.42	72.08	71.67	76.25	70.42	76.25	75.00
Rata Rata					74%				

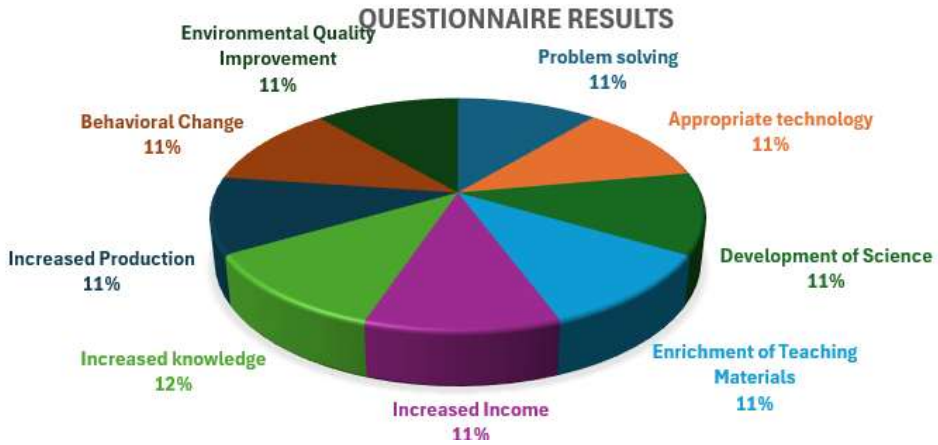

Figure 6. Questionnaire Results Diagram

One of the main outcomes of this community service (PKM) project was the creation of an environmentally friendly hand soap product made from strawberries with natural antimicrobial properties. This product was produced through a series of practical activities involving active student involvement, from the extraction of natural ingredients and the formulation of the soap solution, to packaging and testing its effectiveness.

The practical results showed that the resulting hand soap demonstrated good

quality, with a refreshing aroma, gentleness on the skin, and effectiveness in cleaning and killing germs. Furthermore, the use of natural ingredients, such as strawberries, added value, giving the product a healthier and more environmentally friendly feel, in line with the growing awareness of eco-friendly products in modern society.

Economically and entrepreneurially, this product has significant potential for development into a student-run business. Several indicators supporting this potential include:

1. Relatively low production costs, with readily available raw materials.
2. Competitive selling point, given the product's unique ingredients and natural antimicrobial properties.
3. Broad market segmentation, ranging from households and schools to organic product communities.
4. Ease of packaging and marketing, especially through digital platforms or student social media.

This activity also demonstrated that with the right approach, high school students can understand basic entrepreneurial principles and begin to develop the courage to pursue independent businesses. The active involvement of school partners and the support of teachers were key factors in the success of this activity. Through this Community Service Program (PKM) activity, students not only gained technical skills in producing hand soap but were also encouraged to develop an entrepreneurial spirit, understand product marketing aspects, and develop a simple business plan. The results of this practical experience are clear evidence that a project-based approach not only improves students' skills but also opens up promising business opportunities if continuously developed and nurtured.

Conclusion

The Community Service Program (PKM) activity, which focused on making environmentally friendly hand soap from antimicrobial strawberries, has had a positive impact on fostering entrepreneurial skills and enthusiasm among students at SMAN 2 Rangkas Bitung. This training not only enhanced their understanding of the importance of sanitation but also opened students' minds to the potential of locally sourced products as business opportunities. The success of this activity was demonstrated by the creation of an environmentally friendly hand soap product made from strawberries with natural antimicrobial properties. It is recommended that similar activities be further developed by reaching more schools and partnering with small industry partners to incubate student-produced products. This will create synergy between education, community service, and the development of the creative economy at the student level.

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