

# Implementation Plastic Crushing Machine To Increase Profit In Mutiara Waste Banks

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**Abstract:** Mutiara Waste Bank (MWB) is part of neighbourhood RT. 05 RW. 13, Jakamulya Village, Bekasi City, which innovates in the waste bank activities. The MWB applies 3R through the application of plastic crushing machine to recycle plastic waste. The purpose of Program to determine the benefits of the implementation of a plastic crusher machine at MWB so that it becomes a reference in developing business of 3R-based waste processing for the welfare of the community around the Waste Bank through the active participation of RT residents. With the implementation of the machine, the profits of MWB are increased by the added value of the results of the processing business. Previously, plastic waste was only collected without being processed and sold to collectors. Now the processing of plastic waste is done at the MWB which is close to the household environment. The application of plastic crusher machine can optimize the activities of the waste bank according to the 3R concept. Therefore this activity benefits the environment and enhances the economy of the community.

**Index Terms:** implementation, crushing machine, plastic, waste bank, mutiara.

## 1. INTRODUCTION

Jakamulya Village, every hamlet (RW) has a Waste Bank, management of new waste to sort waste to reused into compost and recycled plastic waste into handicraft products. The Mutiara Waste Bank (MWB) is part of neighbourhood RT. 05 RW. 13, Jakamulya Village, Bekasi City, which innovates in the waste bank activities. This waste bank applies 3R through the application of plastic crushing machine. The machine development has been done, such as design and fabrication Recycling of Plastic System [1], and development of manual drive thrasher plastic cup [2]. They conducted research to produce a plastic crusher as part of the recycle process. It needs a study of economic analysis calculations to get knowledge about the benefits of waste processing businesses such as economic studies [3][4]. Waste banks can be found in neighborhoods across Indonesia. The purpose of the waste bank is to help waste processing in Indonesia, to make people aware of a healthy, neat and clean environment, to turn waste into something more useful in the community for crafts and others. Like a regular commercial bank, you open up an account with your local waste bank. Periodically, you make deposits with your non-organic solid waste, which are weighed and given a monetary value, based on rates set by waste collectors. This value is saved in your account from which, like a regular bank, you can withdraw. The basic principles of waste banks remain the same across provinces: collect, save, earn, change behavior, and enjoy a clean neighborhood [5]. Waste management activities at MWB using the 3R concept (reuse, recycle, reduce). The activity at MWB involves the majority of RT residents as administrators and customers [6]. Historically, this waste management activity was initiated by a number of residents who shared the same vision and attitude regarding the need for jointly managed waste, the cause of

which was the accumulation of waste produced by local residents which was quite a lot. Until now there are eight administrators and the number of customers continues to increase over time. Enthusiasm of residents around MWB to participate in waste management activities both as managers and customers is very good. This can happen because residents feel they have benefited from the existence of MWB in their environment. Plastic is a material that widely used for the manufacture of household appliances, automotive and so on. The use of plastic materials is increasingly widespread because it is strong and not easily damaged by weathering. Plastic products besides being badly needed by the community also have a negative impact on the environment. Used plastic is quite difficult to control. Burning plastic can cause smoke containing chlorine. Plastic waste has the potential to pollute the environment because plastic is a material that is difficult to be degraded so that the landfill in the final landfill will provide many problems including: (1) plastic waste will occupy parts that should be used by other waste; (2) because it is light, with a poor final covering, plastic tends to rise to the surface and pollute the surrounding environment; and (3) if a plastic fire occurs, substances that are harmful to health. Plastic waste management in the waste bank in general has not been carried out thoroughly. Waste from household customers is only sorted without going through processing. The result of sorting is then collected until it is enough to be sold to collectors. Management like this is not optimal to get economic value. The profit from selling directly the results of sorting is not too large when compared with processing plastic into chopped. Need capital for investment in machinery so that the waste bank can get higher profits. This is the reason for the author in reviewing the implementation of a plastic chopper to get economic benefits in the waste bank. What are the benefits of implementing a plastic chopper machine as an effort to increase profits at MWB.

## 2 RESEARCH PURPOSE

Determine the benefits of the implementation of a plastic crusher machine at MWB so that it becomes a reference in developing business of 3R-based waste processing for the welfare of the community around the waste bank through the active participation of RT residents.

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### 3 LITERATURE REVIEW

The term waste bank consists of two words. Bank is an intermediary institution that has a function as a place to save and lend money and also financial transactions. Waste is defined as all unwanted or unusable material, which is usually discarded by its owner [7]. Waste bank is a campaign for handling waste by buying back waste in terms of a deposit like banking system [8]. Waste bank operates like a bank which people in a community, subdistrict, and district can use to deposit their garbage or extract money from the value of the garbage they provide to the facility [9]. The management model of waste bank is almost the same as the commercial banks where there are customers, bookkeeping and its management, in commercial bank, customer deposits money but in waste bank customers deposit is waste that has an economic value, while waste bank managers need to be creative and innovative, and have an entrepreneurial spirit in order to increase income. Waste bank working system based on household, by giving rewards to people who managed to sort and deposit the waste. Community-based waste management as an approach to waste management that is based on the active participation of the community [10]. Government and other agencies are just as motivator and facilitator. According to Douglas et al [11] stated that environmental management requires facilitation and implementation of community-based efforts as a strategy to empower and increase their access to environmental resources are important, especially land, infrastructure, and services. Community-based waste management is very important because the activities are performed by members of the community itself. They make decisions related to their own lives. It would be more effective if tailored to local needs and priorities and their capacity [10]. The definition of 3R consists of reuse, reduce, and recycle. Reuse means reusing waste that can still be used for the same function or other functions. Reduce means reducing everything that results in garbage. Moreover, Recycle means reprocessing (recycling) waste into useful new goods or products. Do 3R every day. Managing waste with the 3R system can be done by anyone, anytime, anywhere, and at no cost, what we need only a little time and care. The following 3R activities that can be done at home, school, office, or in other public places. 3R activities; simple can be done by anyone, anywhere, anytime and does not require a hefty fee. However, from this pure 3R, it can have a significant impact on the handling of waste which often a problem around us. Plastics are made from limited resources such as petroleum, and huge advances are being made in the development of technologies to recycle plastic waste among other resources. Plastics are made up of long chain molecules called polymers. Various types of polymers can be made from hydrocarbons derived from coal, natural gas, oil and organic oils which are transformed into materials with desirable properties. Mechanical recycling methods to make plastic products and feedstock recycling methods that use plastic as a raw material have been widely adopted in the chemical industry [12].

Plastics that can be readily recycled are

- Thermoplastics which means they will soften when heated.
- Thermosetting Plastics harden when heated, are often used in electrical applications and are not suitable for recycling.
- Thermoplastics are light, durable, moldable, hygienic and economic, making them suitable for a wide variety of

applications including food and product packaging, car manufacturing, agriculture and housing products.

- Thermoplastics can be repeatedly reformed into new products and are the focus of this technical brief.

#### The recycling of plastics is carried out in a five step process [12]:

##### Step 1 - Plastics collection

This is done through roadside collections, special recycling bins and directly from industries that use a lot of plastic.

##### Step 2 - Manual sorting

At this stage nails and stones are removed, and the plastic is sorted into three types: PET, HDPE and 'other'.

##### Step 3 - Chipping

The sorted plastic is cut into small pieces ready to be melted down.

##### Step 4 - Washing

This stage removes contaminants such as paper labels, dirt and remnants of the product originally contained in the plastic.

##### Step 5 – Pelleting

The plastic is then melted down and extruded into small pellets ready for reuse.

### 4 RESEARCH METHODS

This research held at the MWB which located in Pondok Surya Mandala Housing, RT 05 RW 13, Jakamulya Village, South Bekasi District, Bekasi City, Indonesia. The focus in this study only limited to the study of the implementation of a plastic crusher machine at MWB. Economic analysis of plastic waste processing, the need for investment capital and how long this business will return on investment. It becomes a reference in developing business of 3R-based waste processing for the welfare of the community around the Waste Bank through the active participation of RT residents.

### 5 RESULT AND DISCUSSIONS

The benefits of waste management activities with the 3R concept carried out by the MWB viewed from the economic sector include income derived from waste management, savings in expenses obtained from waste management, additional funds for operational waste management activities, and job creation. The benefits felt by the community from waste management activities with the 3R concept not only seen in the public health sector and the economic sector but also in the psychological sector. The benefits of waste management activities with the 3R concept carried out by community seen from the psychological sector include: level of public awareness of waste management, improvement of quality of life, lifestyle changes related to waste management, community satisfaction on waste management as an achievement, and efforts to carry out replication of waste management activities. Recycling plastic waste to make money is MWB's goal to benefit from the waste processing business. But the main goal of this waste management business is to maintain environmental cleanliness and preserve it. Recyclable waste is plastic waste that is difficult to destroy. The existence of plastic waste is indeed quite disturbing to society, where it takes hundreds of years for this plastic waste to be destroyed. Lately many products with plastic packaging are circulating in the community. This will

certainly make the greenhouse effect will increase. The use of plastic waste that continues to increase will certainly be handled with the plastic waste processing business. This plastic waste processing business is a business that is able to make money and also provides benefits to environmental sustainability. Waste such as drink bottles, drinking glasses, oil bottles and similar plastic are processed by grinding and then producing chopped plastic. The results of the chopped plastic are sold to the factory to be reprocessed into new plastic. The plastic can be made into new household furniture used by the community. The method of processing plastic waste in MWB is done by wet milling, which is mixing the plastic with water so that it produces cleaner chopped plastic. This plastic chopped is sold to CV.Majestic Buana as an advanced processing company. Waste Bank as community-based environment governance has instruments that can establish self-reliance in a community. Economic independence formed by livelihood support from the profit and intellectual independence formed by sorting and managing waste in a domestic environment [13]. Recycle recycling goods, recycling activities in waste management, residents of RT 05 RW 13 Housing Pondok Surya Mandala Bekasi City chopping plastic bottles and glasses. MWB received a grant from the PKW Program in the form of a plastic crushing machine.

This recycle activity makes the environmental community of Pondok Surya Mandala Housing in Bekasi City benefit from the sale of plastic chopped. Figure 1 shows processing of plastic glass waste, plastic crushing machine that is working on chopping plastic bottles and cups. The work was carried out by a group of PKK mothers. The production capacity of the machine is one hundred kilograms per hour.

The processing of plastic glass waste requires several steps, including:

- a. Collecting plastic waste.
- b. Sorting plastic waste.
- c. Cleaning plastic waste.
- d. Crushing plastic waste.
- e. Washing the results of plastic flakes.
- f. Drying plastic flakes.
- g. Collection of plastic flakes into sacks.
- h. Weighing and selling plastic flakes.

The following is an analysis of the benefits of processing plastic glass waste to illustrate that the application of a crusher machine can produce benefits for residents. Benchmark prices for the selling price of plastic waste in counts per kg of plastic flakes range from fifteen thousand rupiah to seventeen thousand rupiah.

#### Analysis of the plastic waste processing business at MWB with the assumption that

- Rent location for five years.
- The working life of plastic shredding machines is five years.
- The working period of the water pump is five years.
- The service life of the additional equipment is three and a half years.
- Machine installation using public facilities.
- Plastic waste originates from domestic and collectors.

Economic analysis is presented in Table 1, it can be concluded if the plastic waste processing business is very profitable where minimum investment is thirty three million rupiah with monthly minimum savings of five million rupiah and return on investment within seven months. This estimate is a rough estimate if the machine is working with a production capacity of fifty kg per day. For this reason, it is necessary to collect raw materials not only from residents around the MWB. to get the maximum production capacity, MWB can purchase raw materials from other sources. With the implementation of the machine, the profits of MWB are increased by the added value of the results of the processing business. Previously, plastic waste was only collected without being processed and sold to collectors. Now the processing of plastic waste is done at the MWB which is close to the household environment [6]. added value is obtained from the difference between the selling price of the processed product and the price of raw materials. The business opportunity with processing plastic waste is considered to be very prospective. The plastic waste processing business is a lucrative choice for the waste bank business. Not all waste banks in Indonesia implement machines for processing plastic waste. This is because the investment value that must be prepared is quite large, also the availability of labor through the participation of citizens in one RT environment. Plastic waste processing business also does not know the time and season, so this business is suitable for the choice of businesses that run at any time. The business of processing plastic waste is also one of the businesses that is



Fig. 1. The processing of plastic glass waste.

easy to do with very fantastic profits.

**TABLE 1**  
Economic Analysis of Plastic Waste Crusher Business

INFORMATION	VALUE (Rp.)		
Investment in Equipment			
Plastic Crusher Machine	27,500,000		
Water pump installation	4,500,000		
Other additional equipment	1,000,000		
Total Investment	33,000,000		
Fixed cost			
Depreciation of plastic crusher machine	443,548		
1/62 x Rp. 27,500,000			
Depreciation of water pump	51,935		
1/62 x Rp. 4,500,000			
Depreciation of other additional equipment	22,727		
1/44 x Rp 1,000,000			
Employee salary	1,400,000		
Total fixed cost	1,918,210		
Variable cost	@		
Mixed plastic	286,500 x 30	8.595.000	
Sack	58,000 x 30	1.740.000	
Transport of raw materials	50,000 x 30	1.500.000	
Cost of crushing	15,000 x 30	450.000	
Sorting fee	20,000 x 30	600.000	
Transport of finished materials	50,500 x 30	1.515.000	
Rent of place	20,000 x 30	600.000	
Water & electricity	19,000 x 30	570.000	
Total variable cost		15,570,000	
Total operational cost			
Fixed cost + Variable cost		17,488,210	
Revenue per month			
50 kg x 15,000 x 30		22,500,000	
Profit per month			
Profit per month = Revenue per month – Total operational cost			
	22,000,000	– 17,488,210	5,011,790
Pay back period			
Total investment/ profit per month	33,000,000	: 5,011,790	7 Month

## 6 CONCLUSION

This can be seen in the role of the MWB which has carried out the entire series of waste sorting processes by the 3R method. The application of plastic crusher machine can optimize the activities of the waste bank according to the 3R concept. Therefore this activity benefits the environment and enhances the economy of the community. The plastic waste processing business is very profitable where minimum investment is thirty three million rupiah with monthly minimum savings of five million rupiah and return on investment within seven months. This estimate is a rough estimate if the machine is working with a production capacity of fifty kg per day.

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