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THE DEVELOPMENT OF INTEGRATED WASTE PROCESSING AND MANAGEMENT ON CREATIVE INDUSTRY IN TAMANSARI TOURISM VILLAGE, BANYUWANGI REGENCY TO IMPROVE THE ENVIRONMENTAL AND ECONOMIC CLEANLINESS

R N Karimah[1], I P D Lesmana[2], And Beni Widiawan[2]
[1]Health Department, Politeknik Negeri Jember
[2]Departement of Information Technology, Politeknik Negeri Jember

Email: rindank6@gmail.com

Abstract. Banyuwangi is one of the Regencies under National Priority Rural Area. The potential being developed by Banyuwangi Government is the development of tourism village by exploring its resources. Tamansari village, Licin district has become the best tourism village on the category of business network utilization. Several obstacles were found along with the increase on number of tourists, tourists' activities and insensitivity of its community to change: 1) littering on the road, river at ecotourism location 2) lack of environmental cleanliness as wastes were at large volume 3) cleanliness at ecotourism location was not maintained 4) waste transported to landfill did not run well 5) environmental pollution due to community's behavior that stored wastes in excavation of soil pit 6) odor pollution and diseases 7) lack of knowledge and skill in processing wastes 8) the village potential has not been utilized to improve its economic growth. In overcoming these problems, creative industry on labor-intensive referring waste processing and management was established through technology product activities disseminating to community. Waste processing was done by converting organic wastes to compost through *aerated static pile* system which was useful for coffee plant and flower cultivations. Plastic wastes were processed into high-quality paving blocks; and some were processed into semi-raw material for plastic processing industry/collector.

1. INTRODUCTION

Banyuwangi Regency is listed as one of Regencies under National Priority Rural Area. One of its potential developed by the government of Banyuwangi Regency is tourism village by exploring what the villages have. A village named Tamansari Village, at Licin District, Banyuwangi Regency works out as the best tourism village in the category of business network utilization from Ministry Village, Rural Area Development and Transmigration. Tamansari Village which stands right under Mount Ijen marks a success in pioneering tourism potentials like homestay, tourism conveyance, Mount Ijen Guide service, The Carnival of Harjata (the village birthday) and some small-middle business managed by the village business entity called BUMD Ijen Lestari.

The rapid development of Eco-tourism in Sumberwatu and Tanah Loss Backwoods slowly revives the economic matters there previously known as rural area in which most of the civilians work as farmers and farm workers. But the increase of tourism visit makes a new problem that is less anticipated by the people like a lot of waste scattered around the eco-tourism locations, organic waste and nonorganic waste mostly plastic waste. The thing is also supported by the civilians' ignorance towards the tourists' waste as well as their own littering habit. They tend to litter their waste around

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their yards, to river flow or drain, and to side of the road. The waste handling around the eco-tourism objects is less because limited janitors available from the government of Tamansari Village. The household waste is generally conventionally handled by hoarding organic and nonorganic waste in a ground hole or by burning. The garbage dump provided by the village stakeholder also does not function as it should be. It is because sometimes the waste is not brought over and the village road is nowadays ruined so it is difficult to transport the waste over the village like shown in the following Figure 1:

Figure 1. The condition of littering: (A)waste behind the houses. (B,C, D)waste at the river flow or drain flow. (E) waste at pine eco-tourism.

Another obstacle faced all this time is the need of compost to support coffee cultivation, flowers and decorative plants still filled from other village. The cause is the people there do not have enough knowledge yet to start producing compost themselves by making use of abundant organic waste. Seeing the partner's obstacles in handling waste problem, the less awareness of people at Sumberwatu and Tanah Loss to keep their environment clean and health sanitation, the lack of cleaning service, the unequal economic increase, so in the activity of Product of Technology Disseminated to Civilian is proposed a partner problem solution by forming creative industry for integrated waste processing and establishing waste bank. It is hoped to upgrade the people of Sumberwatu and Tanah Loss awareness towards environment cleanliness, health and directly affect the household economic improvement.

2. LITERATURE REVIEW

Waste can be a polemic that disturbs environment. One solution is by designing a waste chopper machine. The machine is hoped to reduce the problem mainly for organic waste processing moved by motor.[1]

Concrete brick for floor *(paving block)* is an element of building material made of the mixing of hydraulic cement, fine aggregate, and water with some additional materials. The need of concrete brick continuously increase, paving block can be an alternative to substitute the function of concrete brick because it has some advantages, namely:

a. It is easy in maintenance and marketing
b. The concrete quality is better than clay
c. Can be produced mechanically, semi-mechanically or even hand printed
d. The size is more assured

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e. Not easily broken by vehicle
f. Anti-slip factor *(Skidding Resistance)* on *paving block* is bigger so it is safer for traffic usage
g. weatherproof

Plastic has become a very essential human needs in every fields. Everyday plastic waste is produced as the result of various activities. Plastic is a synthetic or semi synthetic substance, a kind of organic substances. Plastic becomes a kind of waste that the volume goes up year by year. The use of plastics increases along the development of economy. It is because plastic has some eminences like it is light, firm, corrosion resistant, good insulation and easy to colour. The plastic waste characteristic is different with other waste because it is difficult to ravel in the ground. It will need dozens even hundreds years to be perfectly degraded. So, the waste handling using landfill method or open dumping method is not the right choice. Incineration technology by burning is also not a right choice because it will pollute the air and cause another problem to the environment. To minimize environmental effects from plastic waste, the material should be recycled to get back the plastic products or other products that have economic value. There are some methods to recycle plastic waste namely *mechanical recycling*, f*eedstock recycling* and *energy recovery.* [2] [3]

The plastic processing to be *paving block* material could be a breakthrough for the plastic waste problem. Technically, the quality of plastic waste *paving block* is no doubt, even it is much stronger than the regular *paving block* and not easily broken. [4] [5] [6]

State Minister of Environment Regulation of Indonesia No.13 Year 2012 about Waste Bank is a place to sort and collect the waste that can be recycled pr reused that has economic value. In other words, the waste bank is an economic institute in which the waste works as the transaction tool in the activity. It is different with conventional banks that use money as the instrument. So, waste bank emphasizes more on the waste processing that has become the environmental problem nowadays.

The waste bank is seen as an alternative way in resolving the excessive waste from daily life to be economically valuable things. The 3R concept (*Reduce*, *Reuse* and *Recycle*) is a new method in processing waste. 3R means as decreasing anything that produce waste (*reduce*), making use of the waste that is still usable (*reuse*) and re-processing the waste to be a new and useful product (*recycle*). [7][8][9]

3. METHOD

The implementation method of each step in the Activity of Product of Technology Disseminated to Civilian involves activity implementing team (lecturers and students), Research Center and Community Service (P3M) The State Polytechnic of Jember, Human Resource Development Institute The State Polytechnic of Jember, activity partner (Group RW 001 Sumberwatu dan Group RW 001 Tanah Los, Tamansari Village, Licin District, Banyuwangi Regency) as shown in Picture 2.

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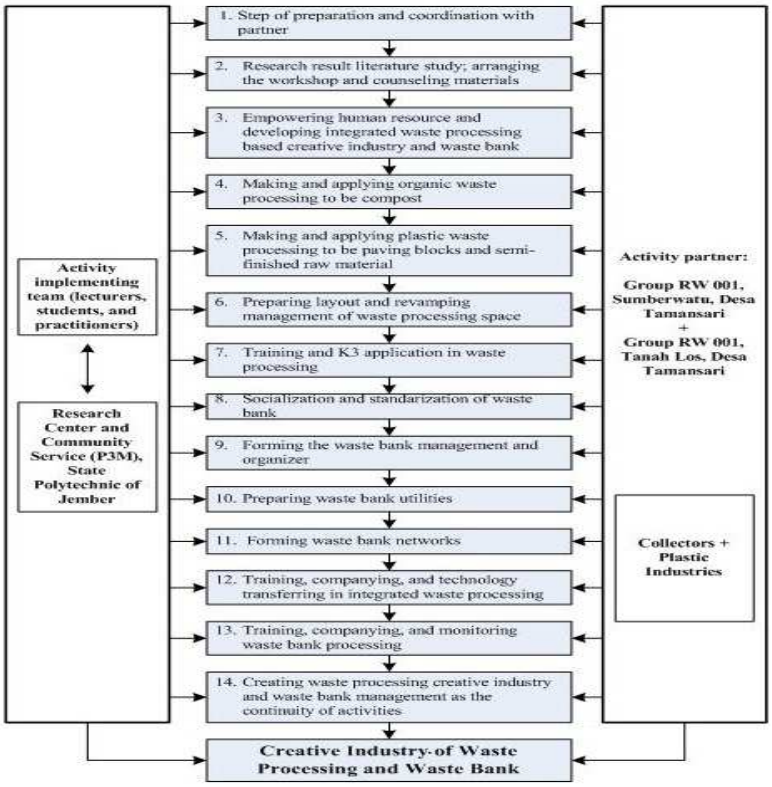

Figure 2. Flowchart of the Activities of a Disseminated Technology Product

4. RESULT

In the implementation, the activity needs commitment, participative approach and individual approach between the both sides starting from preparation process until exploration process. The activity steps are explained below:

1) Step of preparation and coordination with partner
   On this step, the activity implementing team together with partner did *focus group discussion* (FGD) to discuss problems available and made an agreement of solution that would be listed in the program. The targets or the objectives or who will take part in this program was also determined.
2) Research Result Literature study; arranging the workshop and counselling materials
   The step of collecting IoT, control and automation, robotics, health and government rules research result that can be applied as the partner's problem solution in creating waste based creative industry. The literary study became the reference to arrange training and counselling materials in the form of waste processing module, application of K3, waste bank management and entrepreneurship.
3) Empowering human resource and developing integrated waste processing based creative industry and waste bank
   The empowerment of partner resources was done by: a) training and counselling on integrated waste processing; b) the utilization of waste products to environment around and village development; c) the enhancement of partner's role in waste bank network; d) K3 training on waste processing
4) Making and applying waste processing to be compost
   The team accompanied partners in making and applying technology on:
   a. Step of making the organic waste chopper machine, composter tub, and compost sifter machine
   b. Step of waste sorting

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It was done the sorting of bigger organic waste that need to be chopped ad the smaller waste that can be directly processed.

c. Step of Organic Waste Chopping
The process of cutting the organic waste into small pieces using chopper machine made the process of making compost easier.

d. Step of compost forming in the composter tub.
This step was done in composter tub with *aerated static pile* system and set by sensor to detect the temperature inside the composter tub. The tub was set by a holed pipe to flow the air pressed by blower. Because there was air circulation, so the materials pile could be 1 meter higher. It the temperature was too high, the air flow would be stopped, meanwhile if the temperature dropped, the air flow would be added. Because there was no reversal process, the raw materials were made homogeneous.

e. Step of Compost Sifting
To get more delicate compost and worth selling, the compost should be sifted by compost sifter machine.

5) Making and applying plastic waste processing to be paving blocks and semi-finished raw material for advanced industry.

The partners are accompanied in making and applying technology on:

a. The step of making plastic chopper and plastic paving processing machine
b. Sorting and washing plastics waste
The ready to process plastic waste was separated from the other nonorganic waste that could not be processed. It was also done washing the plastic waste that is still worth selling to plastic industry as the raw materials to make recycle products.
c. The plastic waste chopping
The process of cutting the plastic waste into small pieces using chopper machine made the process of paving making easier and ready to sell raw material.
d. Paving blocks dough making
It was done by heating the plastics shards and used oil until they turned to porridge of plastic.
e. Paving blocks printing/ shaping.

6) Preparing layout and revamping the management of waste processing space

At this step, it was done designing the layout and rearrangement of waste processing space by separating the waste receiving, waste processing part and the storage of the waste processing result.

7) Training and K3 Application in waste processing

K3 Training to partners was done by designing a safe, healthy, and pollution-free work space. The good condition can be achieved by maintaining the workers' health, safety and security so they can prevent disease and injury at work so it can increase their works efficiency and productivity.

8) Socialization and Standardization of waste bank

Giving knowledge about environment cleanliness, disease and good household waste processing that can be additional value in family economy. The introduction of system and the flowchart of waste bank

9) Forming the waste bank management and organizer

Arranging the organization structure, the person in charge and the waste bank organizers from two activity partners

10) Preparing waste bank utilities

Collecting the waste, making the schedule of collecting waste, system of registration, cooperation with collectors industry and the agreement of the schedule of waste processing materials taking

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11) Forming waste bank networks Framing the waste bank hierarchy from RT to RW
12)Training, companying, and technology transferring in integrated waste processing
The process of technology transfer to partners and training of compost utilization for farming, compost selling, the use paving blocks for village roads and sales potential
13) Training, companying and monitoring waste bank processing
The development of waste bank management, financial management, and the benefits of profits towards the welfare of members
14) Creating waste processing creative industry and waste bank management as the continuity of activities
The development of waste processing centre, environmental cleanliness education tools, waste bank development for the members' economic improvement from both partners.

5. CONCLUSION

The Activities of a Disseminated Technology Product has been successful to solve problems of waste and handling of organic waste by turning households waste, farming waste, and eco-tourism objects waste into compost or turning them into chopped plastics as the raw material of plastic industry or to be given to collectors. It also changes plastics into economist worth selling products in the form of paving blocks. Meanwhile, the problem of the people less awareness to be actively handling waste problem can be solved by giving training or workshop about the importance of health and environment cleanliness, keeping natural preservation and establishing waste banks. The civilians can be actively collect and sort organic and nonorganic waste to be brought to integrated waste processing. The waste can be changed by money or other households needs such as LPG gas, basic foods (rice, cooking oil, sugar, noodle, etc.) or health service assistance.

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REFERENCE

[1] Yamin Mohamad, 2008, Perancangan Mesin Pencacah sampah Type Crusher, Seminar Ilmiah Nasional Komputer dan sistem Intelijen, Universitas Gunadarma, Jakarta.
[2] Nur I, Nofriadi, Rusmardi, 2014, Pengembangan Mesin Pencacah Sampah/Limbah Plastik dengan Sistem Crusher dan Silinder Pemotong Tipe Reel, Seminar Nasional Sains dan Teknologi, Fakultas Teknik Universitas Muhammadiyah Surakarta, 12 November, Surakarta.
[3] Sharma B K, Moser B R, Vermillion, K.E., Doll, K M, Rajagopalan N, 2014, *Production, Characterization and Fuel Properties of Alternative Diesel Fuel from Pyrolysis of Waste Plastic Grocery Bags*, Fuel Processing Technology 122, pp. 79-90.
[4] Amran Yusuf, 2015, Pemanfaatan Limbah Plastik Untuk Bahan Tambahan Pembuatan Paving blok Sebagai Alternatif Perkerasan Pada Lahan Parkir di Universitas Muhammadiyah Metro, Jurnal TAPAK vol 4 no 2 Mei 2015 ISSN 2089-2098.
[5] Syamsiro Mochamad, 2016, Rancang Bangun Mesin Pencacah Plastik Sebagai Bahan Baku Mesin Pirolisis Skala Komunal, Jurnal Mekanika dan Sistem Termal, Vol. 1(2), Agustus 2016 :43-48. Available from http://e-journal.janabadra.ac.id/index.php/JMST
[6] Syamsiro M, 2015, Kajian Pengaruh Penggunaan Katalis Terhadap Kualitas Produk Minyak Hasil Pirolisis Sampah Plastik, Jurnal Teknik, Vol. 5, No. 1, pp. 47-56.
[7] Shentika Prisa A, 2016, Pengelolaan Bank Sampah di Kota Probolinggo, JESP Vol 8 no 1 Maret 2016.
[8] Wijaya P S, 2014, Implementasi Program Bank Sampah Malang (BSM) dalam Pemberdayaan Ekonomi Masyarakata Kelurahan Sukun Kota Malang, Malang: FE UM.
[9] Surono U B, Ismanto, 2016, Pengolahan Sampah Plastik Jenis PP, PET dan PE Menjadi Bahan Bakar Minyak dan Karakteristiknya, Jurnal Mekanika dan Sistem Termal, Vol. 1.