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Physical, Chemical, and Biological Pollution in Water, Air and Soil Industrial Products From PT. Torabika Eka Universe in Cikupa Tangerang

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ABSTRACT

Technological developments certainly provide big changes in human life, starting from infrastructure management to the food industry, and the drug industry, everything is very easy to do by utilizing current technological sophistication. Many bad impacts arise from these technological advances, the most prominent of which is pollution due to waste generated from the industry. The impact that occurs from failure in waste treatment is the occurrence of air, soil, and water pollution. This research method is a qualitative descriptive research, where the researcher directly becomes the instrument and the company is the respondent. Based on research results Pollution of water, air, and soil due to the industrial products of PT. Torabika Eka Semesta found that Torabika is a well-known coffee drink brand in Indonesia. To maintain a healthy environment, the Torabika company can do several things, including 1) Companies reduce their use of single-use plastic packaging; 2) Use environmentally friendly raw materials; 3) Optimizing energy use; 4) Improve recycling programs; 5) Build environmental awareness among employees and customers; 6) Improve recycling programs; 7) Build environmental awareness among employees and customers; 8) Improve recycling programs; and 9) Build environmental awareness among employees and customers.

KeyWords: Physical, Chemical, Biological Pollution, Processing of Industrial Products, Water, Air and Soil.

INTRODUCTION

PT Torabika Eka Semesta is a company engaged in the production of processed food and beverages. PT Torabika Eka Semesta is a subsidiary of PT Mayora Indah Tbk besides PT Kakao Mas Gemilang. The head office of PT Torabika Eka Semesta is on Jl. Raya Serang Km. 12.5 Bitung Jaya Village, Cikupa - Tangerang. PT Torabika Eka Semesta as a Persero carries out its business activities independently but remains integrated with the holding company (Afrizal et al., 2020). According to Mayora's official website, PT Torabika Eka Semesta is included in the coffee division. PT Torabika Eka Semesta's trademarks include Torabika Duo, Torabika Duo Full Cream Milk, Torabika 3 in 1, Torabika Moka, Torabika Cappuccino, Torabika Ginger Milk, Torabika Creamy Latte, Torabika Double Up, Kopiko Brown Coffee, Toracafe Volcano Chocomelt, Toracafe Caramelove, and many more. The history of the establishment of PT Torabika Eka Semesta is in line with the explanation on Mayora's official website, PT Mayora Indah was established as a company in 1977. The company was able to meet the Indonesian market, then officially conducted an initial public offering and became a public company in 1990. The target market or main market at that time was ASEAN consumers. Now, the products of PT Torabika Eka Semesta's parent company have spread to five continents in the world.

This Persero is also known as a producer of high-quality food. PT Torabika Eka Semesta, the parent company, has now become a successful market leader in producing products that are pioneers in their respective categories. This is a list of PT Torabika Eka Semesta's innovative products, as follows: Torabika Duo and Duo Susu coffees, coffee mix pioneers, and Torabika Creamy Latte (Hartoko, 2018).

The vision and mission of PT Torabika Eka Semesta are as follows: 1) The vision and mission of PT Torabika Eka Semesta is to become a quality and trusted food and beverage producer in the eyes of domestic and international consumers and dominate the largest market share in the category of similar products; 2) PT Torabika Eka Semesta's vision and mission is to be able to obtain a net operating profit above the industry average and provide the best-added value for all of the Company's stakeholders; and 3) The vision and mission of PT Torabika Eka Semesta is to be able to make a positive contribution to the environment and the country where the Company is located (Gunawan & Erdawati, 2021; Aurelia et al., 2023).

Every industrial activity or anything that produces wastewater must create a WWTP so that the waste produced does not hamper the environment or better than that it can be reused. So from that you have to prepare everything starting from the installation of the WWTP itself and also the permit. If a factory produces waste but does not have adequate WWTP or does not have WWTP at all, of course, in addition to endangering the environment and endangering the people more or less, it will also violate applicable regulations and be subject to criminal penalties and fines. This is also regulated in Law No. 32 of 2009 regarding the protection and management of the environment, Law No. 7/2004 regarding the origin of water resources, and many others (Geissen et al., 2015). The required requirements for WWTP consist of technical requirements and administrative requirements.

METHODS

Research is a process of inquiry or process of discovery to obtain truth and prove a phenomenon. In the process of investigation are intellectual activities that seek to uncover new knowledge, and correct and eliminate misunderstandings (Pandey & Pandey, 2015). Every research requires a method of data collection. The research method is a technique used to collect data and analyze data. Determination of research methods adapted to research objectives. Hypothetical research was carried out using quantitative research. Research that is natural, natural, and in-depth using qualitative research. Research that collaborates between the two so that the data is more comprehensive uses combination research.

The choice of research method depends on the research objectives set by the researcher. Research methods are procedures and schemes used in research. Research methods allow research to be carried out in a planned, scientific, impartial, and valued manner. The research method is a strategy for collecting data and finding a solution to a problem based on facts. The research method is also a technique used to conduct research. Method refers to techniques used by researchers to collect research data to find solutions to a problem (Kothari, 2004), and scientific activities carried out systematically to solve research problems. Thus, research methods as data collection techniques to solve problems, find solutions, and techniques to build relationships between data and methods by evaluating research results accurately (Kothari, 2004) scientific, neutral, and valuable.

Students of Postgraduate Environmental Science - Universitas Negeri Padang and their Lecturers have conducted Field Practical Lectures held at PT. Torabika Eka Semesta is a

company engaged in the production of processed food and beverages. PT Torabika Eka Semesta is a subsidiary of PT Mayora Indah Tbk besides PT Kakao Mas Gemilang. The head office of PT Torabika Eka Semesta is on Jl. Raya Serang Km. 12.5 Bitung Jaya Village, Cikupa District, Tangerang. The street vendors were held on Friday, May 12, 2022. The street vendors were warmly welcomed by the managers, supervisors, and existing employees. After the friendly event, it was followed by a presentation from the company regarding the company's description and a glimpse of the permit to control pollution from factory production. After exposure, followed by a question and answer session. After that, the street vendors were invited to see firsthand the production process of their products.

Each must obey the rules of the company, such as not being allowed to wear watches, rings, bracelets, and earrings, and enter using the special clothing that has been provided. Then each person enters the production room with a very tight entry flow. It is mandatory to wash hands with soap and dry with a dryer. Then enter a special room for external sterilization. After that, they can enter regularly into the production and packaging area. While observing the process, a team from the company explained some of the production procedures and mechanisms. Each - must obey the rules of the company, such as not being allowed to wear watches, rings, bracelets, or earrings, and enter using the special clothing that has been provided. Then each person enters the production room with a very tight entry flow. It is mandatory to wash hands with soap and dry with a dryer. Then enter a special room for external sterilization.

RESULTS

Torabika is a well-known coffee drink brand in Indonesia. To maintain a healthy environment, the Torabika company can do several things, including:

1. Reducing the use of single-use plastic packaging: Companies may consider reducing the use of single-use plastic packaging and switching to more environmentally friendly packaging such as paper packaging or recycled packaging.
2. Using environmentally friendly raw materials: Companies can choose raw materials that come from environmentally friendly sources and can be recycled or decomposed easily in nature.
3. Optimizing energy use: Companies can optimize energy use in their production facilities by adopting environmentally friendly technologies such as solar panels or energy saving.
4. Improve recycling programs: Companies can improve recycling programs in their production facilities and ensure that employees and customers have access to easily accessible recycling facilities.
5. Build environmental awareness among employees and customers: Companies can build environmental awareness among employees and customers by providing education on ways to maintain a healthy environment and improve waste management.
6. By doing these things, Torabika can help maintain a healthy environment and contribute to global efforts to protect our planet.
7. PT Torabika is a company engaged in the production and distribution of beverages. Like other big companies, PT Torabika has a big social and environmental responsibility. Following are some of the efforts made by PT Torabika to manage environmental impacts
8. Reduction of Carbon Emissions: PT Torabika has carried out several programs to reduce carbon emissions, such as reducing energy use in factories and replacing fossil

energy sources with renewable energy. In addition, PT Torabika is also conducting afforestation and reforestation programs to absorb carbon dioxide.

9. Utilization of Environmentally Friendly Packaging: PT Torabika has used environmentally friendly packaging such as cartons and glass bottles which can be recycled and reduced the use of plastic packaging.
10. Waste Treatment: PT Torabika also treats waste generated from the production process to reduce environmental impact. The waste generated is processed in a way that is safe for the environment and some of it can be recycled.
11. Development of Environmentally Friendly Products: PT Torabika continues to develop environmentally friendly products, such as products with organic ingredients and free of pesticides.
12. Environmental Social Programs: PT Torabika also carries out various environmental social programs, such as tree planting programs, environmental awareness campaigns, and programs to help communities around the factory
13. By carrying out these various efforts, PT Torabika can assist in overcoming environmental impacts resulting from its production process and can also assist in increasing public awareness about the importance of protecting the environment.
14. PT Torabika Serang Banten is a company engaged in the beverage industry. As a company, they can have a positive social impact on the surrounding community. Some of the social impacts that can be carried out by PT Torabika Serang Banten, among others.
15. Creating job opportunities: With the company, PT Torabika Serang Banten can create jobs for the surrounding community. This can help reduce the unemployment rate in the area and improve the local economy.
16. Develop skills: PT Torabika Serang Banten can provide training and skills development to employees and the surrounding community. This can help improve the quality of human resources in the area.
17. Providing social contributions: PT Torabika Serang Banten can provide social contributions to the surrounding community, such as providing assistance to victims of natural disasters, providing assisting underprivileged communities. Rewritten Content:
18. PT Torabika Eka Semesta has fulfilled its obligation to be a company engaged in the production of processed culinary and beverage products, by obtaining a permit to control water, physical, chemical, and biological pollution to the surrounding environment. Every industrial activity or anything that produces wastewater must produce WWTP so that the resulting waste does not harm the environment or better than that it can be reused. Therefore, it is mandatory to prepare everything starting from the installation of the WWTP itself and also the permit. If a factory produces waste but does not have adequate WWTP or does not have WWTP at all, of course, in addition to endangering the environment and endangering the community more or less, it will also violate applicable regulations and be subject to criminal penalties and fines. This is also regulated in Law No. 32/2009 concerning environmental protection and management, Law No. 7/2004 concerning Water Resources, and many others.

The required requirements for WWTP consist of text requirements and administrative requirements. The following are the technical requirements that must be prepared:

1. Study on the discharge of wastewater into surface water by business actors containing the news: 1) Production capacity; 2) Production process; 3) Production process flow chart; 4) Waste disposal environmental color.
2. Documents regarding holistic industrial layouts and marking of units related to

wastewater management such as: 1) Raw water intake point; 2) Standard water treatment process unit; 3) Supporting activities that form wastewater; and 4) Discharge points and water quality monitoring points.

3. A water and wastewater balance that describes the entire system related to wastewater management is similar: 1) Source and intake volume of raw water at the intake point; and Utilization of raw water for industrial processes and supporting activities that produce wastewater; and 2) Management of sludge.
4. Documents on the description of the origin of the WWTP system.
5. Documents that reveal the efforts made in managing wastewater.
6. The SOP document describes the handling of emergency conditions of water pollution. Another requirement before submitting a WWTP is that you must have a TPS for Hazardous and Toxic Waste (B3) which of course has a permit. the permit conditions for the hazardous waste TPS are by the application for a hazardous waste TPS permit. other conditions must also carry out environmental tests on the waste obtained. environmental test conditions are also crucial and a mandatory requirement whether the waste obtained is by applicable regulations or not. Without environmental testing, the WWTP process will be hampered. In addition to the origin of the technical requirements for disposing of wastewater into the upper reaches, there are also other administrative requirements, such as the legality document of the company that will form the WWTP and also the integrity pact document from the agency as a unit. to apply for WWTP, make sure all requirements have been met. The requirements mentioned above are the general conditions for obtaining a WWTP permit.

But here, researchers see something interesting about the production of this industry, because all products use plastic materials as packaging. Therefore researchers try to explain in full about plastic waste.

3.1 Plastic Waste

Plastic has provided and promised many benefits to human civilization. However, on the other hand, the use of plastic has become a significant global issue in recent years. Today there is growing public awareness of the negative impacts caused by the excessive use and disposal of plastic. The increasing use of plastic and increasing plastic waste are two serious problems that are being faced by the world today. Plastic is a very popular material due to its durability, durability, and low production costs. However, the negative impact of excessive use of plastic has become a global concern.

The increase in plastic use is mainly due to human population growth, urbanization, and lifestyle changes. Plastics are used in a wide variety of industries and products, including food and beverage packaging, electronics, textiles, construction, automotive and more. This high demand led to the production of more plastic. Unfortunately, most of the plastic that is produced is not biodegradable and takes hundreds of years to decompose in nature. As a result, plastic waste accumulates on river banks, in oceans, and at waste treatment sites, and pollutes the environment. Plastic can also harm wildlife and aquatic ecosystems. Some types of plastic also contain hazardous chemicals that can damage human health.

3.2 Plastic Benefits

Plastic has become an integral part of modern human life and has significant benefits in various fields. Some of the benefits of plastic for human life include:

1. Packaging: Plastic is a material that is versatile and resistant to damage, which makes it ideal for use as packaging. Plastic keeps food and drinks fresh, prevents contamination, and protects products from physical damage.
2. Transportation: Plastics are used in the manufacture of vehicles, such as cars, planes,

and ships. This lightweight, strong, and corrosion-resistant plastic is used in a variety of vehicle components to improve fuel efficiency and durability.

3. Medical Industry: Plastics are an important component of modern medical devices. Medical tools such as syringes, infusion equipment, blood bags, and surgical devices use sterile plastic that is safe and hygienic.
4. Construction: Plastics are used in the construction industry for a variety of purposes. Plastic materials such as PVC (Polyvinyl Chloride) are used in water pipes, electrical wiring, and windows. Apart from that, plastics are also used in building insulation, waterproofing membranes, and roofing materials.
5. Electronics: Plastics are used in the production of electronics, such as laptops, cell phones, televisions, and other electronic devices. Plastic provides the strength, durability, and insulation needed to protect electronic components and maintain their performance.
6. Hygiene and Health: Plastics are used in the manufacture of hygiene and hygiene products, including shampoo bottles, toothbrushes, cosmetic containers, and other household items. Plastic allows these products to be hygienic, durable, and easy to use.
7. Convenience and Reliability: Plastics have the property of being malleable, enabling complex and innovative product designs. In addition, plastic is resistant to moisture, corrosion, and chemicals, thereby extending the product's life.

3.3 Global Issues on Plastic Utilization

However, the irresponsible use of plastic has caused several significant global threats and issues, some of which are:

1. Marine Pollution: Plastic waste that does not decompose naturally and improper disposal of plastic is a serious threat to marine ecosystems. Millions of tons of plastic waste enter the ocean every year, threatening the lives of marine animals such as fish, seabirds, turtles, and marine mammals. Plastic can also damage coral reefs and coastal ecosystems.
2. Environmental Damage: Plastic production involves the extraction of fossil raw materials and intensive use of energy, causing greenhouse gas emissions and contributing to climate change. In addition, improper disposal of plastic results in soil and water pollution disrupts the life of microbes and soil organisms, and threatens clean water resources.
3. Health Hazards: Chemicals contained in plastics, such as BPA (Bisphenol A) and phthalates, can leak into food, drink, and the surrounding environment. These substances can have negative effects on human health, including hormonal disturbances, developmental disorders, reproductive problems, and an increased risk of disease.
4. Resource Depreciation: Plastics are generally single-use, meaning that a lot of plastic is used for only a short time before being thrown away. The overuse of plastics and low recycling rates lead to the depletion of valuable natural resources, such as petroleum used in the production of plastics.
5. Food Contamination: Single-use plastic is often used in food and beverage packaging. When exposed to heat or used repeatedly, plastics can release harmful chemicals into the food or drink you consume, causing contamination and health risks.
6. Pile of Garbage: Plastic is one of the largest contributors to the pile of waste in the world. Plastic waste that does not decompose naturally fills landfills and can create sanitation, beauty, and public health problems.
7. Microplastics: Plastics that break down into tiny particles, known as microplastics, have been found in the environment, including in the water, air, and even the food we

eat. Microplastics can enter the food chain and have the potential to negatively impact living organisms, including humans.

The most dangerous threat comes from Microplastic which is understood as a very significant threat to the environment and living organisms. Microplastics are tiny plastic particles that are less than 5 millimeters in size. They can come from a variety of sources, including larger pieces of plastic, synthetic fibers leached from clothing, personal care products such as facial scrubs, and industrial waste. The following are some of the threats posed by microplastics:

1. Environmental pollution: Microplastics can contaminate terrestrial and aquatic ecosystems. They can reach the sea via waterways, rivers, and drainage. Microplastics can also contaminate soil and terrestrial ecosystems when used in agriculture or as a construction material.
2. Impact on marine life: Marine organisms such as fish, seabirds, marine mammals and invertebrates often eat microplastics because they can mimic their natural diet. This can result in health and survival problems for the species. Additionally, microplastics can enter the marine food chain and potentially reach humans through the consumption of fish and other marine products.
3. Human health effects: Although the direct impact of microplastic consumption on humans is still under study, there is concern that the particles may cause health damage. Microplastics can contain harmful chemicals, such as plastic additives and pollutants that bond to their surface. If inhaled or swallowed, these substances can reach organs and affect human health.
4. Ecosystem change: Microplastics can affect a variety of ecosystem functions. They can disrupt nutrient cycles, inhibit the growth of organisms, and reduce biodiversity. In the long term, this can hurt ecosystem productivity and environmental sustainability.

3.4 Plastic Components

Plastics are synthetic materials made from polymers, and the chemical composition of plastics varies depending on the type. Certain chemical components in plastics can hurt global life, including humans, animals, and the environment. The following are some of the plastic components that are considered to have potential threats:

1. Polyethylene Terephthalate (PET): Used in drinking water bottles, food packaging, and textile fibers. PET can release antimony trioxide compounds which are toxic substances when exposed to the environment and living organisms.
2. Polyvinyl Chloride (PVC): Used in pipes, cables, food packaging, and other household products. PVC contains additives such as phthalates which can damage the reproductive and endocrine systems in humans and animals.
3. Polystyrene (PS): Used in disposable food containers, Styrofoam, and packaging. PS contains additives such as styrene, which are potentially carcinogenic to humans.
4. Polyethylene (PE): Used in plastic bags, food containers and milk bottles. PE can release additives such as bisphenol A (BPA), which has been linked to hormonal disturbances and negative effects on human health.
5. Polycarbonate (PC): Used in drink bottles, food containers, and baby gear. PC contains BPA, which has also been linked to hormone disruption and serious health problems.
6. Polyethylene Terephthalate (HDPE): Used in baby bottles, shampoo bottles, and food safety containers. HDPE is considered relatively safe, but the use of additives such as antioxidants, solvents, and dyes can still pose risks if released into the environment.

3.5 Why Plastic Waste Needs to be Managed

Plastic waste needs to be managed properly for several important reasons:

1. Environmental Impact: Plastic waste that is not managed properly can pollute the environment. Plastic that is thrown away carelessly can enter the waters, causing water pollution and threatening the lives of living things in aquatic ecosystems. In addition, plastic that is dumped on land can damage natural habitats, including forests, rivers, and agricultural land.
2. Effects on Wildlife: Plastic waste poses a serious threat to wildlife. Many marine animals, birds, and other animals get stuck in or ingest plastic waste which can lead to injury, illness, and even death. Plastics can also enter the food chain, with the potential to have detrimental effects on animal populations and ecosystems as a whole.
3. Air Pollution: Burning plastic waste produces air pollution which is harmful to human health. When plastic is burned, toxic substances and micro-particles can be released into the air, which can cause respiratory problems, disease, and damage to the respiratory system.
4. Economic Losses: Plastic waste that is not managed properly also causes economic losses. Cleaning up and managing plastic waste requires significant resources. At the same time, plastic pollution can damage the tourism and fishing industries, impacting local people's incomes.
5. Limited Resources: Plastic production uses limited natural resources, such as petroleum. If plastic waste is not managed properly, it means that this precious natural resource is wasted. By managing plastic waste, we can reduce the use of new resources and promote a circular economy.

3.6 Difficult to Overcome Plastic Waste

Even though it promises many benefits, overcoming the problem of plastic waste is indeed a complex and difficult challenge. Some of the factors that cause difficulties in overcoming the problem of plastic waste are as follows:

1. Resistance of Plastics: Plastics are durable and do not biodegrade easily. This makes plastic waste remain in the environment for a very long time and is difficult to remove. Even certain types of plastics that are biodegradable, such as biodegradable plastics, often require special environmental conditions and a long time to decompose completely.
2. High Consumption: The demand for and consumption of plastic is increasing worldwide. The need for plastic products in everyday life, including food packaging, beverage bottles, and other consumer goods, has led to a large and sustainable production of plastic.
3. Lack of Recycling Infrastructure: Adequate infrastructure for collecting, sorting, and recycling plastic waste is still limited in many countries. The lack of recycling facilities means that most of the plastic waste ends up in landfills or is simply thrown away, causing environmental pollution.
4. Limitations of Environmentally Friendly Alternatives: Despite efforts to develop environmentally friendly substitutes for plastics, such as recycled materials, organic materials, or biorefined materials, there are still limitations in terms of availability, quality, and production costs. This makes it difficult to replace the use of plastic in some applications.
5. Reliance on the Linear Economic Model: The linear economic model, in which products are made, used, and disposed of, still predominates in many sectors. Thinking centered on single-use and disposal makes it difficult to introduce more sustainable practices, such as reuse and repair.

6. Consumer Awareness and Behavior: Despite increasing awareness of the problem of plastic waste, changing consumer behavior remains a challenge. Some consumers still tend to choose products that are cheap and practical, even if these products are made of single-use plastic. Broader education and ongoing awareness campaigns are needed to change people's consumption patterns and habits.

3.7 Plastic Waste Management Efforts

Tackling the problem of plastic waste requires a comprehensive approach involving governments, companies, civil society, and individuals. Investments are needed in adequate recycling infrastructure, development of new technologies, policies limiting the use of single-use plastics, and raising awareness and education about plastic waste management. Related to this fact, several efforts that need to be made to overcome plastic waste are as follows:

1. Reducing the Use of Single-Use Plastics: One of the important steps is to reduce the use of single-use plastics. This could include banning or reducing the use of single-use plastic bags, straws, food containers, and water bottles. Companies and consumers can also choose products with more sustainable packaging.
2. Increasing Recycling: Adequate recycling infrastructure needs to be improved to collect, sort, and recycle plastic waste. The government and the private sector need to work together to build efficient recycling facilities and develop markets for recycled products.
3. Innovation of Substitute Materials: The development and use of environmentally friendly plastic substitutes should be encouraged. Materials such as bioplastics, recycled materials, and organic materials can be more sustainable alternatives. Investments in research and technology development are needed to produce substitutes that can be widely used.
4. Awareness Campaigns: Ongoing education and public awareness campaigns are essential. Raising awareness about the impact of plastic waste on the environment and health can drive changes in consumer behavior and influence government policies.
5. Strong Government Policies: Governments need to adopt strong policies to tackle the problem of plastic waste. This includes banning or limiting the use of single-use plastics, imposing taxes or fees on plastics, and incentives to use environmentally friendly substitutes. These policies can drive changes in industry and society.
6. Collaboration and Partnership: Tackling the problem of plastic waste requires strong cooperation and partnerships between governments, companies, and civil society. This collaboration could include joint initiatives, upgrading recycling infrastructure, increasing access to recycling technologies, and joint research to develop more sustainable solutions.

3.8 Wisdom is required

In the fight against plastic waste, wisdom, and special efforts are needed to achieve effective results. Here are some important aspects to note:

1. Lifecycle-Based Approach: In dealing with plastic waste, it is important to adopt a lifecycle-based approach. This means considering the entire life cycle of a plastic product, from design and production to use, recycling, and final disposal. Focus should be placed on reducing the use of single-use plastics, increasing recycling, and promoting the use of more sustainable substitutes.
2. Sustainable Product Design: More sustainable product design should be a priority. This involves developing products with less plastic use, designs that facilitate recycling, and choosing materials that are more environmentally friendly. Concepts

such as design for recycling and design for waste reduction can be important guides in reducing the impact of plastic waste.

3. Prioritize Reduction: The greatest effort should be placed on reducing the use of single-use plastics. This can include educational campaigns to change consumer behavior, bans or restrictions on the use of certain plastics, and stimulation to encourage reuse and refill. Raising awareness and public education about the impact of plastic waste is also very important in achieving significant reductions.
4. Investment in Recycling Infrastructure: There is a need for serious investment in efficient and adequate recycling infrastructure. This includes the establishment of modern recycling facilities, effective collection systems, and proper waste segregation. Governments, the private sector, and civil society need to work together to increase the capacity of recycling infrastructure and ensure plastic recycling is an easier and more affordable option.
5. Global Cooperation: Tackling the problem of plastic waste requires strong global cooperation. Countries need to work together to develop strict international standards for the management of plastic waste, prohibit the export of illegal plastic waste, and share knowledge and technology in plastic waste management. Global collaboration will strengthen individual efforts and ensure broader environmental protection.
6. Technological Innovation: Technological innovation is a key factor in dealing with plastic waste. Intensive research and development are needed to produce new solutions, such as advanced recycling technologies, innovative plastic replacement methods, and more efficient waste management systems.

In addition, it is specifically necessary to develop local wisdom in overcoming plastic waste. This includes utilizing existing local knowledge and practices and involving local communities in sustainable solutions. The following are some of how the development of local wisdom can help tackle plastic waste:

1. Traditional Knowledge: Local people often possess valuable traditional knowledge about the use of natural materials and waste management. This knowledge can be utilized in the development of environmentally friendly plastic substitutes or more sustainable waste reduction practices.
2. Local Recycling Practices: Some local communities have developed recycling practices that are unique to their resources. Examples include crafts that use plastic waste as a raw material or locally managed collection and recycling systems. Recognizing and developing local recycling practices can help reduce plastic waste and provide economic benefits to local communities.
3. Local Education and Awareness: Engaging local communities in education and awareness campaigns is very important. Education about the dangers of plastic waste and the importance of responsible waste management can help change consumer behavior and habits at the local level. This can be done through awareness campaigns, educational programs in schools, or through community groups involved in environmental activities.
4. Empowerment of the Local Economy: The development of local wisdom can also contribute to empowering the local economy. For example, supporting micro and small businesses that produce environmentally friendly plastic substitute products or recycling plastic waste into products with selling value. This can provide employment and income opportunities for local people while reducing the plastic waste generated.
5. Conservation and Management of Natural Resources: Indigenous knowledge often involves sustainable management of natural resources. In the context of plastic waste, this can mean reducing the use of single-use plastics and leveraging existing natural

resources to replace plastics with natural or recycled materials.

6. Partnerships with Governments and Other Organizations: To develop local wisdom, it is important to forge partnerships with governments, non-governmental organizations, and other institutions that have relevant resources and expertise. This partnership can assist in program development, access to resources, and technical support to implement sustainable solutions in plastic waste management.

3.9 The practice of Utilizing Local Wisdom

There are several examples of local wisdom utilization practices that can be used to deal with plastic waste, including:

1. Reuse and Repair: Local people can practice the reuse of plastic items. For example, they can use old plastic bottles as storage containers, or convert plastic bags into cloth shopping bags. In addition, repair practices can also be done by repairing damaged plastic items instead of throwing them away.
2. Handicrafts from Plastic Waste: Local people can turn plastic waste into handicrafts that have a sale value. For example, bags, wallets, or jewelry can be made from recycled plastic. This not only helps reduce plastic waste but also provides economic opportunities for local communities.
3. Composting Organic Plastics: Several types of biodegradable plastics can be processed through composting. Local people can develop organic plastic composting practices, such as disposable cutlery made from bioplastics. The compost produced from this process can be used as organic fertilizer for local farms or gardens.
4. Use of Traditional Substitutes: Local communities can rely on their local wisdom to use more sustainable substitutes for traditional plastics. For example, banana leaves can be used as a substitute for plastic food containers, while natural wicker materials such as bamboo or rattan can be used as a substitute for baskets or plastic bags.
5. Education and Training: Local communities can provide counseling and training to community members regarding sustainable management of plastic waste. This includes education about waste segregation, reducing the use of single-use plastics, and proper recycling practices. With this knowledge, individuals in the community can adopt sustainable behavior changes.
6. Local Collection and Treatment Systems: Local communities can develop locally managed plastic waste collection and treatment systems. For example, setting up a community recycling center that collects, sorts, and recycles plastic waste efficiently. This can involve the active participation of residents and create jobs at the local level.

3.10 Local Wisdom-Based Project

Following are some examples of projects that have used local wisdom to address plastic waste:

1. Ecobrick: Ecobrick is a project that involves the community in collecting non-recyclable plastic waste and compacting it into solid plastic bottles. These eco-bricks can then be used as alternative building materials in construction, such as walls or benches. This ecobrick project has been carried out in various communities around the world.
2. Creative Waste Bank: Creative waste bank is a project that involves the community in collecting, sorting, and processing plastic waste into products with sale value. For example, in some areas, waste banks have developed handicrafts, such as bags, pencil cases, or other accessories, which are made from plastic waste. This provides economic opportunities for local people and reduces plastic waste.
3. Plastic Bottle Processing Program: Several local projects focused on processing used

plastic bottles. For example, in some areas, plastic bottles are used to collect rainwater, provide clean drinking water, or are even used as an alternative building material for making construction blocks. By utilizing used plastic bottles, this project helps reduce plastic waste and provides benefits to the community.

4. Plastic Bag Reuse: In some communities, plastic bag recovery projects have been carried out by turning used plastic bags into other products, such as footwear, picture frames, or other handicraft products. By reusing plastic bags that are usually difficult to recycle, this project provides creative solutions and reduces the amount of plastic waste that enters the environment.
5. Plastic Bag Substitute Program: Several regions have launched programs to replace single-use plastic bags with eco-friendly cloth bags or shopping bags. These programs often involve mass production and distribution of cloth bags to the public, as well as educational campaigns to raise public awareness of the harmful effects of using single-use plastic bags.
6. Creative Recycling: Creative recycling projects involve the community in creating new products from plastic waste. For example, plastic waste can be used to make furniture products, wall hangings, household appliances, or fashion accessories. This creative recycling adds value to plastic waste and reduces its buildup in landfills.

Journal of research conducted by Wali PNR Harahap et al (2022), regarding the Design of Liquid Waste Treatment Equipment and Neutralization of Indoor Air by Utilizing an Ozone Generator, found a way to minimize the occurrence of environmental pollution, continued research and efforts to make tools that can treat liquid waste and air are carried out. Utilizing high voltage which is then transmitted to produce small lightning which will then produce O3 compounds (Ozone) and with PLC controls that will regulate the performance of the system so that the tool can function as fully as possible. The main target is to kill viruses that usually settle in the water, namely e-coli viruses, and viruses in the air. Then purify the water from several dissolved compounds so that the water can be used for household purposes. From the results of the design and testing several conclusions can be drawn, including:

1. The oxygen level that passes through the ozone reactor produces more O3 than ordinary air.
2. Ozone levels cannot last long in water.
3. O3 can reduce the PH of water. Not all materials are resistant to O3, while some materials can survive the O3 reaction, including Stainless steel, Aluminum, Plastic, and Silicone, and the heat generated at the coil point in the ozone reactor can reach more than 90˚C.

The research journal by Nur El Fajri et al (2022) regarding Ecobrick as a Solution for Plastic Waste Management in Tambak Village found that along with increasing population growth, it will have an impact on increasing the amount of waste produced, including increasing the amount of plastic waste in the people's environment. This also causes more or less environmental pollution as well as river pollution due to plastic waste. in Tambak village which is the location of the UNRI village Kukerta Balek dedication, plastic waste is a major problem and if there is no focused control, it is due to the increasing volume of waste dumped around the river. This is due to the absence of facilities for transporting waste from the government for distribution to landfills. to reduce plastic waste, UNRI's village kukerta balek produces eco bricks for the utilization and recycling of plastic waste. Ecobrick is a creative effort to tackle plastic waste. its function is to extend the life of plastics and process them into something useful. by reprocessing plastic bottle waste into

reusable items such as tables, and chairs. The method used is the introduction and demonstration of making eco-bricks. What this dedication will take place in the formation of public enlightenment, especially in the Tambak Village Elementary School environment, to dispose of waste in its place so that it can be used to produce tables. Creative products in the form of tables can be used for student learning. Ecobrick is a creative effort to tackle plastic waste. its function is to extend the life of plastics and process them into something useful. by reprocessing plastic bottle waste into reusable items such as tables, and chairs. The method used is the introduction and demonstration of making eco-bricks. What this dedication will take place in the formation of public enlightenment, especially in the Tambak Village Elementary School environment, to dispose of waste in its place so that it can be used to produce tables. Creative products in the form of tables can be used for student learning. Ecobrick is a creative effort to tackle plastic waste. its function is to extend the life of plastics and process them into something useful. by reprocessing plastic bottle waste into reusable items such as tables, and chairs. The method used is the introduction and demonstration of making eco-bricks. What this dedication will take place in the formation of public enlightenment, especially in the Tambak Village Elementary School environment, to dispose of waste in its place so that it can be used to produce tables. Creative products in the form of tables can be used for student learning. by reprocessing plastic bottle waste into reusable items such as tables, and chairs. The method used is the introduction and demonstration of making eco-bricks. What this dedication will take place in the formation of public enlightenment, especially in the Tambak Village Elementary School environment, to dispose of waste in its place so that it can be used to produce tables. Creative products in the form of tables can be used for student learning. by reprocessing plastic bottle waste into reusable items such as tables, and chairs. The method used is the introduction and demonstration of making eco-bricks. What this dedication will take place in the formation of public enlightenment, especially in the Tambak Village Elementary School environment, to dispose of waste in its place so that it can be used to produce tables. Creative products in the form of tables can be used for student learning.

CONCLUSIONS

PT Torabika Eka Semesta is a company engaged in the production of processed food and beverages. PT Torabika Eka Semesta is a subsidiary of PT Mayora Indah Tbk besides PT Kakao Mas Gemilang. The head office of PT Torabika Eka Semesta is on Jl. Raya Serang Km. 12.5 Bitung Jaya Village, Cikupa District, Tangerang. To maintain a healthy environment, the Torabika company can do several things, including surrounding. The company reduces the use of single-use plastic packaging: Companies may consider reducing their use of single-use plastic packaging and switching to more environmentally friendly packaging such as paper packaging or recycled packaging. Using environmentally friendly raw materials: Companies can choose raw materials that come from environmentally friendly sources and can be recycled or decomposed easily in nature. Optimizing energy use: Companies can optimize energy use in their production facilities by adopting environmentally friendly technologies such as solar panels or energy saving. Improve recycling programs: Companies can improve their production facilities' recycling programs and ensure that employees and customers have easy access to recycling facilities. Building environmental awareness among employees and customers.

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