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PROCESSING USED COOKING OIL INTO SOAP AS AN EFFORT TO ESTABLISH HOME INDUSTRY

Tri Murwaningsih
Lembaga Penelitian dan Pengabdian Kepada Masyarakat, Universitas Sebelas Maret, Indonesia

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ABSTRACT

Cooking oil is a daily necessity used by a family for cooking purposes. As the consumption level of cooking oil increases, it turns out slowly producing waste in the form of used cooking oil. The purpose of this research is to provide training in processing used cooking oil into soap. The training method in the research carried out several stages including preparation, socialization, soap production process, follow-up and evaluation. The training was held in Bulu, Jaten Village, Karanganyar Regency, ob January 16, 2021. The soap was processed from used cooking oil in various stages and mixed with chemicals in approximately 1 month. The results of the training activities could innovate the productivity of the local community with long-term prospects to welcome the empowerment of economically independent of Dusun Bulu residents. It can also build a Home Industry to increase the use-value of used cooking oil.

INTRODUCTION

Cooking oil becomes an undeniable daily necessity that housewives use for cooking. However, as the consumption level increases, this slowly produces waste in the form of used cooking oil. The mass of used cooking oil dumped into the sewers to be then into the river must become a special concern to solve. This can not only pollute the aquatic environment but can also slowly damage river and even marine ecosystems. Abundant quantities of used cooking oil are often left without further treatment or processing. Whereas the used cooking oil has the potential to be utilized as dish soap, soap, floor soap, bath soap, and even biodiesel. These efforts are very effective in reducing the environmental pollution, especially the water pollution. At the same time, it may increase community empowerment in developing home industry for processing used cooking oil. Long-term prospects can lead to marketing with some additives to commercialize the soap product (Sumiati *et al.*, 2019).

* *Corresponding author.*
E-mail address: murwaningsih_tri@staff.uns.ac.id
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Bulu that belongs to Jaten Village is territorially part of the Karanganyar Regency which belongs to an urban area. The livelihoods of people in Bulu village are very diverse among many industrial sectors there. In addition, they also have agricultural land scattered throughout the hamlet. Thus, most of their livelihoods are industrial workers working for some companies, and some are farmers. Differently, some residents chose to initiate a small grocery store and scanty food stalls. Bulu village consists of two neighborhoods which are recorded with a total of 150 families and a total of 140 houses, indicating that a quite dense population. This suppresses daily needs, particularly food where all kinds of fried foods must produce waste cooking oil. A large number of houses in Bulu village causes an amount of used cooking oil. In accumulation, a total of approximately 50 liters per month or 720 liters per year might possibly be reached. This amount is certainly worrying if it continues to be carelessly disposed of without any further handling or processing. Furthermore, if the used cooking oil is disposed of, it is very inefficient and pollutes the environment.

Coconut-based cooking oil can optimally be used to fry food a maximum of 4 times. The used cooking oil for frying more than 4 times is not good enough. The fatty acids contained will be more saturated and change their color. The cooking oil has been contaminated and turned into used cooking oil which contains very high cholesterol levels. It also endangers the health of people who consume it for sure (Prabowo, Ardhi, and Sasono, 2016). Consuming used cooking oil may cause diseases for consumers' bodies and decrease stamina. In addition, prolonged and repeated heating of cooking oil can produce peroxide compounds, where peroxide compounds are free radicals that are toxic to the human body. The maximum limit of peroxide value in edible oil is 10 meq/kg of cooking oil (Aini et al., 2020). However, the general used cooking oil has a peroxide value of 20-40 meg/kg so that it has a significant difference to the limits of health quality standards (Kusumaningtyas and Qudus, 2019). Used cooking oil is contained in foods such as fried foods and is digested by the body so that it can accumulate for days or even weeks. Furtherly, it can cause chronic diseases in the long term use. Therefore, the health effects that can arise when consuming too much cooking oil such as abnormal fat deposits, cancer, abnormal control of the nerve center, and even stroke (Ginting et al., 2020).

Based on the initial observations, the obtained data showed some empirical facts. The data collecting method for this initial observation was through interviews which were conducted with 15 housewives in Bulu sub-village. in detail, the respondents were divided into two groups based on the number of family members. The first group was households or family members consisting of many people (more than 3) and households consisting of less than 3 members. Based on the results of the interviews, both groups use cooking oil for around 3 times in average. Even when the price of oil rises, cooking oil might be used more than 3 times. Furthermore, a household group with more than 3 members tends to be more consumptive using cooking oil.

The results of another separate interview revealed that almost every family uses cooking oil to cook. However, they do not have any alternative way in processing their used cooking oil. This shows the existence of consumptive behavior towards cooking oil and the inability of the community to process waste are economic and environmental problems. The waste must be utilized by processing it into useful products to reduce environmental damage and create new economic value (Darmawan and Susila, 2013). In short, used cooking oil must be reused in oil-based products. One possible product is soap (Prabowo, Ardhi, and Sasono, 2016).

Soap is sodium (Na) or Potassium (K) compound containing fatty acids from vegetable or animal oils. They might be solid or liquid as well as foamy. Soap can be produced through the process of saponification, specifically the process of hydrolysis of fats into fatty acids and glycerol under alkaline conditions. The alkaline conditions commonly used are sodium hydroxide (NaOH) or caustic soda and also potassium hydroxide (KOH). Solid soap can be obtained using NaOH while the liquid form can be obtained using KOH (Prabowo, Ardhi and Sasono, 2016). Used cooking oil has a high potential as a raw material for soap with special chemical treatment, namely the saponification reaction. This can be used as a solution to the abundant production of used cooking oil in Bulu Village which has a negative impact on the environment and its surroundings. The prescribed used cooking oil mainly comes from the post-cooking process of a household. Regarding additional materials that support the manufacture of soap from used cooking oil, it can also increase interest and enthusiasm in processing used cooking oil (Turmudi et al., 2019). These ingredients are commonly used to remove unpleasant odors such as lemongrass, coffee, and pandanus. In addition, charcoal is also used to activate oil that has been damaged structurally, and even add essential oil as a fragrance for soap products (Sumiati et al., 2019).

The novelty of this research is indicated in the management of used cooking oil in Bulu Hamlet which was previously only disposed of and produced waste. This research then tried to convert it into new products that provide economic profit. This is supported by several related studies that produce used goods to provide economic profit or advantages (Saputra, Wicaksono, and Irsan, 2018). Theoretically, it is confirmed from several scientific articles that have been compiled, most of the used cooking oil is just used to provide additional economic value from the oil itself (Adhari, Yusnimar, and Utami, 2016; Harahap and Yullia, 2018; Sekaran and Semarang, 2018). Differently, the used cooking oil is converted into a new different product that produces economic value. It is also hoped to give long-term advantages specially to produce a home industry that can improve the economic advantages for the community.

Based on the description above, the team of the Community Service of Universitas Sebelas Maret Surakarta (KKN UNS) under the Integrative Thematic group 134 serves the community in Bulu Hamlet by providing counseling to housewives in the processing of used cooking oil into soap for dish and clothes. The group has a goal of serving this community as a form of community empowerment in the process of independence and efficiency of the economy through the utilization of used cooking oil waste into household products. It's also hoped to give the long-term prospect such as to have a good Home Industry for the economy as well as the environment-friendly program for the surrounding community. This empowerment allows the community to be economically productive such as the production of home-based products and home-based business management (Turmudi et al., 2019). In addition, it can help create peace and comfort in social life because it can improve soft skills and hard skills through entrepreneurship training, Home Industry encouragement, and even product marketing. This can improve the standard of living of the community as well as open up small enterprise opportunities. It is also hoped that the community can be more advanced in the environment-friendly waste management sector. Besides, it is also to empower economically independent communities (Erviana, Suwartini, and Mudayana, 2018).

The community in Bulu Hamlet, Jaten Village, Karanganyar is a supportive and collaborative community and possesses a high interest in learning new and useful things. Participating in counseling on the processing of used cooking oil into soap

becomes a concrete model for them to train their skills and increase the efficiency of community empowerment. Based on these conditions, the involved community service team (KKN UNS) agreed to collaborate with the community of Bulu hamlet about the current problems so that they can overcome those prescribed problems through assistance activities in form of counseling concerning aspects of waste management, soap production, and entrepreneurship (Prabowo, Ardhi, and Sasono, 2016).

The four priority intricacies from the community in Bulu Village that will be resolved are the insufficient information or understanding regarding the economic potential of used cooking oil waste. Besides, it also concerns the lack of skills regarding processing the used cooking oil to be a valuable product such as soap. The limited skills of the community regarding the pollution control process, especially the scope of water and land. Lastly, it also concerns the limited entrepreneurial insight of the community related to the use of waste cooking oil with high economic value such as soap (Ginting et al., 2020). Therefore, the implementation of counseling is focused on several things. The first is to provide information regarding the economic potential of used cooking oil waste. Second, skills training for the community of Bulu village regarding processing waste cooking oil into soap. Third, this program also provides skills regarding the process of controlling water and soil pollution. The last one also provides insight to the communities about entrepreneurship related to the production of soap produced from used cooking oil (Darmawan and Susila, 2013).

METHOD

The method of implementing this training program consisted of four stages as follows.

A. Praparation stage

The preparation process was carried out by the local community, such as informing about the implementation of a counseling program on processing used cooking oil into soap through the Whatsapp Group of Family Welfare Development I (PKK). In addition, the community service team provided all equipment and materials. The number of participants is set to no more than 20 people who have represented the entire hamlets. Several pre-treatments materials were carried out by the community service team, such as the preparation of used cooking oil, water, and caustic soda as raw materials for producing soap (figure 1).

Figure 1. The equipment and material preparation stage

B. Socialization stage

The socialization was carried out through the broadcasting process on the Whatsapp Group of the Family Welfare Development (PKK) at Bulu village. In addition, this socialization stage was also through the distribution of pamphlets to every house in Dusun village. The pamphlet details include equipment, materials, and manufacturing methods. In detail, this stage can be seen as explained below.

1. Tools: Spoon, bucket/bowl, 1 piece of bread scale (to weigh NaOH), Measuring pitcher (measuring the volume of oil and water in each gallon), mixing pitcher container, Plastic cup (NaOH and water container), Plastic bottle, Funnel (pours used cooking oil from gallons into plastic bottles), Filter cloth (filters oil and charcoal), Stirrer and Mold.
2. Ingredients: 500 mL used cooking oil, sufficient charcoal (roughly ground), 85 grams of NaOH (caustic soda), 175 mL of water, mixture water (lemongrass/pandan/coffee), and 5 mL of essential oil. In detail, the Figure 2 presents the socialization stage.

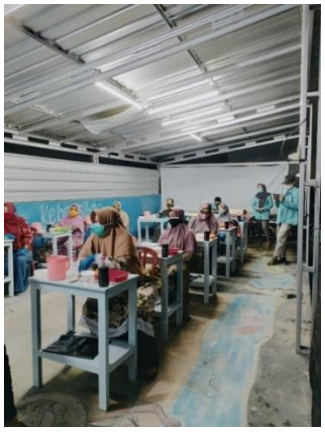

Figure 2. Socialization Stage

C. The training and soap making process

The training was held on January 16th 2021 at 18.30-21.00. The training was attended by nine (9) participants representing all neighborhoods and the community service team. All training equipment and materials were facilitated by the community service team. The training consisted of 2 main agendas, namely the introduction of tools and materials and their functions. After that the training process by mixing the ingredients that have been prepared. The training was ended with guidance on how to store undried soap mixtures and how to use them.

Figure 3. The Trainig Process

D. The Follow-Up or evaluation stage

The Follow-Up or evaluation stage was held a month after the training stage on February 14, 2021, at 11.00-12.00 WIB. The Follow-Up stage was intended to remind participants to complete the curing process of soap that has been made so that in the future the soap can be used for any purpose. The evaluation carried out by the community service team was to provide insight on the importance of processing used cooking oil to the community of Bulu village. In addition, they also familiarize themselves with environment-friendly community lifestyles and increase the innovation of local communities to empower economically independent communities through the prospect of marketing soap from used cooking oil. Figure 4 below is the detail flowchart of the community service

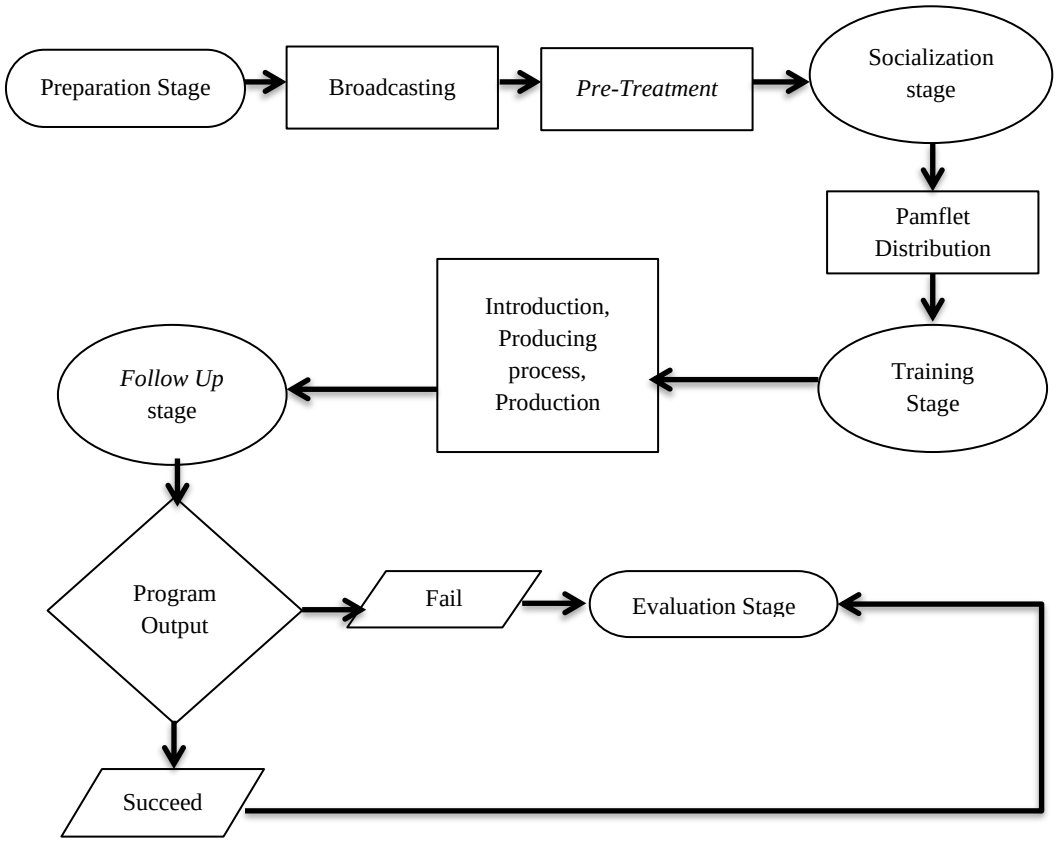

Figure 4. The flowchart of the research methodology

RESULTS AND DISCUSSION

This community empowerment activity is pursued by holding counseling in a kind of training on the processing of used cooking oil into soap. The training was held on January 16, 2021, with a total of nine participants representing all neighborhoods and accompanied by the community service team from the Universitas Sebelas Maret Surakarta (UNS) under Group 134. Before the implementation of the training, the briefing was carried out between the community service Team Group 134 with the local community through the existence of Social Media. The coordination aims to disseminate publications on the implementation of training on processing used cooking oil into soap. This can improve the approach to the community and the consolidation of the local community to motivate each neighborhood's representative. In addition, the

process of preparing equipment and materials for processing used cooking oil into soap was carried out by the community service team from UNS. The shopping for equipment and materials was previously done three days before the training days. Additionally, the collecting process of used cooking oil from the local community was carried out from every resident's house. The used cooking oil obtained reached 5 liters which were accommodated in the bottle. The first pre-treatment process is carried out on used cooking oil by soaking it using charcoal that has been crushed for 24 hours (Haqq, 2019), then shaken after the soaking process to activate the damaged used cooking oil to increase the efficiency of the percentage of soap products formed (Rozaq and Laksanawati, 2018). The second pre-treatment was also carried out on 3 liters of water in gallons by soaking it using lemongrass/pandan/coffee pieces for 24 hours to remove unpleasant odors when mixed with used cooking oil later (Turmudi et al., 2019). The third pre-treatment, one day before the training, was carried out by dissolving caustic soda using water-soaked in lemongrass/pandan/coffee pieces to prevent accidents that could potentially occur because dissolving caustic soda can generate excess heat. So that after dissolving, the caustic soda solution is allowed to stand for about 5 hours. Besides, it also was adjusted to room temperature and was safe to react. The three pre-treatments were carried out starting two days before the activity (Wahyuni and Wulandari, 2020).

The socialization activity regarding preparation was also carried out by providing insight in the form of a list of tools, materials, and methods of making soap from waste cooking oil through the Whatsapp Group of the local community, particularly in the family welfare development (PKK). In addition, the information dissemination was also carried out through printed pamphlets that were given to every house of the local community in Bulu village. These two things are sought to increase enthusiasm for processing used cooking oil waste and instill self-reliance in community empowerment. This socialization was carried out one day before the activity. The participants who attended the training could better understand the process of producing used cooking oil into soap before the implementation of the activity. Here are some details on how to make soap from used cooking oil.

a. Soaking 500 ml of used cooking oil with enough charcoal for 24 hours
b. Soaking 175 ml of water with lemongrass/pandan/coffee leaves for 24 hours
c. Weighing 85 grams of NaOH
d. Filtering the used cooking oil that has been soaked so that the cooking oil without charcoal is obtained
e. Mixing the lemongrass water bath by adding slowly weighed NaOH, and letting it cool down
f. Adding used cooking oil that has been filtered slowly to a mixture of lemongrass water and cold NaOH
g. Stirring the used cooking oil mixture with lemongrass water and NaOH for 45 minutes
h. Adding 5 milliliters of essential oil
i. Pouring into molds and let stand for 4 weeks

The stages of the soap production of the used cooking oil were re-explained during the training session through practice with pre-treatment that had been prepared at the beginning. The training activity was held at the local hall with nine participants representing each neighborhood. They were accompanied by members of the community service team of UNS under Group 134. The training focused on the process

of mixing ingredients and re-understanding the ingredients that are safe to use in soap making. Cooking oil that has been activated by charcoal is poured into a mixing container and then added with water that has been soaked in lemongrass/pandan/coffee pieces as a deodorizer from the oil. Stirring was carried out stably while a solution of caustic soda (NaOH) is added so that the mixture will begin to react to form soap. The used cooking oil which is dark black in color will turn gray with a texture that was initially runny to very thick indicating that the stirring can be said to be appropriate. Stirring is carried out for almost 45 minutes slowly without stopping so that the saponification process takes place efficiently (Hanjarvelianti and Kurniasih, 2020). The addition of fragrance or essential oil as the aroma of the soap is highly recommended so that the unpleasant and rancid smell of used cooking oil will leave. The soap obtained from the training is bar soap because the use of reactants in the form of caustic soda (NaOH) causes the oil to have a new structure containing sodium ions. However, if you want to get liquid soap you can use the reactant in the form of KOH. On the other hand, dyes can also be added like fragrances but not in excessive amounts ranging from 3-5 milliliters so as not to affect the main structure of the soap that has been formed. A mixture of several homogeneous soap-making ingredients can be printed according to individual preferences. The shape of the mold can be varied to increase enthusiasm in making soap such as animal or flower shapes.

After the mixing process is complete, the soap is left for 3-4 weeks. This settling process is called the curing process or soap texture stabilization. The color of the soap obtained is gray with a good density without unpleasant odor and rancidity again (Erviana, Suwartini, and Mudayana, 2018). After that, the soap is ready to be used for washing dishes and clothes that are safe and environmentally friendly. Based on the results of observations, the evaluation process was obtained from the community service team under group 134 as a guide for the management of used cooking oil training. The evaluation process was aimed at providing insight into the importance of processing used cooking oil waste to the local community. This can be seen from the enthusiasm of participating in the training and several questions offered by the participants. As a result, all the soaps were successfully made. The habit of living in an environmentally friendly society is also an evaluation because the importance of waste management must be applied equally to all corners of the village, especially in Karanganyar Regency. The increased innovation of Bulu village to empower economically independent communities through the prospect of marketing soap from used cooking oil is also evaluated because it has become a new concern and has a positive impact on society and the environment. For sure, the community service team from UNS in Bulu village can empower local residents in the right way and take into account health, environmental, and economic efficiency factors. In figure 5 the following flowchart of the steps for making soap from used cooking oil.

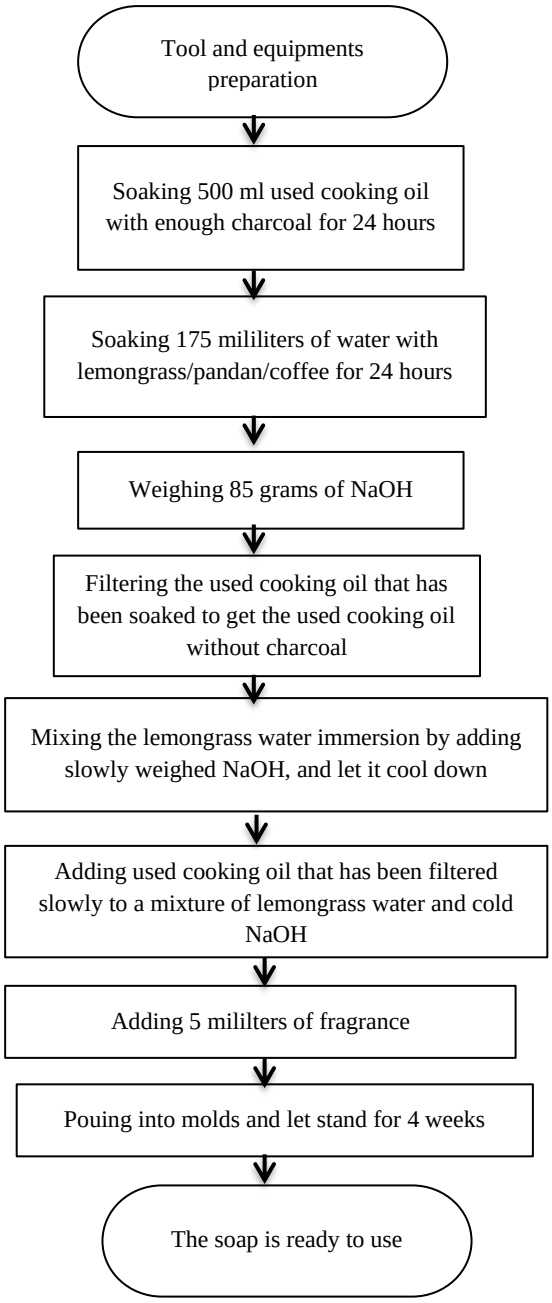

Figure 5. The flowchart of the soap making process

The completion indicator of this training was measured by the presence of a pretest and posttest on the training in making soap from used cooking oil. These two tests were administered to 15 trainees. The comparison of the results of the pretest and posttest can see in the figure 6.

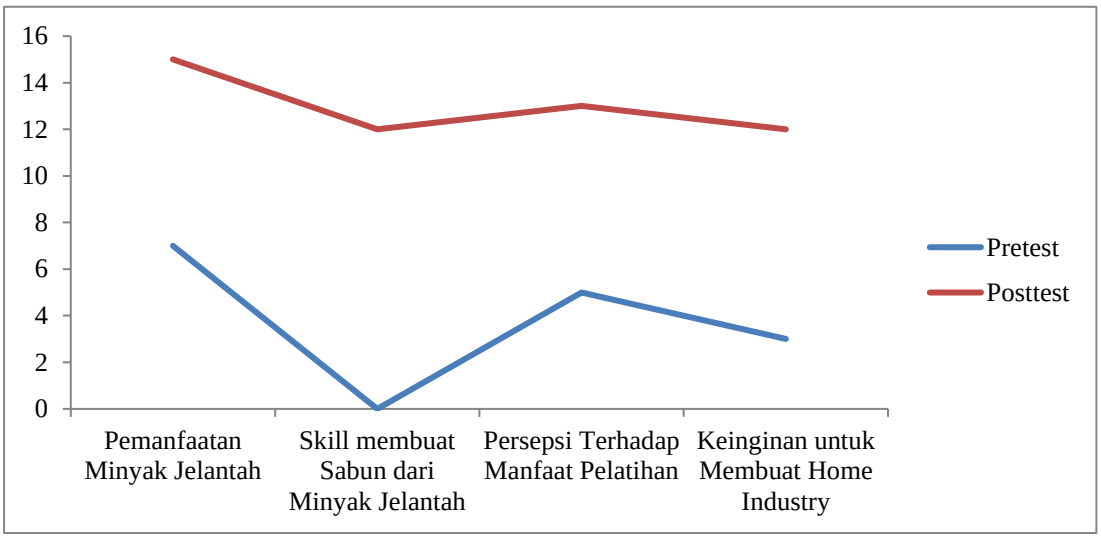

Figure 6. The Pretest and Posttest result comparison

CONCLUSION

This outreach activity in form of the training for producing soap from used cooking oil was intended as main objective of the current community service, especially in Bulu Hamlet, Jaten Village, Kec. Karanganyar Regency. It was previously initiated by the community service team Group 134. Providing insight to the local community can educate them as well as can effort to overcome waste problems, especially used cooking oil. The implementation of this training can also improve community skills in processing waste into a product that has a high commercial value. The existence of training activities can also innovate the productivity of the community with long-term prospects for marketing opportunities for soap from used cooking oil in order to welcome the empowerment of economically independent for the local people. It can also create a Home Industry, especially for housewives. The soap obtained are safe for health and environment-friendly and have the potential to become a high commercial chance for the future.

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