



Active participation of mothers in plastic recycling activities to improve water quality and reduce environmental pollution

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ARTICLE INFO	ABSTRACT
<p>Article history Received: 2024-11-15 Revised: 2025-04-06 Accepted: 2025-04-11 Published: 2025-04-11</p> <p>Keywords Clean water Community service Ecobrick Evaluation Pollution</p>	<p><i>This program investigates active participation of mothers in plastic recycling activities to improve water quality and reduce environmental pollution through the creation of ecobrick. Implemented as a community service program, the initiative followed a structured approach encompassing observation, education, assistance, and evaluation stages. The program aimed not only to minimize plastic waste but also to empower residents with skills and knowledge for sustainable environmental management. Throughout the program, participants showed high levels of enthusiasm and engagement, actively collecting and compacting various types of plastic waste into ecobrick. The program outcomes indicate significant gains in both technical competencies related to ecobrick production and increased environmental awareness among participants, fostering a sense of ecological responsibility and community collaboration. Evaluation results demonstrate the program's effectiveness in reducing the amount of unmanaged plastic waste and contributing to a cleaner neighborhood environment. This success also supports the broader goal of Sustainable Development Goal (SDG) 6, specifically focusing on clean water and sanitation by addressing pollution sources within the community. The findings underscore the potential of community-led initiatives in achieving sustainable environmental impact, suggesting the scalability of this program model to similar urban and suburban areas facing plastic pollution challenges.</i></p>
<p>Kata Kunci Air bersih Ecobrick Evaluasi Pengabdian masyarakat Polusi</p>	<p>Partisipasi aktif ibu-ibu dalam kegiatan daur ulang plastik untuk meningkatkan kualitas air dan mengurangi pencemaran lingkungan. Program ini mengkaji partisipasi aktif ibu-ibu di RW 10, Kelurahan Binong, Tangerang, dalam kegiatan daur ulang plastik yang bertujuan untuk mengurangi polusi lingkungan dan meningkatkan kualitas air melalui pembuatan ecobrick. Dilaksanakan sebagai program pengabdian masyarakat, inisiatif ini mengikuti pendekatan terstruktur yang mencakup tahapan observasi, edukasi, pendampingan, dan evaluasi. Program ini tidak hanya bertujuan untuk meminimalkan sampah plastik, tetapi juga untuk memberdayakan warga setempat dengan keterampilan dan pengetahuan dalam pengelolaan lingkungan yang berkelanjutan. Selama program berlangsung, partisipan menunjukkan antusiasme dan keterlibatan yang tinggi dalam mengumpulkan dan memadatkan berbagai jenis sampah plastik menjadi ecobrick. Hasil program menunjukkan peningkatan yang signifikan dalam kompetensi teknis terkait produksi ecobrick dan peningkatan kesadaran lingkungan di kalangan peserta, sehingga menumbuhkan rasa tanggung jawab ekologis dan kolaborasi dalam komunitas. Hasil evaluasi membuktikan efektivitas program ini dalam mengurangi jumlah sampah plastik yang tidak terkelola dan berkontribusi pada lingkungan yang lebih bersih di wilayah tersebut. Keberhasilan ini juga mendukung pencapaian Tujuan Pembangunan Berkelanjutan (TPB) 6, khususnya terkait air bersih dan sanitasi, dengan menangani sumber polusi di lingkungan masyarakat. Temuan ini menegaskan potensi inisiatif yang dipimpin oleh masyarakat dalam mencapai dampak lingkungan yang berkelanjutan, serta menyarankan bahwa model program ini dapat diadaptasi untuk daerah perkotaan dan pinggiran kota lain yang menghadapi tantangan polusi plastik serupa.</p>

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How to cite: Bermuli, J. E., Dirgantoro, K. P. S., Tantu, Y. R. P., Sitompul, H., Wuisan, P. I., Loho, F. G., & Silaban, G. N. A. (2025). Active participation of mothers in plastic recycling activities to improve water quality and reduce environmental pollution. *Journal of Community Service and Empowerment*, 6(1), 74-84. <https://doi.org/10.22219/jcse.v6i1.37550>

INTRODUCTION

Nature has always been giving the resources that every living being needs, so that humans as God's creation, are given the privilege to think rationally, and the cultural mandate to manage and preserve the earth. As time progresses, population density causes several problems for nature. One of which is the usage of single-use plastics (Rafi & Perkasa, 2023). 53% of plastics that are made of flexible materials are produced into food wrappers; while the rigid ones are turned into drink containers (Nasution, 2015).

Typically, plastic is favored for its distinguished qualities, such as being light weight, free from rust, sturdy and malleable, effective in electrical isolation, dyeable and can be made transparent, as well as its cheap process costing (Praharjo, et al., 2022). In line with that, most of people likes used the plastic bag because of attractive in color, lightweight, practical, and easy to carry (Widayat et al., 2022). Plastic is a group of polymer compounds that consist of several different types of monomers in the process of polymerization. The first commercial plastic was made of nitrocellulose, but recently, the most commonly developed and distributed ones are the types of synthetic polymer compounds that are made from crude oil, which is hard to degrade naturally. Carbon and hydrogen are the main chemical constituents of plastic.

The most commonly found types of plastic in urban wastes include low-density polyethylene (LDPE), polypropylene (PP), high-density polyethylene (HDPE), polyvinyl chloride (PVC), Polyethylene Terephthalate (PET), and polystyrene (PS) (Evode et al., 2021; Setyowati & Widodo, 2017). PET plastic is commonly produced as plastic bottles; HDPE can be used for plastic bags, juice or shampoo containers, pill bottle; while LDPE can be used in plastic wrappers, food containers, and packaging cover (Hasibuan, 2016). In general, plastic takes a long time to decompose, around 100 to 500 years to be completely decomposed (Ramadani, 2019).

The use of plastic is indeed efficient, but it can have a big negative impact on the environment. The impact of pollution on water and soil will disrupt the ecosystem and have a negative effect on the sustainability of all living things in the environment (Rafi & Perkasa, 2023). Plastic waste is one of the largest types of waste and is classified as being unable to be broken down by microorganisms that live in the environment (Hasibuan, 2016). It is further stated that plastic in water will cause problems in the waters, such as being eaten by aquatic creatures who think the plastic is food (for example, turtles that eat clear plastic because of the resemblance to jellyfishes), microplastics that can be mistaken for plankton by other animals in the waters, and even the dangerous chemicals that make up the plastic can break down and enter the water, becoming poison (Hasibuan, 2016) which can cause pollution and kill aquatic animals (Ramadani, 2019).

Water is one of the most important natural resources for the life of every living thing in the world. The need for clean water can support the life of all living things, not only for animals that live in water, but also every living thing that lives in water and on land. In several locations in Tangerang, especially in the Binong Village area, plastic waste management is still considered inappropriate. Many residents still throw garbage in water channels, on the side of the road, and even in other open places. In addition to littering, many residents also choose to burn the garbage, which produces smoke and pollutes the air.

This condition concerns the residents of the complex who live side by side with the Binong area so that the TMD (Tim Mitra Daerah), UPH and Binong Village agreed to create an activity that could handle the problem safely and appropriately. Handling the problem is done by recycling plastic waste into certain products that can be used. One way is to make ecobrick. The origin of the word is from the word eco "nature" and brick. Ecobrick can be explained as the packaging of clean used plastics and compacted in bottles (containers) to a certain density, which can then be used as building materials by arranging the ecobrick like brick blocks (Ramadani, 2019)

Plastic waste that is difficult to degrade, is often found piled up on the ground and around water channels can be a problem for the environment. Therefore, the activity of recycling plastic into ecobrick is carried out in the Pengabdian kepada Masyarakat (PkM, in English "Community Service") program or community service as an alternative solution that can be done to reduce the accumulation of plastic waste in the environment around RW 10, Binong Village. Several points measured in this community service activity are the active participation of Binong Village's women in recycling activities which are assessed using questionnaires and attendance. This community service program was held by involving the women of RW 10 Subdistrict Binong and Binong regional government. The program is supported by the Faculty of Education of UPH Tangerang. The goals of this PkM are: (1) To observe the active participation of the women of RW 10, Binong Subdistrict in this PkM activity, (2) To recycle every type of plastics and plastic bottle to be an ecobrick, and (3) Through this community service program, to provide more opportunities for civils at Binong area with good health and reach a better environment to live in.

It is hoped that through this community service activity, each participant can provide a solution to the use of single-use plastics that accumulate at home, commit to not throwing away plastic waste by recycling it into ecobrick, and enhancing water quality by reducing pollution in the environment to support efforts to improve SDG (Sustainable Development Goal) number 6 regarding clean water and proper sanitation.

METHOD

The community service activities in the form of recycling or recycling plastic waste into ecobrick products are carried out using the workshop method. The subjects and places of this community service activity are women in RW 10, Binong Village, Tangerang. The stages carried out in this community service are 1) Observation and identification stage of problems submitted by partners (TMD and Binong Village); 2) Preparation stage carried out by submitting proposals and submitting permits to the campus and

the Village; 3) Education stage; 4) Assisting stage; and 5) Evaluation stage (Figure 1).



Figure 1. Community Service stages.

In the first stage, the community service team conducted observations and identified problems in Binong Village. Stage 1 was conducted once in the Forum Group Discussion session. In the Observation stage, the PkM team can also observe the environment that is the target for holding this community service (Aryana et al., 2023). When conducting field observations, it was seen that a lot of garbage was thrown away and scattered around the residents' settlements, village halls, and in the gutters, which is our main concern. In the second stage, which is the preparation and writing of the proposal, was carried out as a form of follow-up to the problems found in the field. Then in the third stage, coordination was carried out to plan and finalize the schedule for this community service activity.

The fourth stage is the stage of educating the community. At the education stage, the PkM team also provides a live demonstration of the ecobrick making process so that participants can directly understand the methods and stages in implementing ecobrick. It is also ensured that the groups would be sitting in circle formations in order to help maintain eye contact, discussion, and information processing, which is helpful to the active participation and engagement by the participants (St. Onge & Eitel, 2017). After the education stage, the next stage is the assisting stage as the fifth stage. The sixth and final stage in this activity is evaluation. Evaluation in the form of questionnaire data collection is carried out 2 times, namely at meeting 2 after the assisting stage and meeting 3 during product assessment.

The data collection method is carried out by calculating questionnaire data and product and activity assessment rubrics. A questionnaire is a research instrument in the form of questions addressed to respondents to be answered freely, according to their opinions (Ernawati & Setiawaty, 2021). In line with that, a questionnaire is a data collection technique consisting of questions that must be answered in order to obtain subjective information from respondents (Nugroho, 2022). Questionnaires and questionnaires are data collection tools or instruments that are both taken in an activity. Thus, a questionnaire is the use of a written question instrument that must be answered to obtain subjective information from the community. The data generated from administering the questionnaire is in the form of qualitative data. Sources of qualitative data collection consist of words, community activities, and documentation in the form of photos taken during the activity. Qualitative data can be used to measure the quality of the event to participant satisfaction with the event.

The questionnaire was designed to measure the level of active participation and response of the participants towards this community service activity. The aim was to obtain constructive feedback for future improvements. The Likert scale was used in this questionnaire, which allowed the participants to state their opinions through four answer choices, namely: SA (strongly agree), A (agree), DA (disagree), and SDA (strongly disagree). The use of the Likert scale allows for a more in-depth analysis of the participants' perceptions and satisfaction with the workshop. The data obtained from this questionnaire will be processed to obtain a clear picture of the effectiveness and impact of the activities that have been carried out. Thus, this workshop not only functions as a forum for community empowerment, but also as a means to improve the quality of interaction and social activities in the RW 10 environment, Binong Village.

The next instrument is the product assessment rubric. The assessment rubric used in this community service activity is a measuring tool to assess the products that have been worked on by residents. Rubric is an objective assessment instrument, containing gradations of values, criteria, and aspects that help students produce higher quality performance (Lase & Nababan, 2023). Rubric is an effective alternative assessment currently used to assess student or participant performance which can cover three aspects, namely cognitive, affective and psychomotor (Tangkin, 2019). Based on the opinions of experts, it is concluded that the rubric is an effective assessment instrument to measure participant performance that can be taken and carried out objectively because the assessment is carried out based on the reference criteria in the rubric for the products worked on.

This PkM was held from March to June 2024. The schedule and details of the activities are outlined in Table 1. This community service was attended by women in RW 10, Binong Village. Participants consisted of various elements of society, including RW (Rukun Warga) women, RT (Rukun Tetangga) women, and the local women. Each meeting in the series of Community Service (PkM) activities was evaluated systematically using a questionnaire distributed to all participants.

Table 1. Workshop schedule and details

No.	Schedule	Events
1	Meeting 1	<ul style="list-style-type: none"> ▪ Team introduction and socialization of ecobrick ▪ Education Stage: Collection of plastic packaging and plastic bottles
2	Meeting 2	Assisting stage: <ul style="list-style-type: none"> ▪ Education Stage: Collection of plastic packaging and plastic bottles ▪ Making and production of the ecobrick
3	Meeting 3	<ul style="list-style-type: none"> ▪ Evaluation Stage: Completion of the ecobric ▪ Product assessment and competition

RESULTS AND DISCUSSION

In the second week, the community service activities focused on the assisting stage in the ecobrick making process, where local women were directed to bring plastic waste and plastic bottles that had been collected from their house environments. Handling plastic waste by making ecobrick has also been carried out in Pemogan Village (Suidarma & Antini, 2023). The manufacture of ecobrick has been done a lot and can be one of the answers to reduce plastic waste in the environment (Bermuli et al., 2023). Before starting, the assisting team explained the important procedure of compacting plastic waste into bottles until they were completely full and solid to produce quality ecobrick that meet standards. The women's enthusiasm for this activity was palpable, bringing various types of plastic, such as food wrappers, plastic bags, and used beverage bottles. Each participant was carefully guided in filling the bottles with plastic, using simple tools such as small sticks or wood to help compact the contents of the bottles to the maximum (Bermuli, et al., 2023). During the activity, the women were encouraged to discuss the challenges they faced in the process of collecting and compacting waste, as well as sharing their experiences about waste management in their own households. This activity not only serves to improve technical skills in making ecobrick but also strengthens ecological awareness and develops a spirit of cooperation among local women, who play an important role in environmental conservation efforts in their villages. This can be done to reduce the serious impact of plastic waste pollution which can be a pollutant for the environment, especially water and soil (Rafi & Perkasa, 2023). This PkM, which is titled as "Active Participation of Mothers in Plastic Recycling Activities to Improve Water Quality and Reduce Environmental Pollution" was carried out in several stages of activity with the following details:

Observation and Identification of the Problem

Stage 1 was conducted by observing and identifying problems in Binong Village through 2 methods, namely 1) interviews conducted with the Village Head, Village Secretary, and Family Empowerment and Welfare (PKK, Pemberdayaan dan Kesejahteraan Keluarga) administrators in Binong Village, Tangerang. Then, 2) direct observations were conducted in the RW 10 area, Binong Village, Tangerang to obtain concrete data. After the observation activities were carried out, the team identified the problems and formulated the problems that had been seen during the Village team interview process in the Forum Group Discussion (FGD) and observation activities. The Village Team and PT. Tata Mandiri Daerah Lippo Karawaci (TMD, Township Management Division) worked together to create shared prosperity as fellow residents who live close together. This is due to the anxiety of the housing residents regarding improper waste management. Residents who live side by side with the Lippo Barat housing complex are often found burning garbage until the smoke disturbs the housing complexes nearby. This can trigger health problems if it is allowed to continue.

Diseases that can be suffered by the community if they are continuously exposed to smoke from burning garbage are respiratory disorders (asthma, bronchitis, and pneumonia), chronic obstructive pulmonary disease (COPD), acute respiratory infection (ARI), cardiovascular disease (stroke and heart), fetal development disorders, and decreased lung function (Maharani & Aryanta, 2023). Based on the data and information, the most common diseases suffered are diseases related to the respiratory organs. This is because burning waste will produce residue in the form of highly concentrated smoke that can pollute the environment. Therefore, the problem of plastic waste management is a problem that needs to be followed up immediately. The purpose of TMD is to maintain and clean the environment, maintain road and channel infrastructure, provide consumer services, and provide transportation services in the Lippo Village area. Thus, to achieve this goal, TMD invites Binong Village and Pelita Harapan University (UPH) to work together to find solutions to the plastic waste problem that occurs around the Binong Village area.

Preparation and Writing of the Proposal

The second stage of the community service series carried out is the preparation and writing of the proposal for this activity. The entire team prepared literature to write a draft of the community service proposal. The proposal is a draft of a research proposal conducted by a researcher on the research material to be conducted. The draft of a research activity proposal requires the approval of other parties before the research activity is carried out (Khoiriyati et al., 2022). According to KBBI (Badan Pengembangan dan Pembinaan Bahasa (Pusat Bahasa), 2024), a proposal is a research plan that is realized in the form of a systematic, complete, and thorough activity plan that is designed before the research is conducted. Thus, the proposal is a document containing a draft of activities that will be carried out and requires approval from other parties before the research activity is carried out. In addition to containing details of the activities to be carried out, the proposal also contains details of the budget expenditures needed during the research. A proposal is made to obtain approval from the parties involved during the research, so that the entire contents of the proposal must be understood by the approving party. The community service proposal then became an official document for UPH and Binong Village in working together to find solutions and solve the problem of plastic waste in the environment. Ecobrick is one way that can be done to reduce plastic waste in the environment to maintain environmental cleanliness from polluting agents (Bermuli et al., 2023).

In addition, the writing of the activity proposal is carried out to apply for permission and funding from UPH regarding this activity. After the submission of the activity proposal is approved, the team coordinates with the Binong Village. This activity is the third stage of the community service activity process that is carried out. The writing of the proposal contains the background of the activity and the objectives to be achieved by the UPH and Binong Village PkM team members. In addition, the proposal

also contains details of the method, assessment rubric, questionnaire, activity agenda, and the funds that will be used in this program. The results or outputs of this activity are also written in the activity proposal.

Coordination with the Related Parties

The coordination stage with the related parties included the preparation of the activity agenda, determination of the material to be delivered, and preparation of the facilities and infrastructure needed during the process of carrying out activities in the field. The coordination stage is carried out by involving several parties, such as the Binong Village Team, PKK Management, Head of the RW 10, Secretary, mothers who live in the RW 10 area, UPH students, and members of the community service team. The division of roles and responsibilities for the activity is the Binong Village Team, a leader from that area and RW 10 Secretary as Activity Supervisors, PKK Management and women in the RW 10 area as activity participants, UPH students as group facilitators, Head of the community service activity served as the speaker and competition judge, members of the PkM team also served as competition jury team and field supervisors. Good coordination is needed between the campus and local residents. Because this problem comes from environmental problems in the area where they live, it requires the cooperation of residents to be able to find the right solution. This is because the community needs to be involved in decision-making and the implementation of activities that can improve the quality of the environment around them (Fatmawaty et al., 2020).

Education for the Local Community

The community education activity began with a welcoming speech and opening by the RT (Figure 2A). Education is an interactive process where an educator or presenter would deliver some materials to the participants (Pasalina et al., 2023). After the opening activity, it was proceeded with the presentation of material by the PkM team (Figure 2B). During the education activity, participants will follow a series of detailed explanations regarding the background of the activity, the impact of plastic waste on the environment, how to reduce the amount of plastic waste, the origin of ecobrick, functions, techniques, the processes of making, and the expected results of the community service activities carried out (Figure 2). Residents were explained about the impact of plastic waste pollution because plastic waste is one of the inorganic waste that cannot be degraded in nature (Putra & Yuriandala, 2010). Details of the ecobrick making process regarding how to select materials, prepare, and manage plastic waste properly, were also explained during the education session given to participants. The PkM team also showed examples of ecobrick products that had been made and could be used as useful products in everyday life.



Figure 2. The education stage for the residents of RW 10, Binong. A) Opening by the RT head; 2) Explanation of the material for the benefits and how to make ecobrick.

At this education stage, the women of RW 10 were taught about the impact of littering single-use plastic waste. If thrown away carelessly, for example on the ground or in the gutter, it will cause environmental pollution and water pollution. Based on Figure 1, the chemical structure of each type of plastic is quite different. If plastic is not processed properly, it will have a bad effect on all living things. The nature of plastic that is not easily decomposed will become a dangerous pollutant in the soil and in water areas. Therefore, making ecobrick can be a positive alternative to reducing the use of single-use plastic and plastic bottles. In the education stage, every piece of information about ecobrick is delivered to people who live in RW 10, Binong, Tangerang. The making of ecobrick aims to raise environmental awareness and reduce plastic pollution, to keep the environment clean and help reduce water pollution that can cause a clean water crisis. This activity is designed to educate participants about the negative impacts of plastic on land and water, as well as how every community can contribute to solving the problem of water pollution caused by plastic waste (Bermuli et al., 2023; Suidarma & Antini, 2023).

Education stage begins with preparation of tools and material that we used in this workshop. Preparation tools and materials are significantly important for every situation (Sine et al., 2023). During the education stage, participants received information on how to make ecobrick. The ecobrick making technique starts from 1) selecting the plastic bottles to be used, 2) cleaning the bottles that have been sorted by washing the inside of the bottle thoroughly with water or with soapy water for plastic bottles containing water containing sugar, 3) drying using a dry cloth, 4) chopping each cleaned and dried plastic food wrap into about 1-2 cm in size, 5) inserting flexible and fairly thin plastic such as plastic bags into the bottle, 6) pushing the plastics with a wooden stick until it occupies the bottom of the bottle, 7) inserting pieces of plastic food wrap, 8) repeating and pushing with a wooden stick until the bottle becomes solid and does not enter when pressed on the surface of the bottle or is sturdy when the bottle is stepped on, 9) weighing each filled bottle and making sure it reached the specified volume, 10) the ecobrick is ready to be used

for various purposes. The steps have been modified from several resources (Bermuli et al., 2023; Ramadani, 2019; Suidarma & Antini, 2023). Ecobrick can be used as a substitute for bricks which are one of the elements in building construction. In addition, ecobrick can also be used for other purposes, such as small chairs, mini sofas, shoe racks, flowerpots, and so on.

Assisting

The assisting stage is a stage carried out by the PKM team to see the progress of the ecobrick project of each team. In the assisting process, the college students were given the opportunity to help the women in working on the ecobrick. At this stage, the community team can weigh the finished ecobrick and re-evaluate them. If it was done correctly and filled the bottle according to its size, it will be given a weight label and marked. Even for bottles that were labeled as approved, it was still necessary to re-evaluate the density of the contents in the bottle. This was done to ensure the ecobrick bottle would remain sturdy and filled. At this stage, students also help with the process of cutting the plastics, inserting the plastic bits into the bottle, compacting them with wooden sticks, then weighing the ecobrick (Figure 3). At the mentoring stage, the community continues to be reminded to care about the environment and participate in the fight against plastic waste. This is because environmental issues have a direct impact on the people who live and live in the area. In addition, it is said that the issue of plastic waste generally has a very significant impact on every resident living in the area (Rusdiono et al., 2023). After that, when closing the assisting stage, the PKM team reminded the community team to plan the final product of the ecobrick that had been worked on.



Figure 3. Stage of assisting the residents of RW 10, Binong in the activity of making ecobrick

Evaluation of the Products and Closing

The product assessment and closing stages are the final stages of a series of ecobrick making activities at RW 10, Binong. At this stage, the resulting product will be assessed using an assessment rubric with the criteria listed in Table 2. Rubric is a tool or instrument that is used as a reference in the assessment of an activity (Mahmudi, 2018). There are 4 criteria that are assessed for the ecobrick products carried out by the community team. The criteria include correspondence with the goal, creativity, appearance, and teamwork. The PKM lecturer team will act as judges in this product evaluation stage. At this stage, there are 4 groups of residents who will compete and there are 4 lecturers assessing them. Each lecturer assesses 2 groups so that there is no element of subjectivity in the evaluation (Figure 4). Each evaluation results would then be collected, then added up and then divided by 2. As a result, the highest score will emerge as the winner of the product competition that was worked on. This assessment rubric is carried out to be able to motivate residents to be able to work on each ecobrick properly and carefully. Because residents and the environment are two components that cannot be separated, so when working and managing waste, residents need to do their work properly to fulfill their rights and obligations (Kewengian, 2019).

Table 2. The rubric of evaluation of ecobrick

Criteria	Score		
	3	2	1
Correspondence with the goal	The product corresponds to its purpose and needs, proved useful	The product corresponds to its purpose	The product does not correspond to its purpose
Creativity	The product is based on original, innovative ideas and is made from environmentally friendly materials.	The product is based on a modified idea	The product imitates a concept that already exists, nothing new
Appearance	Impressive, well-structured, and sturdy	Impressive; there are fewer sturdy parts	Less impressive and less sturdy
Teamwork	All group members work together and are enthusiastic in completing the work	Some group members do not appear to be working together on the product	No teamwork, the product is done individually

Note: 3 = Very satisfactory; 2 = Satisfactory; 1 = Unsatisfactory



Figure 4. Product evaluation of the ecobrick made by the teams of residents of RW 10, Binong

At the product assessment stage, several community teams still had difficulty working on the final part of the product. This is because the denser the ecobrick, the harder it is to push the plastic pieces into the bottle. This caused the ecobrick activity participants who were around 40 years old and above to need help from the college students as a community service team (Figure 5). At the final stage of making the ecobrick, the cut plastic pieces must fill up to the bottle cap.



Figure 5. Product evaluation of the ecobrick made by the teams of residents of RW 10, Binong.

The evaluation stage is carried out to measure the process of implementing the program carried out. The evaluation stage is carried out by various methods of data collection. Existing data collection techniques, for example in the form of tests, observations, questionnaires, interviews, document and artifact analysis, and monitoring the implementation of program evaluations (Diana, Nizar and Sari, 2023). In this community service activity, the evaluation stage was carried out with several data collection techniques, namely, product presentation, product assessment, and questionnaire filling. The evaluation stage is the stage carried out after the product presentation stage. After the evaluation, one of the college students read the results of the judging. After the winning team was announced, each team of residents was given a prize for the hard work they had done based on the product they had made. Prize giving and documentation are the final sessions in the product assessment stage (Figure 6).



Figure 6. Prize giving based on the ecobrick product made by the teams of residents of RW 10, Binong.

Evaluation

The evaluation stage is a stage carried out to assess the series of activities by collecting questionnaire data. Evaluation needs to be carried out to see the achievement of an activity. Evaluation is carried out in every daily activity, such as in the learning system. Evaluation activities in learning are carried out so that educators are able to assess the learning activities that take place (Musarwan; Warsah, 2022). This community service also needs an evaluation to evaluate everything that already did. The evaluation can be delivered with questionnaire, interview, or even a test. In this community service, the training participants were asked to fill out a questionnaire. In the questionnaire, there are 5 questions. Each question contains an assessment of the active participation of the activity participants (Table 3). Based on the data in Table 3, 15 respondents were asked to choose the answer that best suits their view and experience. The answer choices are SA = Strongly Agree, A = Agree, DA = Disagree, and SDA = Strongly Disagree.

In Question 1, 87% or 13 respondents answered strongly and 13% or 2 respondents answered agree with the statement "I am happy with the activities carried out". Statement 2 regarding "I actively participated during the activities", 87% or 13 respondents answered strongly agree and 13% or 2 respondents answered agree. Statement 3 regarding "I gained a lot of knowledge and skills from the activities carried out", 93% or 14 respondents answered strongly and 7% or 1 respondent answered agree. Statement 4 regarding "I enjoy working in groups", 80% or 12 respondents answered strongly agree and 20% or 3 respondents answered agree. Statement 5 regarding "I am happy to gain knowledge about making ecobrick", 87% or 13 respondents answered strongly agree and 13% or 2 respondents answered agree (Table 3).

Table 3. Result of the questionnaire

No.	Statement	Answer			
		SA (%)	A (%)	DA (%)	SDA (%)
1	<i>Saya senang dengan kegiatan yang dilakukan</i> (I am happy with the activities carried out)	87	13	0	0
2	<i>Saya berpartisipasi aktif selama kegiatan berlangsung</i> (I actively participated during the activities)	87	13	0	0
3	<i>Saya mendapatkan banyak pengetahuan dan keterampilan dari kegiatan yang dilakukan</i> (I gained a lot of knowledge and skills from the activities carried out)	93	7	0	0
4	<i>Saya senang bekerja dalam kelompok</i> (I enjoy working in groups)	80	20	0	0
5	<i>Saya senang mendapatkan pengetahuan mengenai pembuatan ecobrick</i> (I am happy to gain knowledge about making ecobrick)	87	13	0	0

Note: SA = Strongly Agree, A = Agree, DA = Disagree, SDA = Strongly Disagree

The evaluation data of the questionnaire results are visualized using a bar chart shown in Figure 7. The diagram data in Figure 7 is taken based on the results of Table 3. Visualization of the data in Table 3 shows that respondents answered all statements with Strongly Agree and Agree. This can explain that the activities carried out by UPH's PKM team can provide benefits for the residents. In addition, each series of activities also helps residents to actively participate until the closing of the community service activities carried out. Therefore, follow-up activities would be needed in RW 10, which are related to the processing of waste or waste into useful products that support the health of the environment and the local community.

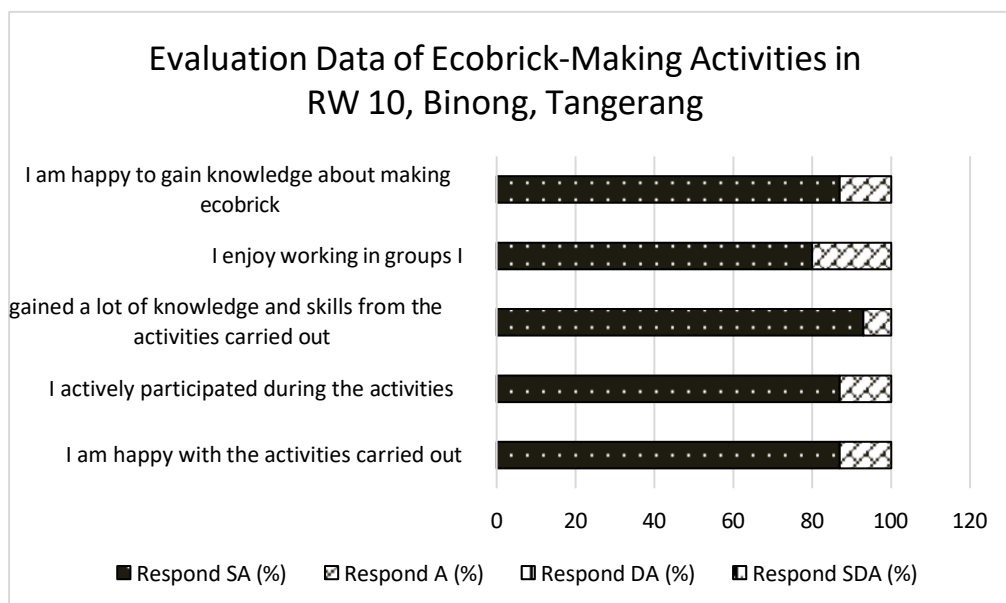


Figure 7. Evaluation data of ecobrick-making activities on RW 10, Binong, Tangerang.

Based on the evaluation results, it can be concluded that all workshop participants felt significant benefits from these activities and the suggestion is the activities are very good to continue to be held regularly. This is in line with the opinion that evaluation activities aim to provide recommendations on the sustainability of an activity based on the data generated (Diana et al., 2023). Participants expressed satisfaction and joy in participating in the series of activities held, especially in gaining new knowledge and skills related to making ecobrick. In addition, at the last meeting of this community service activity, the community service team saw that the area around RW 10, Binong residence, looked clean, and the amount of plastic waste thrown away in their residential environment had decreased significantly. If this activity continues to be carried out sustainably, it can support SDG number 6.3, "By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally." (Indonesia, 2025). The problem of plastic waste will have a great impact on reducing soil fertility and damaging the environment due to its unbreakable nature and potential to become harmful pollutants (Purwaningrum, 2016). By reducing pollution, eliminating waste, and minimizing the amount of hazardous chemical materials, water quality can be improved. Waste processing and recycling are very good positive activities to continue to be developed so that the environment becomes cleaner and healthier for every living creature that lives and resides in the environment.

The community service team also conducted interviews with several residents who participated in the ecobrick making activities and felt that the workshop provided not only theoretical insights but also valuable practical experience. This activity was held as one of the activities to follow up on the problem of plastic waste in the environment. In addition, in the session given, the public was also given education to reduce plastic waste by bringing their own shopping bags and not using single-use plastic. This is in line with the explanation that campaign and education activities need to continue to be carried out to every community and also students to reduce plastic waste, as well as other activities that can increase awareness that are beneficial for reducing plastic waste (Razza et al., 2020).

The active participation of all participants was clearly visible during the workshop sessions. This was seen when the community team was directly involved in various activities and discussions. The enthusiasm of the participants was reflected in their ability to collaborate effectively in groups, demonstrating a strong spirit of cooperation and mutual support. The cooperation that was established among the participants was one of the positive aspects of this workshop, helping to build a more solid social network among the residents of RW 10. This workshop succeeded in creating an interactive and fun learning atmosphere, while strengthening the community in achieving a common goal of reducing plastic waste and improving environmental quality. This is in line with the statement that face-to-face activities such as workshops can increase participant participation and interaction from each subject involved in it (Marco-Fondevila et al., 2022).

It is hoped that the women of RW 10 will become agents of change in their community, promoting sustainable practices, and contributing to the reduction of environmental pollution and the improvement of water quality. With new knowledge and skills, they can play a key role in maintaining environmental cleanliness and quality, especially related to the availability of clean water.

CONCLUSION

The ecobrick-making program in RW 10, Binong Subdistrict, Tangerang, demonstrated a significant impact in fostering environmental responsibility and active community engagement among local women. The program effectively mobilized participants to repurpose plastic waste into ecobrick, addressing both environmental pollution and community health concerns by preventing the accumulation of non-degradable waste in the area. Through hands-on workshops and continuous assistance, participants not only developed practical skills in recycling but also gained a deeper understanding of the environmental consequences of plastic waste. This initiative successfully promoted ecological awareness and fostered a collaborative spirit among residents, leading to the creation of a cleaner, safer community environment. Moreover, the positive reception and high levels of engagement among participants underscore the program's potential for long-term impact and scalability. By directly aligning Sustainable Development Goal 6, focused on clean water and sanitation, this initiative contributes to improved local water quality through reduced pollution and serves as a replicable model for other communities. Sustained and expanded efforts in similar recycling programs are encouraged to build upon this success, further embedding sustainable practices within the community and supporting regional environmental goals.

ACKNOWLEDGEMENT

Thank you to Universitas Pelita Harapan for all the support of community service permits. These community permits were conducted through a performance contract with the number PM-069-TC/1/2024. We also wanted to say thanks for the Government in Binong Village, Tangerang for its service, guidance, and collaboration in this community service.

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