

Waste Management Implementation: A Case Study of Bintang Sejahtera Waste Bank at Tanak Awu Village, Central Lombok, Indonesia

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Abstract. In terms of environmental and economic concerns in Indonesia, waste management is critical. One option for addressing waste problems is a waste bank. Bintang Sejahtera Waste Bank is a waste management pilot initiative conducted by a community group in Lombok. As this study used a descriptive qualitative approach to examine how the Bintang Sejahtera Waste Bank manages waste. The findings revealed that the waste management process is separated into two phases: waste milling phases and waste pressing phases. From this point, the researcher believes that waste management is compelling the waste bank to share the public's understanding of how essential waste management is. It is hoped that by teaching and socializing the program, people would become interested in collecting and delivering their garbage to the waste bank. Meanwhile, the rise in societal wealth is not dramatically altering, but local groups are still becoming empowered in terms of work possibilities that may sustain their economies. As waste management pilot project in Lombok, There is a need for waste recycling management training and coaching so that it may be reused as one of the waste management principles. Strong rules and supporting facilities are required so that people do not toss rubbish everywhere.

Keywords: Community Participation, Waste Bank, Waste Management

1. Introduction

Waste problem in this period has become a challenge and a major concern in a country's environmental problems. Waste generation will not decrease or run out and will even continue to grow along with the growth of human population and the complexity of human activities. The accumulation of waste that is getting bigger from day to day will reduce space and disrupt human activities so that the human goal to improve the quality of life actually makes the quality of life decline or hampered due to the problem of the waste generation [1]. In Government Regulation No.81 of 2012 on the Management of Household Waste, it is specified that household waste is waste which originates from daily household activities which do not involve particular feces and waste. Type of household waste is a waste that comes from commercial areas, industrial areas, special areas, social facilities, public facilities and/or other installations.

The waste has a serious threat to the natural environment, economy, and society. Waste contains hazardous materials that directly affect the function of the natural environment which is the main supporter of life. Waste that is not treated properly can disturb the environmental aesthetics, cause odors and contribute to the creation of diseases. Environmental waste

disturbances can arise from the source of the waste, where the waste producer does not properly handle the waste. When viewed from an environmental viewpoint, waste is 'costly' material because it can have local, national, and global environmental impacts. From an economic viewpoint, waste is the value of objects that have been lost, which has a negative effect on mankind (can be in the form of disturbances; diseases and foul odors) and costs are not insignificant (for processing and in the long-term storage) [2].

As one of the biggest problems at this time, waste in Nusa Tenggara Barat (NTB) province, people can produce approximately 1,400 m² of waste per day. Unfortunately, 30-40 m² of the total cannot be completed optimally. Seeing this, one of the community associations or commonly called a community organization in Central Lombok called Tanak Awu village, made this community aim to reactivate the role of society in controlling, making, participating until evaluating the program and improving the quality of society itself [3][4].

This community organization comes from Tanak Awu Village, Central Lombok district in West Nusa Tenggara Province which called Generasi Bintang Sejahtera Foundation. The initial formation of Generasi Bintang Sejahtera Foundation was due to several factors, such as; lack of local community participation in the village development process, the existence of environmental problems that cause health problems including the amount of waste in their villages, lack of community skills and expertise, lack of economic income, and waste problems. Focusing on the waste management, this Generasi Bintang Sejahtera Foundation community is trying to solve it by utilizing and reducing existing waste in the community and trying to attract participation, reduce the impact of waste, address environmental problems and increase revenue through waste, therefore one of the efforts is by establishing the Bintang Sejahtera Waste Bank.

Bintang Sejahtera Waste Bank is a social enterprise in waste management that adopts waste bank model that has been supported by the Indonesian government since 2008 as one initiative to solve waste problem at grass-root level. Further, this research will talk about how the Bintang Sejahtera waste bank works in managing the waste as the community organization in Tanak Awu Village, Lombok, Nusa Tenggara Barat Province.

2. Method

This study uses the qualitative descriptive method. Descriptive qualitative method is research aimed at understanding phenomena encountered by study subjects such as action, interpretation, motivation, behavior, etc. that are holistic through explanations in the form of words and sentences, in a specific sense that naturally uses multiple natural methods (Basrowi, 2008). This research will conduct the data in Tanak Awu Village, Central Lombok District at West Nusa Tenggara Province, Indonesia. The unit of analysis on this research is mostly the household that lives in Tanak Awu village and focusing on the management of Bintang Sejahtera waste bank which is runs by the Generasi Bintang Sejahtera Foundation as the community organization in that village. This unit of analysis is conducted by researchers so that the validity and reliability of research can be maintained, and researchers can distinguish between research objects, research subjects and data sources.

3. Result & Discussion

3.1 Bintang Sejahtera Waste Bank's Background

The Bintang Sejahtera Waste Bank was established in July 2010 with the aim of finding solutions to waste problems, developing local entrepreneurship, empowering communities, and supporting the Nusa Tenggara Barat province government to manage waste and the

environment. This project is a community-based waste management program. The founder of this waste bank is Mr. Syawaludin. The other reasons he chooses to create a waste bank are 1) he loves to take care the environment. He learns a lot about it from a bunch of resources. It turns out that he creates The Waste Literacy Movement. The Waste Literacy Movement is an initiative aimed at enhancing the Character Care for the Environment, where it aims to be involved in the development of community habits from an early age and to make positive and sensible choices and implement them in daily life, why starting by sorting the waste according to categories and types. 2) Lack of waste management program in NTB province. The growth in population and the arrival of visitors is triggering an increase in the amount of waste. Many people littering on the side of roads, waterways and beaches cause pollution, flood, some of the areas that look polluted and the amount of waste in the landfill is increased.

3) Knowing the market and the costs of waste. The improvement and demand of waste is one of the reasons. In the Lombok island, mainly in Java, they have a waste collection system (by machine). So, he wanted to collect as much waste as he could, and send it to other places like East Java, which later could convert it into valuable stuff. From this, his optimism has increased, he recognizes that waste has an outcome on the health of society. So, he's trying to expand his waste bank by disseminating knowledge and informing people to encourage them to join in, creating a waste bank management book that includes his waste bank profile and distributing it to the government and other villages to attract new waste bank comers.

Nowadays, this Bintang Sejahtera waste bank is one of the oldest and a pilot project in Lombok. Through the experiential ups and downs they have experienced, this waste bank is growing rapidly, a lot of other rural society is seeking to learn how to create a waste bank in their rural.

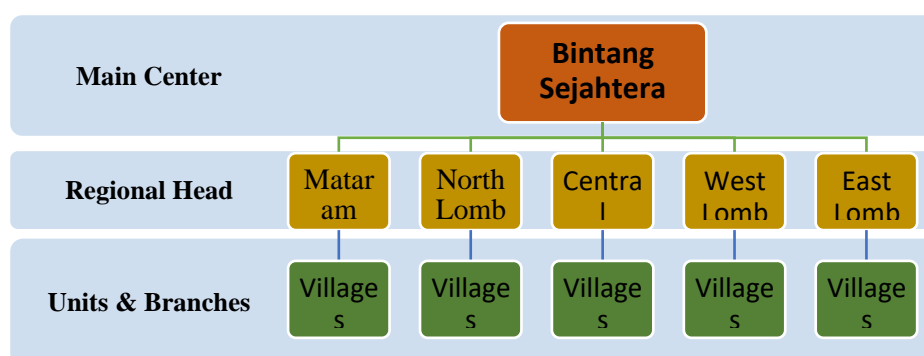


Figure 1. The Hierarchy of Waste Bank in Lombok Island (Source: Bintang Sejahtera Waste Bank)

Recorded, since 2010 to 2020, there are more than 270 waste banks registered in the Bintang Sejahtera waste bank. Bintang Sejahtera is the hub of the waste bank, which means that all the waste bank units are giving their waste collected by the villagers to this waste bank. Most of the regulations and programs come from the Bintang Sejahtera waste bank. Those community-based waste banks in the province of Nusa Tenggara Barat were educated and worked under their business coaching and network. The problem experienced by Bintang Sejahtera Waste Bank is the existence of a waste bank unit and branches that is not being maintained due to the fact that people around the village rarely collect or give their waste to the waste bank. They prefer to throw it in the village trash directly. This causes the waste bank to

operate rarely and cannot get income in running the waste bank operations. So, some of them are hardly maintaining the waste and or even close.

3.2. Waste Management

In managing the waste, Mr. Syawaludin is start by creating the mindset of society about the importance of waste managing. By delivering the socialization about waste management, the need of head village is really important to gather and inform the society. The lack of head village participation will affect the spread of information held by the waste bank and the public awareness will not increase significantly. The society are required to know the criteria of the waste (organic and non-organic) which he gave education through socialization to all community about how to sort out the waste by its classification starting from the household level.

In the Bintang Sejahtera waste bank, the waste management process is a process that begins with sorting the types of waste, removing the labels attached to the plastics, and then going to the weighing stage where the waste is separated. The table below shows the price and types of waste that managed by the Bintang Sejahtera waste bank:

Table 1. Price and Type of Waste Managed by Bintang Sejahtera Waste Bank 2020

No.	Waste Type	No.	Waste Type	No.	Waste Type
1.	Mix (Plastic, Metal)	17.	Cardboard	33.	Bottle Cap Mix Color
2.	Small Glass Bottles	18.	Newsprint	34.	Bottle Cap Separate Color
3.	Big Glass Bottle	19.	Paper	35.	Dirty Mixed Blowing
4.	Battery	20.	Mix Packaging	36.	Mix Blowing
5.	Brass	21.	Detergent Packaging	37.	Jerry Blowing
6.	Milky White Blowing	22.	Cooking Packaging	38.	Chopped Plastic Bucket Separate Color
7.	Mixed Copper	23.	Kitchen Seasoning Packaging	39.	Chopped Plastic Bucket Mix Color
8.	Duplex Mixed	24.	Snack Packaging	40.	PET / Mixed Bottle
9.	Fiber Copper	25.	Crackle Mixed	41.	PET / Mixed Color Bottles
10.	Aluminum	26.	Crackle Color	41.	PET / Fuel Bottles
11.	Iron Mix	27.	Crackle Limpid	43.	PET / Green Bottle
12.	Iron Junk	28.	Plastic Mix	44.	PET / Dark Blue Bottle
13.	Iron Super	29.	Plastic Housing	45.	PET / Light Blue Bottle
14.	Super / Thick Copper	30.	Bronze	46.	PET / Clear Bottle

15.	Another Duplex	31.	PP & PET Mix	47.	PP / Mixed Glass
16.	Egg Duplex	32.	Plastic Buckets	48.	PP / Color Glass
Note PET: Polyethylene Terephthalate PP: Polypropylene					

Source: Document of Bintang Sejahtera Waste Bank

From the table above, we can see, every type of waste has their own price. The customers need to follow the requirement before they sell their waste to the waste bank. The requirement is;

- a. Prices can differ depending on market price fluctuations and will be distributed on the basis of conditions.
- b. The two types of prices above are the purchase prices by the Bintang Sejahtera Waste Bank to all partners using the pick-up or drop-off transportation system.
- c. For the purchase price of goods at partners / branches / units, please adjust the margin requirements which will be determined based on the purchase price from the Bintang Sejahtera Waste Bank.
- d. The items we weigh must be clean from contaminants such as: water, wood, cork, sand, food, soil and other waste that is not included in the purchase list. If there are still contaminants above, we will apply the following rules:
 - We will tolerate it for the first time by applying a shrinkage value according to the condition of the weighing item.
 - For the second weighing time onwards, in addition to applying a shrinkage value according to the condition of the weighing item, we will also impose sanctions in the form of price reduction according to the type of goods containing contaminants.
- e. For the following types of waste are temporarily NOT taken while waiting for a better situation, there are:
 - Clear Glass Bottles (Syrup Bottles)
 - Shards
 - Crackle
 - Used sacks
 - Used tires

After knowing the waste types, the household can give their waste to the waste bank near their location. Bintang Sejahtera waste bank has procedures in it when someone wants to deposit their waste. A person must first register as a Bintang Sejahtera waste bank customer by showing their ID card / waste bank book. Bintang Sejahtera waste bank prepares administration such as master books, customer account books, and price lists for types of waste. Each customer of a waste bank must carry a waste savings book so that they can record how much waste is weighed.

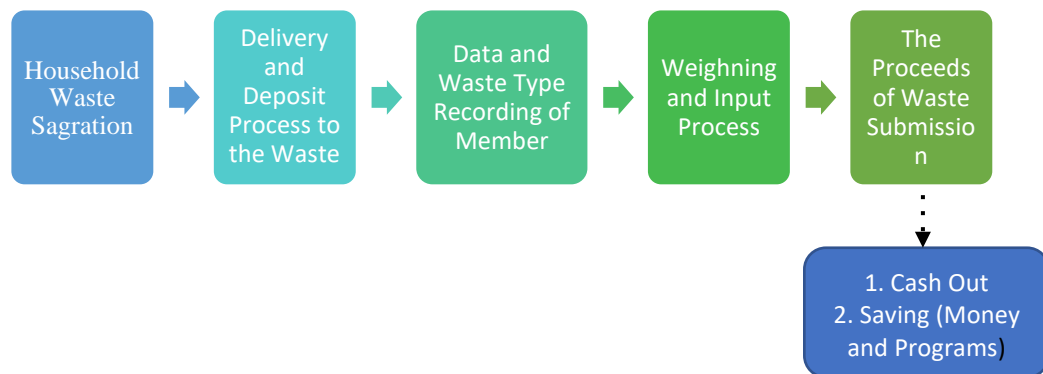


Figure 2. The Procedure of Waste Management Collection in Bintang Sejahtera Waste Bank (Source: Bintang Sejahtera Waste Bank)

From the figure above, the procedure of waste collection in Bintang Sejahtera waste bank require all the customers have to sort out their waste before collecting them to the waste bank. Every society (member or non-member) can give their waste to Bintang Sejahtera waste bank. In the delivery process, the Bintang Sejahtera waste bank has two types of delivery process, there are pick-ups and deliveries. The price of the pick-up and delivery system will of course be different later. Based on Bintang Sejahtera waste bank customers, there are several methods used by employees to collect waste. If the customer is a regular customer, they can deposit plastic waste at any time to the Bintang Sejahtera waste bank by coming in person.

Bintang Sejahtera waste bank will serve a waste pick-up system if the customer does not have a vehicle to deliver the plastic waste to the waste bank or can contact the employees of the Bintang Sejahtera waste bank directly. The customers of the Bintang Sejahtera waste bank unit group are groups of people formed by individuals who have at least a chairperson. The activity carried out is buying plastic waste around it and then selling it back to Bintang Sejahtera waste bank. Once they collected the waste, the member data and waste type are being recorded along with the weighing process. The process of input data is being used. Both customer and waste bank will get the result about how many kilograms and money they will get.

The customer can freely choose whether they ask for the cash out or saving into a saving book which they can get later in the form of money or some programs offered by Bintang Sejahtera waste bank. Some of the programs offered by the Bintang Sejahtera waste bank are:

3.2.1 Pawnshop

Pegadaian is an Indonesian state-owned financial sector that operates in three business lines, namely financing, gold, and various services. Cooperating with Pegadaian the programs are a) Turn waste into Gold, b) Turn waste into Hajj voucher (Hajj is the annual pilgrimage made by Muslims to the holy city of Mecca in Saudi Arabia, in the Middle East), and c) Motorcycle tax payments.

3.2.2 University of Nahdlatul Ulama NTB

The benefit of this agreement is students are able to pay the tuition fee from collecting waste and put it on the university waste tank, which later the Bintang Sejahtera waste bank will come to collect it and proceed all the waste and decide about the payments.

3.2.3 Mosque

Society can deliver their waste in the mosques which have a waste bank in their village. This is aims as a free donation for the development of mosque. The waste bank will turn the waste into money which later they give it to the mosque administrator as their savings.

Furthermore, all of the customers need to follow all the regulation and requirement once they sell their waste. The problems that faced by the waste bank and customers is the different price of the waste. Every waste bank has their own price which makes the people is looking a waste bank with higher price. It is ok to sell the waste to another waste bank, but since the waste bank has own regulation and works together with another waste bank, they will not give the fixed price (higher) to the people who wants to sell their waste to another waste bank since they are not the waste bank customers[6].

Plastic waste that is collected in the Waste Bank comes from individual users, groups of village waste bank units, as well as schools ranging from primary school, secondary school, and college. In addition to saving plastic waste, operations in Bintang Sejahtera waste bank export waste to manufacturers, where the plastic waste process is later sold to plastic companies who transform plastic waste into finished products.

1. Pressing Process Phase

Today, the method of recycling plastic waste is becoming very common. However, only some recycling has been carried out. Although there are many alternate recycling processes that are more successful and have positive hopes for the future, one of which is that plastic waste is becoming stronger. The use of plastic waste of different shapes and models has been widely used. Plastic waste treatment needs to be handled in such a manner that the environment is clean and does not create disasters such as flooding and diseases caused by unmanaged loads of waste.

This plastic waste press process is one of the techniques used by the Bintang Sejahtera waste bank, the press machine is used the hydraulic press machine. Hydraulic Press Machine is a paper, cardboard, can or plastic press instrument that is ready to be delivered to a recycling factory for the next step. The existence of this hydraulic press machine is very important considering that these materials are very large in volume. The effects of the press machine will then minimize the volume so that the distribution process can make it easier, both in terms of cost and in terms of technical distribution.

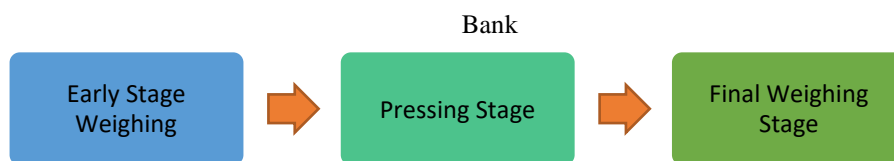


Figure 3. Pressing Process Phase on Waste Plastic PET by Bintang Sejahtera Waste Bank
Source: Bintang Sejahtera Waste Bank

The figure above shown that the early stage weighing was the first step to begin. The waste bank will classify the PET plastic which only can be used and pressed as the requirement from the business partner. Before they put into the Hydraulic Press Machine, they have to clean the classified PET plastics from the brand labels and bottle caps, then put them based on their classification. The pressing process using a hydraulic press machine takes about 30 minutes to complete.

The plastic waste that has been pressurized using a pressurized system will be accompanied by a wrapping procedure (packaging) using a sack layer on the last pressed plastic. Placing the sacks on the top and bottom layers of the plastic that is pressed is intended to make it easier to bind the plastic waste and to ensure that the waste that is pressed does not disintegrate. If the plastic waste is sturdy and neatly bonded late, the plastic press may be separated from the hydraulic press. The next step is to weigh the results which is intended to assess the amount of the plastic pressure. The size of pressing waste is 90 cm x 75 cm x 95 cm and for the weight is approximately 55 - 70 kg.

2. Milling Process Phase

Bintang Sejahtera waste bank is a pilot waste bank in Lombok that manages and recycles waste into products of economic value. Bintang Sejahtera Waste Bank handles waste by pressing and milling phases of production, which will later be distributed to milled and pressed waste processing companies. The phases of milling waste can be seen in the figure below.

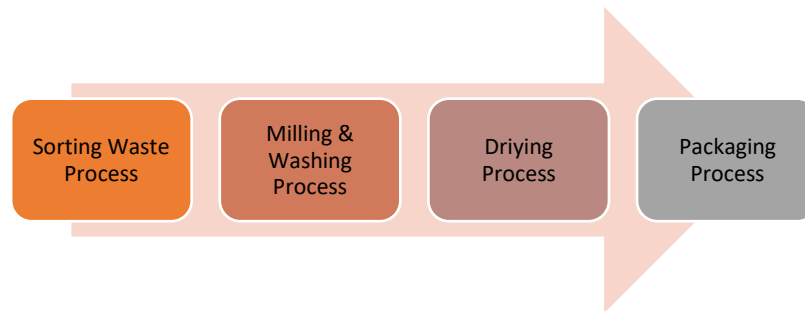


Figure 4. Milling Process Phase on Waste Managed by Bintang Sejahtera Waste Bank
Source: Bintang Sejahtera Waste Bank

The key raw materials to be processed at this point are transparent glass, colored glass, bucket, and others. The sorted waste process is the first step to proceed in the waste milling process. Through separating out the waste, the Bintang Sejahtera waste bank will quickly classify the plastic depending on their types and colors, which would differentiate the brand name from the bottle caps. So that the output of milling is one form of plastic of the same color, so the quality of milling would influence the sale price [7]. This is because not all types of plastic can be recycled at this phase. Other kinds of plastics, such as plastic foil, other plastic bags cannot be recycled, or plastics that are in very bad condition can no longer be recycled.

Second step, after cleaning the plastic waste, the milling and washing process is carried out by loading the plastic into a system that has been turned on. This plastic washing operation to be recycled is generally followed by plastic shredding. The sorted plastic is then inserted into a plastic cutting machine (this cutting and washing process is always done separately for each type of plastic). From the milling machine, the plastic which has become small sheets with a size of $\pm 1\text{cm}^2$ will be mixed with water and washing soap which will then be accommodated in a certain container. The result of milling into plastic undergoes milling to the size according to the essence contained in the machine, the source of water for washing plastic waste is from ground water that is collected in the reservoir.

The plastic wash would be better if the plastic is first soaked so the surface area is limited enough that it can be assumed to be washed by briefly washing in plastic soapy water. This method of washing is done for plastics processing in small to medium scale industries. After a bit, it was soaked in the laundry basket for \pm 5-10 minutes. The washing process is important because if the washing is not clean it can cause failure in the next process.

The plastics produced from this milling process are plastics that have gone through the gauze pore size filter. In each milling process, a plastic residue that has not been fully filtered is created so that it cannot move through the filter. However, this residue may be reprocessed at the same stage of the process. Failure of the process is typically caused by dirt, such as dust or ashes, which has not been properly cleaned during the washing process. As a result, the washing process plays an important part in plastic processing, since the cleaner the washing, the quicker the plastic is to melt to be a small particle. Repeating the procedure for the reprocessing of non-recycled plastics would reduce work efficiency and increase costs.

Third step, drying process. Plastics that have been cleaned and milled can be removed with a sieve and then put in a plastic bag for drying / aeration. The plastic from each of the bags was dry within 4-7 days. In a large industrial scale, a dryer typically needs a blower, but the purchase of a blower requires higher costs in addition to the investment costs as well as the cost of the electricity supply. Fourth step, packaging process. The packaging that is carried out aims to make it easier to weigh the results of milled plastic waste so that it is not scattered, facilitate transportation, the sacks used are gunny sacks with a capacity of 80 kg for milled plastic waste. The waste that has been pressed has different weight, depending on the type of plastic. For plastic cups that have been pressed, the is weigh 40 kg/sack.

When the plastic waste has been packed, the plastic waste will be taken to the storage warehouse. The purpose of storage is to collect all types of plastic waste that have been milled and stacked together, the maximum pile of processed plastic waste reaches 15,524 tons and a minimum of 10,206 tons will be sent to PT. Sumber Plastik, Sidoarjo, East Java that is the center for plastic waste recycling.

Bintang Sejahtera implements an Integrated Community Based Waste Management System through the Waste Bank Program, which includes 4R activities, namely Reduce, Reuse, Recycle & Replant. This is in line with the basic principles of developing a participatory & sustainable circular economy. The NTB Provincial Government itself has launched NTB Zero Waste in 2023, as one of the main priorities in the 2018-2023 Regional Medium-Term Development Plan. A 30% reduction in waste generation and up to 70% waste handling are targets of the NTB Zero Waste Program until 2023.

The initial objective of the Bintang Sejahtera Waste Bank is to help with the treatment of waste in Indonesia, especially in the West Nusa Tenggara Province, and to make people aware of a safe, sustainable and clean environment. They are trying to provide waste management education to local governments, schools and villages. Education involves Socialization and Educational Awareness Workshops, Trainings, Conferences and Business Counseling, meaning targeted audiences can take the initiative to set up waste bank systems in their respective societies.

At the time, Bintang Sejahtera, through its corporate agency, recycled more than 50 tons of waste each month. They raise money from recyclable waste obtained from community-based waste banks, schools, and private industries (e.g. restaurants, schools, hotels) by five steps; gather, divide, press, mill, and pack. (Syawaludin, 2020). The society has become conscious, through the Waste Bank, that waste, which has been overlooked by its presence, will potentially have an economic effect on the community. The economic value of the waste is stored or saved

by the customer, and the savings will usually be made by the customer by the time they have decided.

Bintang Sejahtera Waste Bank also helps the community to develop the ability of its consumers to use waste through waste management. The effect of the waste bank can be seen from the perceived economic point of view. According to the findings of this report, the economic effect;

1. Job Creation

With the waste bank, every activity carried out in the waste management process always includes the society surrounding the waste bank. For work done by housewives, it typically begins with 1) sorting the waste that is meant to sort the waste according to its type. In addition, 2) the process of drying waste is done after milling and pressing process.

As for the men and youngster, they are assigned to 1) waste collection (transporter) at each unit waste bank that will sell their waste, 2) waste weighing, 3) machine operation in the process of milling and pressing waste, 4) packaging process, and 5) the process of loading waste into the transport cargo (truck) which will be sent out of the area as a final process. The activity of recycling waste into new products is carried out by all groups, from school children, youth organizations, to housewives. But the majority that is involved in this process are housewives who intend to get more income.

2. Additional Income through the Waste Sales Program

In addition to earning more income by providing new jobs to local communities, they also earn income from selling the collected waste and selling it to the waste banks where they live. Looking at some literature sources and the results of the interview, it can be said that every citizen can feel the economic results of this waste bank. Although even it is not significantly improving their income, they are willing to provide a little help to gradually restore the family economy. The main objective of Lombok residents in these programs are to reduce the uncontrolled amount of waste, reduce the occurrence of diseases and disasters caused by piles of waste, as well as additional activities for housewives who spend their time at home.

Each waste bank has its own ways of managing its waste, some waste bank just being a waste collector, some focus on collecting and making handicrafts made from the waste, some are innovating themselves in turning the waste into building materials such as brick substitutes and paving blocks, and others. At Bintang Sejahtera waste bank itself, they only focus on purchasing waste, pressing and milling waste, and selling waste to a waste recycling center on the Java island. In the activity of waste recycling, Bintang Sejahtera waste bank is rarely focused on this time, but they also made an item such as sofas that will later be used for their office purposes. In addition, they also provide a socialization program for each waste bank that invites them as speakers for a training program for recycling reusable waste.

Bintang Sejahtera Organization has created employment possibilities (full time, part time and volunteer work) as well as extra revenue for local community. Their market strategy is one of the main achievements in ensuring the viability of community-based waste management in the province of West Nusa Tenggara. They agree that together we will preserve our world as the greatest legacy for our next generation.

4. Conclusion

The waste management run by the Bintang Sejahtera waste bank has several phases and processes, beginning with waste delivery; sorting the waste in the household, delivering the waste to the waste bank, waste recording process, waste weighting process, and waste submitting values to determine whether the customers will receive money directly, save money, or pay for the program they have chosen. The waste management process is divided into two phases: milling and pressing. The final waste will be sent to the company that has a corporate relationship with this waste bank at the end of all processes. On the other side, the waste management carried out by the Bintang Sejahtera waste bank has a positive influence on the people's economic situation. According to reports, they received an income but did not significantly better their financial situation. It has also led them to an activity that would help them cope with the waste problem. Even if it is only a part-time employment, job creation occurs in this waste management. The objective is that this waste bank would like to provide the passage to all society by raising awareness through socialization and training programs, with the goal of broadly expanding the waste bank. This waste management will have an impact not only on the economic side, but also on the social and, most importantly, the environmental side.

As a waste management pilot project in Lombok, Bintang Sejahtera waste bank can work more closely with the community and the government in increasing corporations and collaboration in handling the increasing number of wastes along with the increasing population. Socialization continues to be carried out on a daily basis with a view to spreading information on the value of waste management in everyday life. The value of citizen engagement in helping authorities and waste banks cope with waste concerns. There is a need for waste recycling management training and coaching so that it may be reused as one of the waste management principles. Strong rules and supporting facilities are required so that people do not toss rubbish everywhere.

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