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Socialization and Training on the Utilization of Plastic Waste as a Mixture in the Making of Paving Blocks

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A B S T R A C T

This Community Service program focuses on socialization and training activities on the use of plastic waste as a mixture in making paving blocks. The first activity was in the form of socialization about the dangers of plastic waste and its potential for processing as a mixed material for paving blocks, while the second activity was in the form of training on the practice of making paving blocks by utilizing shredded plastic waste measuring 0.1–2 cm. The implementation of these two activities has a positive impact on the Waste Care Community (MALISA), especially in improving knowledge and skills related to plastic waste processing. The results of this activity are expected to be the basis for the development of small and medium enterprises (MSMEs) based on plastic waste processing in the future.

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INTRODUCTION

Plastic is a very durable material, very difficult to decompose and can cause a variety of problems for the environment and life. When it becomes used or garbage and is disposed of carelessly in the terrestrial environment, plastic can last for hundreds to thousands of years, which can lead to soil and water pollution. When plastics decompose, harmful chemicals such as bisphenol A (BPA) can seep into the soil and contaminate groundwater, where the groundwater is often used as a source of drinking water by many communities. Soil pollution occurs due to plastic buried in the soil so that it interferes with soil quality by blocking the flow of water and air which is important and necessary for plant growth. The existence of soil pollution also results in reduced soil fertility and plant productivity. In addition, the impact on land animals such as cows or goats often ingest plastic mixed with their food, causes serious health problems or even death. (Agnes Sri Mulyani, 2021) (Central Statistics Agency/BPS–Statistics Indonesia, 2018).

At the time of plastic production, many fossil fuels such as oil and natural gas are needed, which are the main sources of greenhouse gas emissions. In addition, burning plastic as a method of handling waste will produce carbon dioxide and toxic chemicals that pollute the atmosphere. So from manufacturing to disposal in the form of used goods, plastic has a negative impact on the environment. At the time of plastic production, there is a significant contribution to climate change, namely by increasing greenhouse gas emissions, which accelerate global warming and negatively impact ecosystems and human lives around the world.

When plastic is burned, there is the release of toxins such as dioxins, furans, mercury, and polychlorinated biphenyls (PCBs), which can cause air pollution so that various human health problems are disrupted, such as cancer, immune system disorders, and respiratory disorders. Plastics in food and beverages can also cause health threats to humans. Microplastics, which are small plastic particles formed from decomposing plastics, have been found in a variety of food and drinking water sources, including bottled water, sea salt, and other marine products. The consumption of microplastics by humans can cause various health problems. Plastic waste management can be done in various ways, including the 3R (Reduce, Reuse, Recycle) concept which is a popular way to manage plastic waste. (Hutabarat & Mulyani, 2022) Reduce means reducing the use and purchase of plastic goods, especially disposable ones. Reuse means reusing used items as handicrafts, such as plastic, plastic, and paper bottles (Munthe, D., & Tampubolon, S. P. (2024). and Recycle means recycling plastic waste so that it has a use-value product. (Irwan et al., 2022; Maf'ulah et al., 2021; Triawan et al., 2018)

The Waste Care Community (Malisa) is a community of people living in Cawang Village who care about the existence of waste around Cawang Village. Their daily job is as a cleaner in Cawang village. Besides them as cleaners, they also sort garbage. Until now, the waste collected in the form of plastic waste is sold to collectors. For the purpose of collecting and sorting waste, they have a place to carry out these activities.

Figure 1. Malisa's Activities in Waste Sorting and Collection

IMPLEMENTATION AND METHODS

The method used in this Community Service is in the form of socialization of the dangers of plastic waste and training in making paving blocks using plastic waste as a mixed material.

Socialization

1. Socialization About the Dangers of Plastic Waste for Health and as a Cause of Global Warming
   Socialization activities were carried out to the people of Malisa, Cawang Village with materials on the use of plastic waste as a mixed material for making paving blocks. Figure 2 shows the socialization activities for the Malisa group in Cawang Village. (Asnur & Setiawan, 2020)

Figure 2. Photo of Socialization of the Utilization of Plastic Waste into a Mixture of Paving Block Making

2. Environmental Arrangement with Paving Block
   The use of Paving Blocks in environmental arrangement can be used around residents' yards and roads around Cawang Village. By using paving blocks, it is hoped that the environment will be clean because these paving blocks are beautiful to look at and can increase the aesthetic value of the building, are durable and tend to last longer than asphalt or concrete, and can be made into a variety of shapes and colors, friendly to the environment, made from natural materials that can be recycled and when dismantled do not create a lot of waste.

Figure 3. Paving Blocks that Have Been Used in Environmental Planning

3. Socialization of the Utilization of Plastic Waste as a Mixture of Paving Block Making
   The socialization was carried out to provide education about waste processing into a mixture of paving block making, with this socialization it is hoped that the public is aware that environmental problems are not only the responsibility of the government, but also the responsibility of the local community in reducing the problem of waste around Cawang. In addition, this socialization activity can also help the development of MSMEs in the Cawang Village Community with the Utilization of Plastic Waste. Based on the results of discussions with partners, as well as the problems in the environment, before PKM activities are carried out, a contract is signed in the form of a letter of cooperation with partners, namely MALISA in Cawang Village to solve serious problems that occur related to the environment, because plastic waste is a source of problems that threaten the cleanliness and sustainability of the environment. In addition to the use of plastic waste as a mixture in making paving blocks, the production of paving blocks is expected to be made as an independent entrepreneur for the local community. Therefore, in this activity, the PkM team encourages the local community to develop MSMEs in making paving blocks, as well as provide education on how to market paving blocks. (Asnur & Setiawan, 2020; Indrawijaya, 2019)

Paving Block Making Training

The training procedure for making paving blocks is as follows:

1. Plastic Waste Collection

   Plastic waste used as the main material in making paving blocks consists of various types of plastic waste collected by the community as a form of participation in this activity. Organic and inorganic waste originating from household waste is separated, after separation is then recycled, in this case plastic waste as a mixture into paving blocks. In this way, plastic waste that is usually a source of environmental pollution can be processed into useful and environmentally friendly products. This process not only helps reduce the accumulation of plastic waste, but also reduces the use of new materials that have the potential to damage the environment. (Kader et al., 2021)

Figure 4. Sorted Plastic Waste is Ready to Be Chopped

2. Plastic Waste Shredding

   After plastic waste is collected, plastic waste is washed with water to remove other impurities that are attached After the drying process, plastic waste is put into a chopping machine that has been made by the PkM Team (Ilhamsyah, 2020) , to make it easier to mix with other materials.

Figure 5. Shredded Plastic Waste

3. Paving Block Printing
   After the plastic is successfully chopped, then sand, cement and water are given, then stirred until smooth, then poured on paving block molds. In this process, the addition of sand is carried out so that the surface of the resulting paving block is not slippery.

Figure 6. Paving Block Printing Material Preparation

4. Paving Block Curing Process
   The paving blocks that have been molded are then cooled until they harden evenly. The process of conditioning this plastic paving block is about 1 day (24 hours), after curing is complete, the paving block can be immediately used or given a coat of paint to beautify and protect the surface of the paving block from friction. (National Standardization Agency, 1996).

RESULTS AND DISCUSSION

The socialization on the use of plastic waste as a mixture for making Paving Blocks was held on Tuesday, October 29, 2024 at the Cawang village hall which was attended by staff from the village, community leaders, Malisa members, the PkM Team, and students. Before the training was carried out, the procedure/mix design of the mixture of making Paving Blocks (SNI 03-2834-2000, 2000; SNI 7656:2012, 2012) and the use of each tool was explained. After the mixing procedure is explained, it is then continued with training on making Paving Blocks by first providing examples of mixing and printing.

Figure 7. Explanation of the Proportion of Mixed Materials for Making Paving Blocks

Figure 7 shows the explanation, procedures, and steps in the process of making paving blocks, so that with the procedures described, the community better understands the process of making paving blocks.

Figure 8. Paving Block Mixing and Molding Process using Plastic Material Mixture

Figure 8. shows the process of mixing materials and printing paving blocks which is directly practiced and carried out by the Malisa group. After the printing process is completed, Figure 9 shows the final result of the paving block that has been printed by the Malisa group using a plastic mixture material. After the printing process is completed, it is continued to the next stage, namely the curing process of the paving block.

Figure 9. Final Result of Paving Block Mold using Plastic Waste Mixed Material

Community involvement is an important component of evaluating public understanding of the benefits of plastic waste management. The implementation of this program activities is expected to be sustainable, provide benefits, and have a positive impact on the environment and the local community. This PkM activity is expected to provide benefits and innovations in the future to increase the income of the Waste Care Community (MALISA).

CONCLUSIONS AND RECOMMENDATIONS

Community Service with the title Socialization and Training on the Utilization of Plastic Waste as a Mixture in the Making of Paving Blocks. This activity consists of two activities, the first is socialization about the dangers of plastic waste and the processing of plastic waste as a mixture in making paving blocks, while the second activity is training on making paving blocks using a mixture of plastic waste that has been chopped with a size of 0.1-2 cm. These two activities have a positive impact and new insights to the Waste Care Community (MALISA) on the benefits of plastic waste processing which can be used as one of the tools in making paving blocks and is expected to be used as one of the MSME activities in the future.

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