

## Exploration of Interior Material Based on Plastic Waste

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**Abstract.** This research is to determine the exploration of interior materials made from plastic waste, such as the process of collecting materials and the stages until they can become interior materials. To find out the process and stages, this research uses data collection methods in the form of observation, interviews, and documentation. The findings of this research are the analysis of plastic waste such as the content and properties of plastic when used as an exploration of interior materials and the strength of the interior material itself. Plastic is not only dangerous for humans, but also endangers all living things and the environment around us, especially according to Indonesian domestic statistics, Indonesia is a country that ranks second in the largest contributor of plastic waste. Based on data analysis, it can be concluded that the formation of knowledge regarding the creation of creative products to tackle plastic waste, by using it as an interior material is able to turn useless objects into very useful object for the survival of human life.

**Keywords :** Exploration materials, Plastic substances, Plastic waste, Waste management

### 1. Introduction

Exploration of plastic waste-based materials is an effort to utilize recycled materials that are very intended for the personal, the surrounding community and for the world. Plastic waste is a problem that is still very difficult to handle, Jambeck 2015 stated that Indonesia is the second country after china which is the largest contributor of plastic waste in waters as much as 187.2 tons [1]. Indeed, plastic waste is not only a problem for Indonesia, but Indonesia occupies the second position as the largest waste contributor, this can happen because its use is still very large and this plastic is everywhere because it is used for basic human goods daily. Therefore, the exploration of materials made from plastic waste is able to turn useless objects into very useful objects and these efforts have enormous potential to save the survival of humans, animals and natural ecosystems [2].

Waste is waste material that is discarded or no longer needed after the end of the process [3]. This waste is not only produced by humans, but also produced by animals and even plants, and the higher the amount around the environment the environment will certainly be polluted [4]. Waste has two groups, which are organic and inorganic, which can be solids, liquids or gases. Organic waste is waste that can rot and decompose by itself such as food waste, dried leaves, vegetables and the like. While inorganic waste is waste that is not easily decomposed even most of the waste can not be decomposed naturally. This inorganic waste is in the form of glass bottles, cans, paper, plastic and the like [5]. One of the waste that is very accumulated and takes a long time to decompose is plastic waste, and the problem in

Indonesia is still very dependent on plastic, as well as the Japanese who are already aware of the dangers of plastic [6]. This plastic is produced about 300,000,000 tons per year. To occupy such a figure, when viewed from the perspective is about 820,000 tons per day and 9.5 tons per second. Of that amount of production, only about 10 percent of plastic waste is recycled per year, meaning that as many as 270,000,000 tons of plastic are left to be disposed of [7]. The disposal of plastic waste by being buried, allowed to be thrown into water such as seas, sewers, rivers or burned will only add to the misery of nature and human health. If it is buried in the soil to decompose it takes millions of years and will inhibit the water in the soil, while if it is burned it will only become a lump, it takes a long time to decompose it and the smoke from burning waste is very harmful to human health [6]. Plastic disposal in such a way results in very excessive amounts of plastic pollution [7]. It exerts a heavy and serious burden not only on human life but also on the elements of the environment and nature, hence the need for deep efforts to deal with plastic waste[8].

Today, every country has competed to create effective and efficient waste management and treatment to address waste [8]. In Indonesia there are companies, both large and small companies that build plastic recycling businesses. Moreover, the island of Bali which is one of the tourist destinations that has a variety of natural beauty, marine life and biology as well as cultural uniqueness that is always visited by tourists from various parts of the World[3]. With all the beauty of the island of Bali, it would be unfortunate if the environment is polluted enough plastic waste. Therefore, many entrepreneurs are building a plastic waste recycling business to reduce polluted waste in Bali, and one of the large enough companies that make the best use of plastic waste, namely Ecollabo8, Ecollabo8 is making efforts to overcome waste by applying the most basic 5R; reducing, reusing, recycling, rejecting and repairing and processing plastic waste into decoration items and interior materials such as walls, doors and others [9].

The purpose of this study is to determine how the journey of plastic waste can finally be used as an exploration of interior materials such as strength, content of plastic waste and the stages of plastic waste collection, stages of plastic waste processing and how to apply it into interior elements and interior decoration and furniture. Given the harmful content of plastic, this study is important so that we better understand how the right attitude to treat plastic and how the right steps for plastic waste management efforts.

The method carried out in the Exploration Research of plastic waste-based Interior materials is a descriptive method to describe as it is and explain each process carried out in an effort to handle plastic waste[10]. The Data was obtained from observations, seminars and personal communication with one of the companies that the author chose to conduct observations. The research was conducted virtually through communication media and social media.

## 2. Method

The research method used in this study is a descriptive research method used to describe and explain the process of material collection and manufacture of interior materials based on plastic waste, to determine the manufacturing process, the content of plastic and determine the strength of plastic waste when used as interior material. The data obtained in this study came from observations, the author's personal communication with the assistant director of one of the plastic waste recycling companies, documentation and data collection from related literature studies.

Descriptive research methods are research methods that describe a phenomenon as it is, there is no special treatment or controlled treatment [10]. In this study used descriptive method to describe efforts to overcome plastic waste by using it into interior materials. The authors conducted a study in one of the plastic waste recycling company named Ecollabo8 which is located on Jl. Raya Tumbakbayuh-Pererenan, Tumbak Bayuh, Kec. North Kuta, Badung Regency, Bali 80361. The Data was obtained from observations, seminars and personal communication conducted in approximately 2 months and carried out virtually through Ecollabo8 communication and social media media such as WhatsApp, Zoom, Instagram, Tiktok and Youtube.

**Table 1.** Time frame

Number	Date	Observation	Communication Media/Social Media
1	5 March 2022	Application of 5r to solve the problem of plastic waste	Instagram Tv (IGTV)
2	7 Maret 2022	Climate mitigation and waste management for business innovation	Youtube streaming
3	1 March 2022 – 21 April 2022	<ul style="list-style-type: none"> <li>• Routine activities of plastic waste extension</li> <li>• Stages of plastic waste collection</li> <li>• Stages of processing plastic waste into interior materials</li> <li>• Interior material application experiment</li> </ul>	Instagram, Youtube, Tiktok
4	<ul style="list-style-type: none"> <li>• 5-6 April 2022</li> <li>• 8 April 2022</li> <li>• 10-11 April 2022</li> </ul>	Personal communication (author with Assistant Director of Ecollabo8)	WhatsApp, Zoom

### 3. Results and Discussion

Plastic pollution already occupies such a high level on the environment that it has been named one of the biggest environmental challenges of this lifetime [11]. This is because of the widespread use of plastic, it is like a daily necessity, both for individuals, for stores and for large companies. In this country Indonesia is still less aware of the dangers of excessive use of plastic, most people use plastic with no guilt, after using plastic is certain they will throw it away, some throw and some burn the plastic waste [6]. With the lack of public awareness about the dangers of plastic waste, the importance of conducting this study. The research will provide a broader insight into the dangers of plastic waste and know what efforts are appropriate to overcome it.

Plastic is made from inorganic materials that are very difficult and impossible to decompose on their own by bacteria. When buried into the ground, it will make the water in the ground inhibited, and when burned, the smoke produced will be very dangerous. In addition, handling plastic waste by burning will not eliminate the waste at all, it will produce microplastic that can be easily inhaled and will easily also settle in the human body. These things can expose humans to diseases such as cancer, disrupt natural ecosystems, and disrupt the lives of aquatic inhabitants (seas, rivers, reservoirs, etc.) [9]. Therefore, there needs to be an effort to deal with plastic waste, one of the efforts to handle plastic waste that is useful is by using it into interior materials. The Material has many benefits, among others, it can be used for the manufacture of interior elements and materials for furniture and decoration [12].





**Figure 1.** Design doors and tables that use material from recycled plastic waste by Ecollabo8 (<https://www.instagram.com/ecollabo8/>)

However, before making these efforts, there are some fundamental efforts that can be done that can be started from yourself, the first is by separating organic and inorganic waste. This method is to facilitate the sorting of waste that later they will recycle the waste in accordance with the type and function of each. The next step is to apply 5R to our lives. 5r: Reduce, Reuse, Recycle, Refuse and Repair. The five have an important role in reducing plastic waste which is a very big problem in Indonesia.

- Reduce, reduce to a minimum the garbage or traces of traces that we use such as food wrappers, packages of goods and others
- Reuse, using items that can still be used. Such as jars or glass bottles, plastic containers that can be used repeatedly, and others
- Recycle, collect garbage and make useful objects from the waste material. This is to reduce the accumulation of plastic waste waste
- Refuse / refuse to use unnecessary items. Choosing needs that are needed, not just a desire
- Repair, repair items that can still be repaired, it is not easy to throw the goods and then buy it back

This 5r is very important considering that today humans live in times of garbage that is very accumulated, not just plastic waste but all kinds of waste. Living things can very easily find garbage, either in settlements, in the sea, forests, or other places of the like. Therefore, the concept of 5r is very important to be applied to human life, by applying 5R life, we can save the health of living things and natural ecosystems [13].

In addition, a greater effort is an effort to deal with plastic waste by utilizing it into interior materials and creative products, this way is able to cope with plastic waste as well as to advance Indonesia's creative products. These efforts have actually been done by many people around Indonesia, but Indonesia is the largest archipelago in the world consisting of 17,504 islands, with a population of 270,203,917 inhabitants in 2020, Indonesia being the fourth largest populated country in the world. With a country as big as Indonesia, according to the author, it will be difficult to conduct research as a whole. Therefore, the author makes a limit of research in the form of a boundary of the area to be studied. These

limits are taken to make research more focused and in-depth. Limitation of research in the form of research location, the research location taken is Bali.

Bali is a tourist island visited by many foreign tourists, and the existence of Bali has been recognized for its beauty by the world, but this condition does not correspond to reality.. The beauty of the island of Bali is tarnished by the presence of garbage, garbage is dominated by many activities, the activities of tourists who lack discipline in maintaining cleanliness and businesses in the form of traders around who do not comply with the rules of garbage disposal [3].

Because of these things, many large companies are building waste recycling businesses to overcome this, and one of them is Ecollabo. Ecollabo8 is a recycling company that seeks to overcome plastic waste by utilizing it into high-economic creative products. Ecollabo8 aims to bring communities together and collaborate with as many people as possible to achieve a common goal: making positive change for the world by helping people understand the value of waste [13]. The concept of this exploration material is exposing plastic waste that can be useful for our daily lives. The way Ecollabo8 does to collect plastic waste, which is in the following ways:

- A. Ecollabo gets plastic waste from local garbage banks.
- B. Ecollabo often held counseling, understanding about the dangers of plastic waste. These activities are usually accompanied by activities to clean the surrounding environment, from here Ecollabo will collect materials that will then be processed again
- C. Ecollabo is a recycling company that accepts collaborations with other brands or communities, so that plastic waste can also be sourced from the brand or community. Like the latest collaboration, Ecollabo collaborated with The Body Shop. Recycled plastic waste is the shells of The Body Shop products obtained from EcoBali. EcoBali is a company that maximizes recycling and reduces the amount of waste to landfill [13].



**Figure 2.** Eco Bali Logo (<https://eco-bali.com/about-us/>)



**Figure 3.** Ecollabo8 collaboration with The Body Shop (<https://www.instagram.com/p/CcCdkuPPOb7/>)

After successfully collecting plastic waste, Ecollabo8 will process the waste into interior materials such as making interior elements, decorations and furniture. The processes carried out are:

- Cleaning plastic waste (washing, removing labels if there is, sometimes separating by color)



**Figure 4.** The process of cleaning materials and grouping colors  
(<https://www.instagram.com/p/CajKq3svke8/>)

- Crush or make plastic into plastic pieces using extruder machine. In this process, the amount of plastic needs extra attention, this is necessary because to prevent the spread of plastic waste that can later become microplastic pollution



**Figure 5.** Plastic waste count using extruder machine  
(<https://www.ecollabo8.com/vision>)

- Heating the plastic chop using an oven. As seen in table 1, plastics have their own types and also have different melting points.

**Table 1.** Types of plastic and their melting point

(<https://mesinunimus.files.wordpress.com/2008/02/sifat-karakteristik-material-plastik.pdf>)

No	Material	Processing Temperature Rate	
		oC	oF
1	Abs	180 – 240	356 – 464
2	Accetal	185 - 225	365 – 437
3	Acrylic	180 – 250	365 – 482
4	Nylon	260 – 290	500 – 554
5	Poly Carbonat	280 – 310	536 – 590
6	LDPE	160 – 240	320 – 464
7	HDPE	200 – 280	392 – 536
8	PP	200 – 300	392 – 572
9	PS	180 – 260	356 – 500
10	PVC	160 – 180	320 - 365



In this process, the type of plastic and its melting point must be adjusted because it will make the plastic burn and will release toxins. So as much as possible the oven manager must be standby and must always check the temperature.

- To make interior materials that will be applied to objects of decoration and furniture, Ecollabo has 2 ways, the first is to pour the plastic melt into a box mold whose result is called " plastic sheet", and the second is to pour the plastic melt into a mold made of aluminum (mold made from recycled materials)



**Figure 6.** Furniture made using plastic sheet.



**Figure 7.** Furniture made using molds.  
(<https://www.instagram.com/ecollabo8/>)

The nature of plastics is flammable, but in the process carried out, Ecollabo heats plastic waste to temperatures below the melting or boiling point that should be and is not exposed to fire directly, so it is not dangerous. Because in such cases the harm is the smoke from the burning of the plastic, in each process, Ecollabo8 does not allow the fire to directly touch the plastic [15].

For the strength of exploration materials made from plastic waste, when making plastic waste into plastic sheet, there is a pressure process with a strength of 15 to 20 tons, the pressure aims to remove the air in the plastic sheet, resulting in a solid or solid plastic sheet. With this process, the power produced is certainly very strong and has been tested [9].

#### 4. Conclusion

Plastic pollution already occupies a high level of Environmental so it has been named as one of the biggest environmental challenges of this lifetime. This is because of the widespread use of plastic that has been like a daily necessity, both for individuals, for stores and for large companies. There is a need for deep effort to overcome this. The effort in question is by applying 5R life, Reduce, Reuse, Recycle, Refuse and Repair. In addition, a greater effort is an effort to deal with plastic waste by utilizing it into interior materials and creative products, this way is able to cope with plastic waste as well as to advance Indonesia's creative products.

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