

# ENVIRONMENTAL ECHNOLOGY INNOVATION TO BE AN ALTERNATIVE PRODUCT (BIOPLASTIC & REFUSED DERIVED FUEL)

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**Abstract.** Waste is an environmental problem that most dominates and cannot be resolved properly. One of the causes is human consumptive behavior which causes environmental damage. This is frightened by the large amount of garbage that has been mounting in several regions of Indonesia. If environmental problems continue and without management, human welfare will be achieved, one of which is economic welfare. The need for environmental technology innovation in waste management is a solution to environmental problems in Indonesia. Utilization of waste in environmental technology that creates an alternative ecopreneurship product can balance the economy and the environment, because besides being able to add to the pile of waste, the products of this environmental technology innovation can be used as a business to overcome economic burdens, one of which is Bioplastic innovation and Refuse Derived Fuel. Bioplastics are plastics or polymers which naturally can be easily degraded either through attack by microorganisms or by weather (moisture and solar radiation). Meanwhile, Refuse Derived Fuel (RDF) is treated with biodrying waste. RDF can be used as a renewable fuel derived from combustible waste. This study aims to introduce environmental technology innovation and the concept of ecopreneurship as an attractive and opportunity business concept.

Keywords: ecopreneurship, waste, innovation, environmental technology, bioplastic, refuse derived fuel.

## I. INTRODUCTION

Waste is a problem that needs serious attention. Waste from year to year continues to increase in line with the rate of population growth. Population growth accompanied by high flow of urbanization to urban areas has resulted in a higher volume of waste that must be managed every day. This is getting more difficult because the management and management of waste is less than optimal. Likewise, from the active role and public awareness and funding which is still very low. In this system approach, it can help solve the complexity of waste management problems by looking at the problems comprehensively.

Industrial growth and urbanization in high urban areas of the world are increasing the volume and type of waste. Inappropriate waste management regulations and limited capacity and funding sources increase the impact of waste that is detrimental to human health and the environment, especially in urban areas. This is a major problem for central and local governments, especially in developing countries. Municipal solid waste management in general takes into account the main problems in solid waste management in Indonesia and various alternative solutions to solid waste problems by referring to solid waste management in developed countries (Curitiba). Furthermore, the problems faced will be discussed with a systems approach.

The increasing volume of waste in Indonesia will have an impact on the Indonesian state. One of them is the environmental and economic impact. In accordance with the ecopreneurship concept that economy and the environment will always be sustainable and must be addressed together. If environmental problems persist and without solving problems, human welfare will be difficult to achieve, one of which is economic welfare. Therefore the need for environmental

technology innovation that can be a solution between the two. This technological innovation is made in addition to protecting the environment, this technological innovation is also made to promote the ecopreneurship concept as an attractive and opportunity business concept.

## II. BASIC THEORY

### A. Ecopreneurship

Kirkwood & Walton sees ecopreneurship as an integral part of entrepreneurship. The definition of ecopreneurship according to Kirkwood & Walton (2010: 205), "Entrepreneurs who found new businesses based on the principle of sustainability." which means entrepreneurs who find new businesses based on the principles of sustainability. According to Walley & Tailor, ecopreneurs are among the drivers of change. Meanwhile, based on Isaak in Walley & Taylor, ecopreneurship is also called "green business" which is defined as a business that is found or run on the principle of sustainability while ecopreneurs is defined as individuals who find or run the business. Based on the above theories, it can be concluded that ecopreneurship is closely related to environmental sustainability because ecopreneurship is formed and run by ecopreneurs based on the desire for better environmental changes so that environmental sustainability is very much a consideration.

### B. Environmental Technology Innovation

Environmental technology is a concept for a specific purpose. Where in its implementation refers to environmental factors. Improper use of technology can cause environmental damage. The existence of this technology aims to provide convenience and fulfillment of human needs. One of them is technology for waste management. Waste management

technology is very influential for human comfort and health. How can an area or a place apply technology in this waste management appropriately and as well as possible. As we know and feel, garbage that is just thrown away will certainly pollute the environment. It can cause uncomfortable effects, even serious effects that may be caused, such as disease and poisoning. For this reason, it is necessary to implement and use waste management technology. Innovations generated by environmental technology in waste management can produce products that are alternatives to ecopreneurship.

### C. Principles of Environmental Technology

Simply put, environmentally friendly technology is technology created to facilitate human life without the need to damage or have a negative impact on the surrounding environment. Technology like this is expected to be able to protect the environment, for example in environmentally friendly technology tools that do not use pollutants, and in the end can provide appropriate handling of wastes that may be generated from these environmentally friendly technology tools.

There are 6 principles applied to the concept of environmentally friendly technology, namely:

1. Refine, which means using environmentally friendly materials and through a process that is safer than the previous technology.
2. Reduce, which means reducing the amount of waste by optimizing the use of materials.
3. Reuse, which means reusing unused materials or materials that are already in the form of waste and processed in different ways.
4. Recycle, which means almost the same as reuse, it's just that recycle reuses materials or waste and is processed in the same way.
5. Recovery, which means the use of certain materials from waste to be processed for other purposes.
6. Retrieve Energy, which means saving energy in a production process.

## III.METHOD

This article is written with a method of reviewing articles, books, and research that discuss ecopreneurship and environmental technology. The discussion is carried out by examining environmental technology and product results created from environmental technology.

## IV.DISCUSSION

### A. Bioplastics

Biodegradable plastic or commonly known as bioplastic is a type of environmentally friendly plastic, can be degraded by microorganisms and all its components are made from renewable raw materials. Bioplastics are usually made from starch, vegetable oil and microbiota, which under certain conditions and at certain times changes in their chemical structure, which affects their properties due to the influence of microorganisms so that they can break down easily. Biodegradable plastics are a type of plastic made from biopolymers, which are a type of polymer composed of renewable biomass. Bioplastics can be used as packaging because they are not easily penetrated by moisture, so they can be used as packaging materials for ordinary plastic. Bioplastics that burn do not produce hazardous chemical

compounds. In addition, soil quality will increase in the presence of bioplastics, because the decomposition of microorganisms increases nutrients in the soil. Bioplastics can be used for packaging food products. Bioplastics function as a diffusion barrier for oxygen and water vapor as well as flavor components so as to create an internal atmospheric condition in accordance with the needs of the packaged product. The advantage of using bioplastics as food packaging is that they can extend the shelf life of the product and are environmentally friendly.

Industrial growth and population demand the use of plastic which is difficult to eliminate, even though the impact is not good on the carrying capacity of the environment. Seeing this, the Center for Agricultural Postharvest Research and Development (BB Postharvest) issued a bioplastic innovation from starch nano cellulose which is much more environmentally friendly. Bioplastic packaging has been produced quite a lot in foreign countries, even local industries also have several industries that produce bioplastics from cassava starch. However, the challenges are less heat resistance, less mechanical strength, and very sensitive to water. Therefore, many researchers as well as bioplastic producers are looking for solutions to overcome these shortcomings of bioplastics. Scaling up of nanocellulose production to an industrial scale is still a challenge going forward. However, innovation to support environmentally friendly technology will continue to be carried out and improved by providing competent human resources and nanotechnology equipment that respond to today's world challenges. Uses Bioplastics are often used for disposable items such as packaging, shopping bags, one-time catering equipment and for wrapping other foodstuffs that can be used as a solution for running a business. For food packaging, safe bioplastic to use is made from materials that will not cause chemical reactions when food is packed. Even not only that, the type of bioplastic with a sample thickness of 2 mm can break down 90% into CO<sub>2</sub> in 6 months, so it can also be beneficial for the environment.

### B. Refused Derived Fuel (RDF)

Refused Derived Fuel (RDF) is a waste processing technology through the process of homogenizers into a smaller size. The result is a source of renewable energy in the combustion process, as a substitute for coal. RDF is flammable waste and is separated from non-combustible parts through the process of shredding, sieving and air classification. RDF is produced by separating the fraction of combustible waste and the fraction of waste that is difficult to burn from waste mechanically. RDF is known as an alternative fuel produced from combustible waste, such as plastic, rubber and leather waste, textiles, wood, paper, synthetic resin, wastewater treatment sludge and processed sludge.

The development of the first RDF in Indonesia is in Cilacap, it is hoped that this RDF can be a solution in future waste management. Not only that, this facility also provides benefits in the form of renewable energy. By processing it into RDF, it will greatly reduce the disposal of waste to landfills. By converting waste into RDF, the product can be used as a substitute for coal in the cement industry or coal steam power plant. This is why it is called a new milestone in waste processing, because its products can be used as fuel. The

potential is enormous, especially since Indonesia has 34 cement factories and more than 50 PLTUs. In one day, there are 28 thousand tons of waste that can be processed. The cost of producing processed waste using the RDF system requires IDR 300 thousand / ton per day or around 20 US dollars. As for coal, in one ton it reaches 40-50 US dollars. Even though the calorie value is up to 3,000 calories per ton. That way, the production costs of processing waste into RDF are more efficient when compared to using coal.

#### V. CONCLUSIONS

Based on the description above, we can conclude that environmental technology innovation will have a good impact on the environment and the economy, besides environmental technology innovation also provides alternative eco preneurship products that can address economic and environmental disparities. From the case studies, bio plastic and refused derived fuel can be used as inspiration and motivation for better waste management in the future so that we can build a country that is clean from waste. Due to the development of the times, there will be more and more environmental technologies that can be used as solutions in solving problems in all aspects including the environment and economy.

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