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"Trashmart": Innovation to Overcome Environment Problems and Increase Public Awareness of the Environment

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Abstract.

Environment is one of Indonesia problems that should be solved. Environmental conditions have impaction the quality health of human resource from a country. The Ministry of Environment and Forestry stated that the number of garbage stacks in Indonesia has reached 65.2 million tons per year. This condition has impact for health and economic aspects. The government has made regulations to overcome the garbage problem. However, the completion of waste cannot be finished if only relies on the performance of government. Society participation is also needed, so, that environmental conditions will get better. "Trashmart" is an innovation in waste management that starts from the idea of utilizing economically valuable waste, so that it can reduce the amount of garbage piles. This concept invites participation from the society to participate in sorting and grouping waste. Beside an idea about "Trashmart" that provide innovative solutions to reduce waste piles, there search describes the public perception about "Trashmart" idea. The method used is descriptive research conducted through surveys through the distribution of questionnaire along with interviews with the related government institution. Most of respondents and Surabaya government support "Trashmart" concept and that idea will be realized.

I. Introduction

Waste is a national problem, along with increasing population, garbage is an environmental issue that is often be discussed by the community regarding its handling and regulation [1]. The Ministry of Environment and Forestry states that the number of garbage stacks in Indonesia has reached 65.2 million tons per year [2]. The rubbish piles have an impact on the decline in environmental conditions. Flood disasters, pollution of the waters to diarrheal diseases in humans do not escape the effects of the explosion of garbage. The problem becomes complicated, because there is some garbage can notis easily decomposed like inorganic waste, for example plastic waste and used cans.

The other of waste issues, including garbage piles and the habit of disposing of garbage is everywhere. The behavior of people who do not care about the environment such as disposing of garbage on the streets, in rivers, or in waterways can cause the environment to become dirty. Shopping habits or buying groceries cause piles of plastic bags, plates, metal cans, cups, plastic bottles, and so on. In addition, those garbage piles is abandoned and not cultivated well can caused pollution. The increasingof the amount of waste in Indonesia depends on human activities.

The government has carried out various activities to overcome the garbage problem. The garbage management concept has applied by the government such us implementation of the 3R principle (reuse, reduce, and recycle), gasification technology for cultivate the garbage into electrical energy, bank of garbage and so on. Moreover, the government, in this case the environmental minister also tried to encourage people to be more environmentally conscious by applying the relevant regulations called "ecolabel" in the Minister of Environment No. 02 of 2014 [3]. However, the completion of waste cannot be finished, especially if it only relies on performance from the government. Society participation is also needed, so that environmental conditions can improve. Therefore, this study will provide proposals regarding the implementation of the 3R principle (reuse, reduce, and recycle) with the concept of "Trashmart". The concept that starts from the use of waste that still has this economic value, hopes to reduce the number of scattered waste piles and foster public awareness of environmental conditions. Due to the damaging effect on the environment, people from diverse professions, such as scientists, politicians, and business leaders have become concerned about the worsening gradual condition of the Earth and effect of global warming [3].

II. Literature Reviews

Literature Review related to Waste

Garbage is unwanted or unusable materials. Garbage is any substance which is discarded after primary use, or is worthless, defective and of no use [3]. Garbage is an item that does not have a selling value, so it will be better if it is disposed of immediately. However piles of rubbish coupled with the increasing density of the population, can be a factor in the increasing number of garbage that collects in garbage disposal sites (TPA). Recorded in 2016, the amount of landfill in Indonesia reached 65.2 million tons per year.

In addition, the lack of public awareness about the environment is assumed to be the cause of garbage problems. The behavior of underestimating waste is not in place can increase pollute the land and river, resulting in blockage of waterways which ultimately causes disasters and many diseases [4]. Then, awareness in sorting waste also needs to be highlighted. Not all garbage in the landfill cannot be used. Some of garbage are still have selling value. However, the item which is originally still valuable, the quality is reduced because it had mixed with other garbage. That is what triggers many types of garbage that accumulate in landfill waste.Trash can be grouped into several types. In principle, waste is divided into solid waste, liquid waste, and garbage in the form of gas. Solid waste itself is divided into the following [5] :

Based on the chemicals contained, for example

Organic waste

Organic waste is waste that does not contain chemicals. Organic waste is easy to rot, so it can be further processed into compost. Examples of this waste are leftovers, vegetables, and dried leaves.

Inorganic waste

Inorganic waste is garbage containing chemicals. This rubbish is not easy to rot, so it is usually used as commercial waste or sold garbage into other products. Inorganic waste types are food packaging containers, cans, used bottles and glasses, glass, and others.

Based on the ability decomposed by nature, it is further divided into:

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Biodegradable

This rubbish is a type of waste that can be completely broken down either through aerobic biological processes (requires air) or anaerobes (does not require air). Examples of biodegradable waste are kitchen waste, animal remnants, agricultural and plantation waste.

Non-biodegradable

Non-biodegradable waste is waste that cannot be described by biological processes. This garbage is divided into recyclable and non-recyclable. Recyclableis waste that can be processed and reused because it has economic value such as plastic, paper, clothing, and so on. Then non-recyclable is a type of waste that has no economic value so it cannot be processed or changed again. Examples of this type of garbage are tetra packs (canned substitute packaging), carbon paper, thermo coal, and others.

Based on international recycle journals there are plastic waste processing consisting of primary recycling, Secondary Recycling or Mechanica{l Recycling, Feedstock or Chemical Recycling, Energy Recovery or Quaternary Recycling[6].

Alternative Waste Management

Waste management means a field that deals with controlling landfills, storing, collecting, transporting and transporting, managing, and disposing of waste in a manner that is in accordance with the best principles that consider the wider community [7]. Waste Management has proved a huge challenge for local authorities in Nigeria. The Federal Government of Nigeria has implemented various laws and regulations in an attempt to tackle the problem, however, insufficient funds are available at the local level to invest in either training or the technical resources that are needed to tackle waste problems[8].Some of the waste management that has been carried out includes:

Hoarding

This method is a fairly simple waste management. Garbage is collected in a place that is located far from the settlement. Then the waste is buried under the ground, or used to reduce swampy soil which is then covered with soil. The next process is decomposition carried out by soil microorganisms. The weakness of this management is that it creates a problem of groundwater pollution which can affect the quality of well water and sewerage water near the location.

Incineration

Blinding or incineration is not the same as using garbage in the open environment. The incineration process is a place of garbage that is burned in a special place, ash and other materials originating from development are piled up or buried in the space provided. The heat is generated by incineration can be used to increase steam or electricity. The disadvantages of this alternative can produce dioxin which is dangerous and causes health problems.

Validity and Reliability

Validity is a measure that shows the level of validity of an instrument. A legitimate instrument has high validity. To find out whether the questionnaire that was prepared was able to represent the purpose of the study, it is necessary to conduct a correlation test between the scores of each item in the questionnaire. The instrument is said to be valid if the value of the probability of correlation sig. (2-tailed) < alpha (5%).

Reliability is an index that shows the extent to which a measuring device can be trusted or relied upon. Measuring instruments are said to be

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reliable if they produce the same results despite repeated measurements. The method used to measure the reliability of the questionnaire is to look at the value of Cronbach's Alfa. The category of Cronbach's Alfa value can be seen in Table 1 as follows.

Table 1. Category of Cronbach's Alfa Value

Alpha Value	Reliability's Category
0,8-1,0	Very High
0,6-0,8	High
0,4-0,6	Enough
0,2-0,4	Low
0,0-0,2	Very Low

III. Research Methods

Variables

The type of data used is descriptive research method based on the results of observations. The research was carried out by conducting a survey through the distribution of questionnaires related to interviews with the govenrment that related environment problem in Surabaya called DKRTH.

Data collected consists of 5 variables. These variables are perceptions about the ability to overcome waste problems, the "Trashmart" system, the ability to reduce spending money, innovative points, and confidence in overcoming environmental problems. The scale is used in ordinal scale. For variables can be seen in Table 2.

Table 2. Variables definition

Variable	Scale
Trashmart's ability to overcome the environmental waste problems	Ordinal
The level of efficiency of "Trashmart"	Ordinal
Trashmart's capabilities reduce spending	Ordinal
The innovative level of "Trashmart"	Ordinal
Trashmart's ability to overcome waste problems in Surabaya	Ordinal

Data obtained from questionnaires through online surveys. Survey-based research requires a very definitive population. Population is the whole experimental unit that is used as the object of research. The population is defined as the city of Surabaya. It is known that the population size of Surabaya is 2.107.728 person according to Surabaya Statistics 2018.

This study uses convenience sampling with Slovin formula. The most suitable and efficient convenience sampling for this study is due to the lack of information relating to the population for which samples are taken only based on availability. While it can be said that the results of this sampling are less objective [9]. Based on the Slovin formula [10] used 0.14 as a margin of error, obtained a sample of 50 people.

Hypothesis Test Related with Quistionnaire

The hypothesis used in this study is a validity test with an alpha value of 5%.

H0: There is no correlation between variables.

H1: There is correlation between variables.

While for reliability test is done by comparing the values on Cronbach Alpha.

IV. Results and Discussion

Review of the "Trashmart" System

"Trashmart" is a new innovation in waste management solutions that starts from the idea of utilizing economically valuable waste so that it can reduce the amount of garbage piles. This concept invites participation from the community to sort and classify waste. Collected waste can be distributed to a place that has become a "Trashmart" location, so that it is exchanged for

daily necessities such as rice, sugar, oil, and others. Then trash in "Trashmart" is sold to scavengers or waste processing agencies to increase profits. In addition, garbage can also be reprocessed into valuable craft items. The profits generated are reused as "Trashmart" operational costs in managing environmental waste.

Trashmart 's trash accepts three types of inorganic waste. Such as are plastic, paper, metal and diaper waste. The collected plastic waste, will be reused as fuel oil to reduce emissions of waste combustion. Then paper waste management can be carried out by cooperating with the paper management industry. Paper waste from "Trashmart" is processed into paper pulp whose output can be reused into economically valuable paper. This is done to utilize used paper that has been used. Furthermore, metal type waste will be processed by collaborating with companies in Indonesia. By this activity, it is expected to be able to reduce the amount of metal waste that still has a commercial value so that it does not accumulate in the landfill. Then the diaper waste that is already on the "Trashmart" will be processed into fertilizer by taking the gel from the diaper. Gel is useful because it has an easy to absorb water. Diaper waste that has been taken in the gel is useful for fertilizing plants. Thus process will produce plastic. Plastic waste from processing products can be reconstructed into pots or processed with technology into fuel oil.Thus, the implementation of"Trashmart" idea requires many steps so that this concept can be accepted in the community. The stages of Trashmart's establishment are explained as follows:

Socialization

The first step is to socialize. This is intended to provide an introduction about"Trashmart" to the public. The explanations which are delivered include the understanding of "Trashmart", the waste management flow, and the "Trashmart" system. Then it proceed with technical explanations such as determining the minimum weight and type of waste that can be exchanged for goods from "Trashmart". Then it also highlights how positive the impact of this concept is to be able to attract participation from the community.

Implementation of the "Trashmart" system

The next step is implementing the "Trashmart" system. Employees are prepared with administrative and weighing equipment requirements. The community comes to the "Trashmart" location by carrying the sorted waste. Then, the community will get points in accordance with the garbage paid. If the number of points is sufficient, the points can be exchanged for items needed at "Trashmart".

Monitoring and evaluation

Certain problems arise when implementing "Trashmart". Monitoring needs to be done in controlling at the field conditions for implementing this concept. Evaluation must be carried out in order to deal with problems quickly. This is important so that the "Trashmart" implementation can run better.

Development

The final stage is development. This step can be done with the addition of the types of goods needed to attract more citizens. In addition, Trashmart can also develop by providing training to the community in converting waste into valuable items that can be sold. On the other hand, "Trashmart" can build relationships with waste management agencies to provide wider benefits. The following is presented in the chart of the establishment of the "Trashmart" system.

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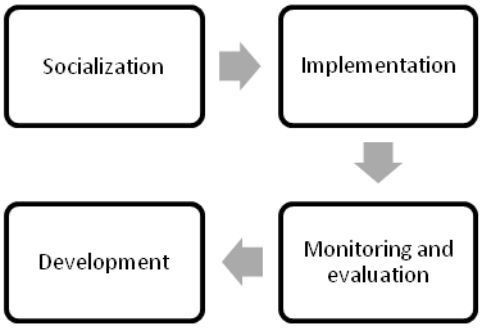

Figure 3.Establishment of the "Trashmart" system.

Garbage has economic value when it is still not mixed with other garbage. This is the background of the "Trashmart" establishment to reuse objects that have been used. Items to "Trashmart" will be rewarded according to the type of goods collected. A list of prices and types of items that can be used in the "Trashmart" system are presented in Table 4as follows.

Table 4.Prices and types of "Trashmart" items.

Item	Price
Plastic glass	8000 / kg
Plastic bottles	3000 / kg
Plastic wrap	500 / kg
White paper	4000 / kg
Newspaper	2500 / kg
Metal scrap	3000 / kg
Used aluminum cans	10500 / kg
Diapers	5000 / sheet

The "Trashmart" system is a concept in growing public awareness about the environment. The idea that contains the introduction of environmental conditions and the use of waste is expected to reduce the amount of garbage in the landfill. A clean environment that free from garbage creates many positive impacts so that it can reduce disasters and health problems. In the end, this condition will certainly have an impact on human resources that are not only able to succeed in the Southeast Asia region, but also able to compete up to the international level.

Validity and Reliability Test

Data analysis results to test the validity after using the SPSS program, found that with alpha 5% obtained as follows:

		Variable_1	Variable_2	Variable_3	Variable_4	Variable_5
Variable_1	Correlation Coefficient	1	0.584**	0.446**	0.665**	0.681**
Variable_2	Correlation Coefficient	0.584**	1	0.419**	0.707**	0.572**
Variable_3	Correlation Coefficient	0.446**	0.419**	1	0.421**	0.653**
Variable_4	Correlation Coefficient	0.665**	0.707**	0.421**	1	0.534**

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Variable_5	Correlation Coefficient	0.681**	0.572**	0.653**	0.534**	1

Based on the Spearman correlation output, for the real level a = 0.05, it appears that all items in the questionnaire have a value of p_value below 0,05. The decision rejects H0, the conclusion is that there is a correlate between variables. Thus it can be concluded, that all variables are valid at the real level alpha = 0,05.Then to test reliability, the following results are obtained:

Table 6. Reliability Statistics

Cronbach's Alpha
0.878

Based on the Cronbach's Alpha value category and the SPSS output, the Cronbach's Alpha value is 0.878. Thus the reliability of the questionnaire made belongs to the category of very high reliability.

Interpretation of Questionnaire Results Data

Based on research that has been done with 50 respondents using Linkert scale one to five, public perception of "Trashmart" is based on the ability to overcome environmental waste problems, level of efficiency, reduction Innovative points, and the value of "Trashmart"s ability to overcome the garbage problem in Surabaya.

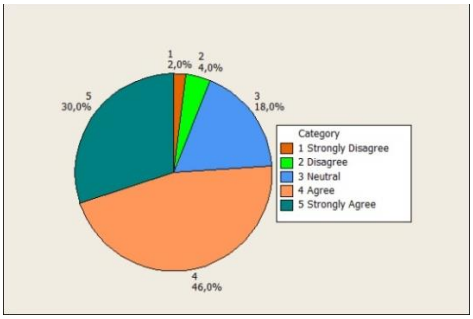

Figure 7.Assessment of "Trashmart" system overcoming garbage problem

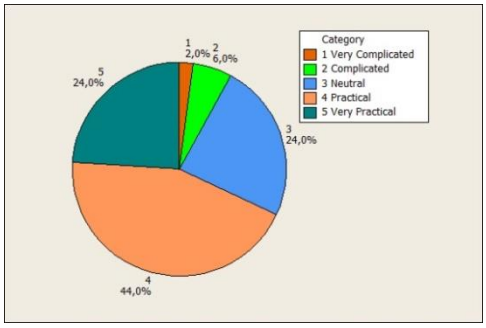

Figure 8.Assessment of "Trashmart" system on efficiency systems

Based on the Figure7 Public assessment of the "Trashmart" system in overcoming garbage problems in the environment is about to get a value of 76%. This suggests that this concept, according to the Community's view, is quite capable to address the environmental problem of trash. In the Figure8 Public assessment of the system "Trashmart" earn points 68%. According to these points it can be concluded that "Trashmart" system is quite efficient when applied.

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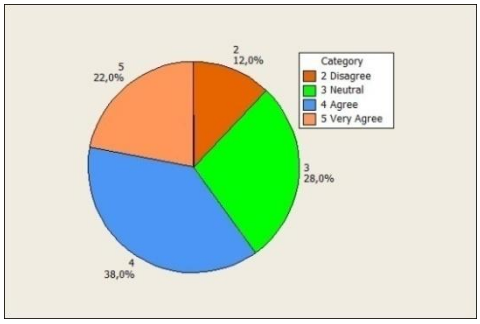

Figure 9.Assessment of "Trashmart" system reduces spending expenditure

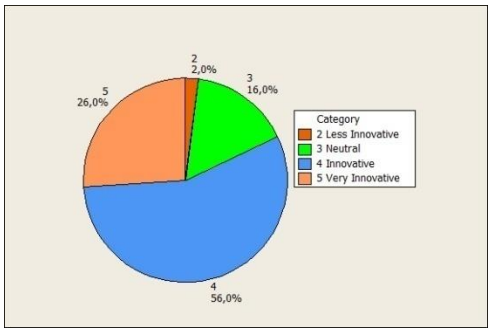

Figure 10.Innovative assessment of "Trashmart" system

According to Figure 9, assessment of the ability to reduce spending expenses, "Trashmart" concept earns a value of 60%. These points can be described that "Trashmart" is quite capable in reducing spending.

Figure10 public assessment against the innovative points "Trashmart" get a value of 82%. It can illustrate that public perception of "Trashmart's idea" is a new innovation that has never been found.

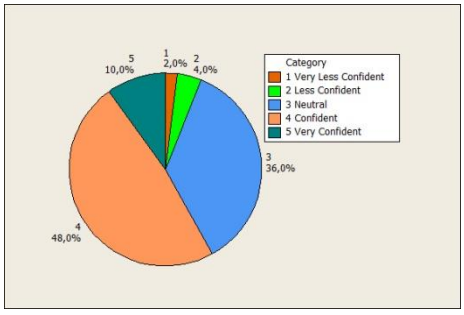

Figure 11.Public confidence assessment of the system "Trashmart"

Based on the Figure 11 public assessment of the belief for "Trashmart"s ability to overcome the garbage problem in Surabaya, get a value of 10% to be very confident and 48%. According to society view, "Trashmart" is considered quite capable in providing solutions in the garbage problem in Surabaya. This can show that more than half of the selected samples have an interest in the "Trashmart" program.

Conclusion

"Trashmart" is a new innovation in waste management solutions that starts from the idea of utilizing economically valuable waste so that it can reduce the amount of garbage piles. This concept invites participation from the community to join, so that efforts to reduce waste can run optimally. The hope of this sorting step is to be able to foster public awareness of the environment. Awareness built through information that waste can still be utilized, so over time will have an impact on the reduction of garbage disposed of carelessly [11].

Then to illustrate the community's perception of "Trashmart", this research has conducted a survey concerning Trashmart's ability to overcome environmental waste problems, efficiency, expenditure reduction, innovative points, and the value of Trashmart's ability to overcome waste problems in Surabaya. Based on the test criteria, there was a conclusion that the public perception of "Trashmart" showed a positive response. Based on the questionnaire that has been distributed and discussions with the DKRTH in Surabaya about the "Trashmart" concept, there are some inputs or recommendations in order to make this concept better in the future. Among others are

Mapping the area that produces relatively high amounts of waste to become a Trashmart location so that this concept can be massive in reducing waste piles.

Socialize the Trashmart concept to all groups so that it is able to attract people to join in it.

Collaborating with various waste management agencies in order to be able to accelerate the processing of collected waste.

Expanding relations with all parties, both the government, the community, and the waste processing industry to continue innovation in creating new discoveries in terms of reducing waste piles in the landfill.

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