

# Training of application plastic waste into ecobricks at Notoprajan, Ngampilan, Yogyakarta Indonesia

Gita Indah Budiarti <sup>a,1,\*</sup>, Surya Adami <sup>b,2</sup>, Erfan Fakhriyanto <sup>b,3</sup>

<sup>a</sup> Chemical Engineering Departement, Faculty of Industrial Technology, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

<sup>b</sup> Industrial Engineering Departement, Faculty of Industrial Technology, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

<sup>1</sup> [gita.indah@che.uad.ac.id](mailto:gita.indah@che.uad.ac.id) \*; <sup>2</sup> [surya1500019172@webmail.uad.ac.id](mailto:surya1500019172@webmail.uad.ac.id); <sup>3</sup> [erfan1500019143@webmail.uad.ac.id](mailto:erfan1500019143@webmail.uad.ac.id)

\* Corresponding Author

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## ABSTRACT

Plastic waste is a serious problem in the community, especially in RW 4,5 and 6 of Notoprajan, Ngampilan, Yogyakarta. The utilization of plastic waste in the region is not yet optimal. This community service activity aims to provide education about plastic waste and train teenagers to make ecobricks. The method used is providing education about the types of plastic waste, the dangers of plastic and the various uses of plastic waste, ecobrick manufacturing. Furthermore, participants will be accompanied to practice directly making ecobricks. The results of this activity were in the form of ecobrick work by the participants. This proves that their understanding and skills have improved with this training.



## KEYWORDS

Ecobrick  
Plastic waste  
Notoprajan  
Teenagers



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## 1. Introduction

Ngampilan District is one of the areas in the city of Yogyakarta. The area of Ngampilan District is 0.82 m<sup>2</sup>, part of the area is traversed by the Winongo river. Ngampilan sub-district consists of two sub-districts, namely Notoprajan and Ngampilan villages. The population in Notoprajan Village is 1367 people, with 680 male residents and 687 female residents. The work of the Notoprajan community is dominated by students and students, amounting to 314 people. The last education in Notoprajan Village is mostly high school equivalent of 482 people. Teenagers or students are the next generations who are creative and innovative, so they are chosen to be the target of this activity. A large number of residents in Notoprajan Village and the busyness of urban communities cause various problems. The biggest problem for urban communities is waste, especially plastic waste. Every day plastic waste is always produced by households. Plastic waste issued by RW 4.5 is 28% and 96.3% of the total waste generated. Plastic is a material that is very helpful for human life. However, single-use plastics pose serious environmental problems. Plastic waste is difficult to decompose; if it is piled up or burned, it will cause serious health problems, namely cancer [1]. The time required to decompose plastic waste is very long, namely at least 450 years. Types of plastic waste and its nature are presented in Table 1 [2]. Plastic waste management is very important to pay attention to. There is no optimal processing of plastic waste in this area. Only a few RWs already have a waste bank, but the waste from the waste bank has not been used properly. Plastic waste can be used to make various crafts, fuel and ecobricks. Brick is the raw material for making walls in buildings. Conventional brick making requires much energy. The energy used during combustion produces pollution from combustion in the form of CO<sub>2</sub> gas, which is harmful to the environment [3]. These bricks can be replaced with environmentally friendly materials, including eggshell waste [4], [5], and plastic waste cut and put into bottles. Amena [6] reported that plastic waste strips and brick waste powder were found to increase the strength qualities of expansive soils. According to Aneke's [7] research, bricks from plastic waste can substitute bricks for eco-friendly buildings. The strength and attractiveness

of plastic waste can be used as a good ecobrick [8]. Ecobricks are bricks made using plastic bottle waste filled with paper waste or plastic waste that is chopped first [9]. This activity aims to utilize plastic waste into ecobricks in the RW 4,5, and 6 Notoprajan, Ngampilan, Yogyakarta, with the target of teenagers.

**Table 1.** Types of Plastics, Their Properties and Hazards

No	Plastic Type	Application	Properties
1.	PolyEtylene Terephthalate (PET)	Juice bottles, soda bottles, bedding, textile fibres	Heat-resistant, hard, translucent, melting point 85°C
2.	High Density Polietilen (HDPE)	Packaging for milk, fruit juice, shopping bags	Rigid, strong, tough, moisture resistant
3.	Polivinyll Chloroyde (PVC)	Juice bottle, water pipe, plastic wrap	Tough, strong, easy to mix
4.	Low Density Polietilen (HDPE)	Frozen food bags, soy sauce bottles, sauces, honey, plastic wrap	Easy to process, strong, tough, flexible, easy to seal, moisture resistant
5.	Polypropilen (PP)	Kitchen utensils, microwave utensils, disposable plates and bowls	Strong, tough, heat, oil and chemical resistant, moisture resistant
6.	Polystyren (PS)	Egg carton, Styrofoam, Disposable bowl	Easy to shape and process
7.	Another plastics (Polikarbonat atau ABS)	Drink bottles, baby bottles, electronic goods	Depending on the type of polymer

## 2. Method

This activity took place on January 5 and 9, 2020, from 14.00 to 16.00. The location of the activity in RW 4, 5 and 6 Notoprajan, Ngampilan, Yogyakarta. The training participants were teenagers totalling ten people. Students involved six people. The tools used for this training are plastic bottles of mineral water, plastic waste (instant noodle wrappers, detergent, shampoo, soap, drink sachets), raffia, glue, paper, paint/*pilok*, bamboo sticks/long wood. The method used in this training is the presentation of education or the provision of theories about the types of plastic waste and the use of waste, one of which is ecobricks. After the education, the direct practice of making ecobricks was carried out. On the first day, January 5, 2020, carried out educational activities, counting plastic waste, filling chopped plastic waste into bottles, and pressing them until they were solid. On the second day, on January 9, 2020, the activities carried out were assembling the filled bottles and decorating them with colourful paints.

## 3. Results and Discussion

The results obtained from this service activity are participants' understanding of the types of plastic waste and their increased use. Plastic waste processing is the 3R, reducing, reusing, and recycling [10]. Participants were given the education to reduce plastic waste (Figure 1).



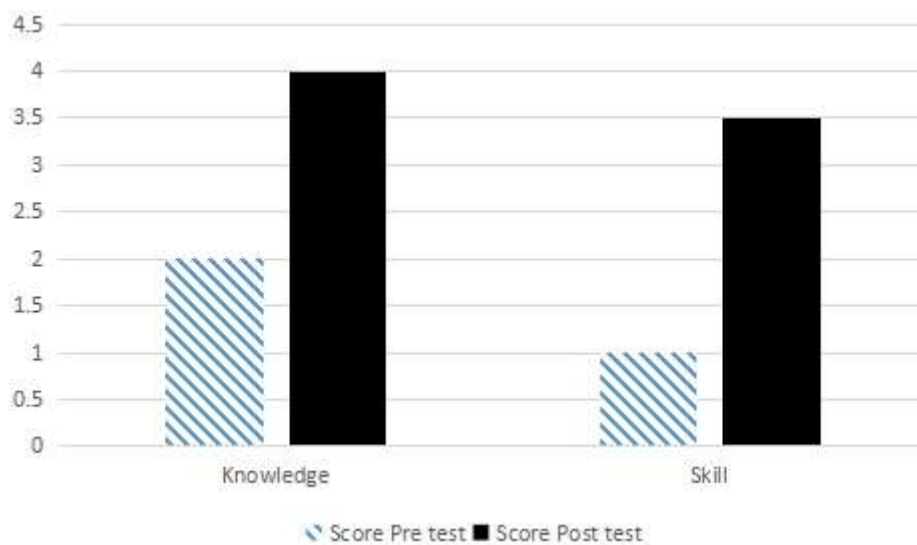
**Fig. 1.** Education and discussion about plastics waste and ecobrick

For example, if you are shopping, bring a goodie bag from home. Do not use disposable drink bottles. Apart from reducing and reusing, they are also trained to recycle plastic waste. One way to recycle plastic waste is ecobricks. They said they were happy to be able to process waste into something useful (Figures 2 (a) and Figure 2 (b)). The training results are ecobricks in the form of shoe racks, tables and chairs to relax. This proceeds will be donated to RW 4,5,6 Notoprajan, Ngampilan, Yogyakarta.



**Fig. 2. (a) Training of making ecobrick; (b) Training of arrange ecobrick**

Figure 3 shows that this training can increase knowledge and skills in making eco-bricks. Knowledge has increased from 2. Namely, they do not really know what ecobricks are, and the use of plastic waste to 4 or understand the meaning and benefits of ecobricks. Skills increase from 1, or participants have not been able to make eco-bricks that can be used for equipment such as tables or sofas to 3.5, where participants can make garden tables and chairs from ecobricks. The difference between this ecobrick training activity and other training that has been carried out is the target chosen. The previous training targeted women. The selection of youth targets because they are the nation's successors, teenagers are more creative and innovative in making ecobrick designs, making teenagers aware of how to protect the environment. The impact of this activity is that teenagers become more aware of the types of plastic waste, the dangers of plastic waste and how to process plastic waste through ecobricks.



**Fig. 3. Scoring Knowledge and Skill Before and After Training**

#### 4. Conclusion

Based on the activities that have been carried out, it can be concluded that the participants' understanding of the use of plastic waste, especially the manufacture of ecobricks, has increased. This is evidenced by the fact that they are able to make various objects using ecobricks.

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