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Utilization of Bottle Plastic Waste at Community Level through Gamification Method

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Abstract

Based on data from the Indonesian Central Bureau of Statistics on the percentage of households by province and the treatment of waste sorting easily decayed and not easily decayed, West Java Province compared to the year 2013 suffered a setback in 2014. Based on these data, the percentage rate of un-sorted garbage increased from 69.48 % To 77.36%. If waste management, especially plastic bottle waste at the household level, can be managed in such a way, it can have a huge positive impact, especially in reducing the number of waste production that will be sent to landfill (TPA). The simplest waste management that can be done by the community is to sort out the waste that will be disposed of. Rubbish plastic bottles are separated from other household waste. Through the gamification method, people can collect points obtained from plastic bottle bins that are inserted into special machines designed for this system. The machine is placed in a place that became the center of community activities. Points collected can be exchanged for some rice. With this approach, it is hoped that people will start managing their household waste better, and the existing waste problem can be overcome.

At present the increase in the volume of plastic bottle waste in households is increasing. This is due to changes in lifestyle that are all practical, also more and more emerging mini markets that are located close to the community. With the increase in the volume of waste plastic bottles, there is a chance for garbage accumulation to occur at polling stations. Very few people in the Cigadung area, especially the poor, have the initiative to collect or separate plastic bottles from other household waste. This is because the result of collecting plastic bottles if sold is not comparable, so people just throw it away.

One of the programs owned by the Bandung City government is the welfare of the people, especially those who are economically disadvantaged. One of the efforts that have been made by the government is providing compensation, but because it is done at a certain time, residents cannot rely too much on such assistance for their daily needs. Therefore, a strategy is needed to organize welfare programs for disadvantaged people so that they can be done at any time.

BeHappyOur, adopted from the word Behavior, is a system that aims to improve people's behavior in disposing of garbage. The BeHappyOur system will be used to accommodate the needs of the poor. The BeHappyOur system is run through a garbage ATM / machine that can provide reward points with a certain amount that can be exchanged by citizens with basic necessities to the Partner. With this system, it is expected that the research partner program to improve the welfare of its citizens can run better.

Keywords: plastic bottle, waste, gamification, point system, waste management

1. Introduction

Several big cities in Indonesia are faced with problems that always recur. This can cause serious damage to the city's infrastructure. Not infrequently the damage that arises is due to negligence of the people in the city. Various disasters such as floods began to spread to various cities, but the people did not try to introspect themselves. Trash scattered everywhere is a tangible manifestation of people's lack of awareness of cleanliness. Major cities in Indonesia, especially those on the island of Java, are upgrading to Smart Cities. One city that is implementing the program is the City of Bandung. To realize the development of Smart City, one of the factors that must be

addressed is Smart Living. Smart Living is a condition where the city environment is able to provide comfort, and support survival for its people. Revitalizing infrastructure and public facilities is being carried out by the mayor of Bandung, but public awareness of cleanliness is still lacking. This is evidenced by the fact that there is still a lot of garbage scattered on the highway. The sanction of careless dumpers is not effective, because officers who are authorized to impose sanctions are not always at the scene. Therefore, a different approach is needed that can change the behavior and thinking patterns of the people so that they are more aware of environmental cleanliness. By following the current trends in society, especially the trend of technological developments, a system is needed that can use technology to embrace the community in terms of disposing of garbage.

At present the increase in the volume of plastic bottle waste in households is increasing. This is due to changes in lifestyle that are all practical, also more and more emerging mini markets that are located close to the community. With the increase in the volume of waste plastic bottles, there is a chance for garbage accumulation to occur at polling stations. Most residents, especially the less fortunate, have very few initiatives to collect or separate plastic bottle waste from other household waste. This is because the result of collecting plastic bottles if sold is not comparable, so people just throw it away.

One of the efforts that have been made is giving compensation, but because it is done at a certain time, residents cannot rely too much on the assistance for their daily needs. Therefore, a strategy is needed to organize welfare programs for disadvantaged people so that they can be done at any time.

BeHappyOur, adopted from the word Behavior, is a developed gamification system that aims to improve people's behavior in disposing of garbage. In this research activity, the BeHappyOur system will be used to accommodate the needs of the poor. The BeHappyOur system is run through a garbage machine / ATM that can issue receipts in the form of reward points with a certain amount that can be exchanged by residents with basic necessities to the Partner. With this system, it is expected that programs to improve the welfare of its citizens can be run better and more effectively.

2. Situation Analysis

Bandung have once received the title of City of Trash because the volume of garbage is very high. Based on data from the Regional Medium Term Development Plan (RPJMD), Bandung City Regulation Number 3 of 2014, it is estimated that garbage in the city of Bandung reaches around 357 tons per day.

Table 1: Results of Performance of Environmental Affairs of the Regional Government of Bandung City Period 2008-2012

No.	Aspek/Fokus/Bidang Urusan/ Indikator `Kinerja Pembangunan Daerah	Capaian Kinerja				
		2008	2009	2010	2011	2012
Lingkungan Hidup						
1	Penanganan sampah[1)]	23%	67%	70%	73%	85%
2	Cakupan pelayanan air minum2)	64,00%	66,00%	67,00%	72,00%	72,43%
3	Tempat pembuangan sampah (TPS) per satuan penduduk[2)]	77%	76%	76%	77%	76%
4	Penegakan hukum lingkungan[2)]	69,23 %	100%	100%	100%	100%

Source: LPPD AMJ Kota Bandung.

The issue of waste management in the city of Bandung, should receive special attention. The amount of garbage transported has increased significantly from 23% in 2008 to 85% in 2012, which means 15% of un-transported waste, it is estimated that 15% of this un-transported waste is managed by the community itself or dumped into rivers, land empty or on the roadside, this behavior must be changed immediately. Until 2012 Trash is transported every day as much as 1000-1100 tons or 69% of the total waste generation.

The ratio of landfill (TPS) per unit of population in the city of Bandung during the period 2008-2012 was relatively stagnant at a rate of around 76% - 77% of polling stations / population units. This shows that the capacity of TPS (m3) has increased slightly compared to the population.

Disposal of waste to Final Disposal Sites is still the main alternative for waste management in the city of Bandung, the landfill owned by the city of Bandung (TPA Jelekong, TPA Pasir Impun, TPA Cicabe) has expired and is converted into a Green Open Space; except for land after the Jelekong landfill is currently used as composting land. So that the municipal waste disposal in Bandung was diverted to the Regional Sari Mukti Landfill in Sarimukti Village, Cipatat District, West West District which would end its useful life in 2015 managed by the West Java Provincial BPSR. Considering the Sarimukti landfill will end its useful life in 2015, the Bandung city government seeks to encourage alternative waste management in another way, namely through the development of Environmentally Friendly Waste Management Technology that will be planned to process Bandung municipal waste by 700 m3 / day, the rest of Bandung City waste disposed to the Legok Nangka Regional Landfill in Garut Regency and waste management with a 3R pattern.

Based on a circular from the Mayor of Bandung Number 658.1 / SE.087-DLHK on October 3, 2018, one of which was addressed to the heads of villages throughout the city of Bandung, the mayor asked all staff to immediately form a Waste Bank at the regional apparatus / work unit / regional company to reduce waste generation. This is done because the city of Bandung does not have sufficient land for landfill (TPA), so it must dispose of garbage outside the administrative area of the city of Bandung.

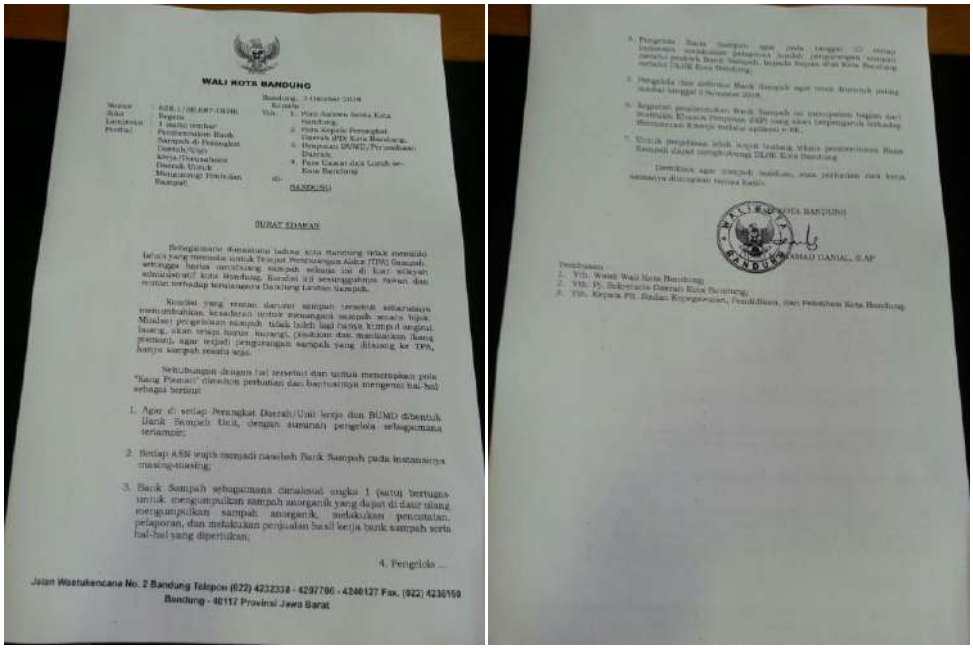

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Fig. 1: Circular Letter of the Mayor of Bandung regarding the establishment of a Waste Bank

One type of waste that often arises is plastic bottle waste. Plastic bottle rubbish is increasing in number because of the changing lifestyle of people who want to be more practical, so that for daily drinking needs it is not uncommon for people to prefer to buy bottled water rather than boiling water first.

Most people still do not use plastic bottle waste. The garbage is currently thrown away, even though it has a selling value even though the value is not much. A small part of the community separates plastic bottle waste from other household waste. Once collected with a certain amount and weight, it will usually be sold to plastic waste collectors.

With the presence of hygiene movements owned by Partner, waste management in the Partner area is relatively manageable, but plastic bottle waste that should be used to be a more useful economic value becomes completely untapped.

This research activity aims to change the minds of residents in terms of disposing of garbage. Through the ATM Trash tool / machine, it is expected that residents can start sorting waste by separating plastic bottle waste from other household waste. In addition, this activity is also expected to help solve the economic problems of poor people, at least for their daily needs, through the exchange of rewards points collected from the results of inserting plastic bottle garbage into the ATM Trash with a number of rice.

The output target of this activity is a gamification system, with certain development called BeHappyOur, which is expected to change the community paradigm in processing household waste, especially plastic bottles. This system will regulate plastic bottle collection activities by residents until the residents get basic food from the results of the collection of plastic bottles.

3. Implementation Methodology

Science and technology transfers carried out at each stage using the principle that every innovation that will be accepted should go through a process: Hearing, Knowing, Trying, Evaluating, Receiving, Believing, Implementing, Socializing. Through the entire process, it is hoped that innovation can be accepted by the community because the parties who convey the innovation are the government for the community. Submission of innovation to research partners is taken through stages of explanation, discussion, practice of using tools with assistance.

In general, the process of approaching the acquisition of knowledge to research Partners to run the BeHappyOur system is presented in the framework of the problem approach as follows.

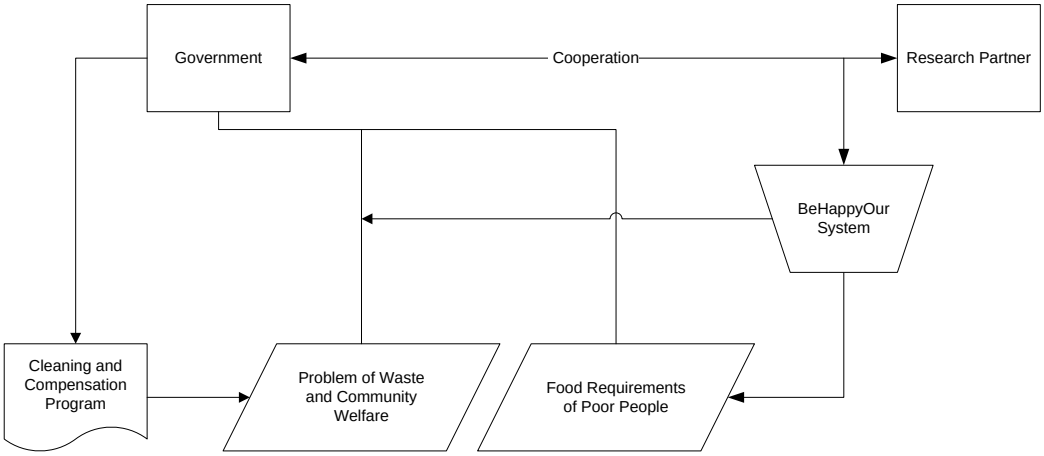

Fig. 2: Framework for Approach Problems

Based on Fig. 2. above, the government has 2 (two) main problems, namely the problem of waste and community welfare, and the food needs of the poor. To overcome the problems they have, the government implements a hygiene and compensation program for the poor. However, this is still not helpful, especially for compensation, because the program is implemented only at certain times. For the problem of food needs of the needy people who are needed daily, collaboration with research partners is carried out to supply rice, and through the BeHappyOur system, people who are less able can make a little effort to collect plastic bottle waste to be exchanged for rice through ATM machines / machines Rubbish. Thus, it is expected that the BeHappyOur system can be an alternative solution to overcome problems that are owned by the government.

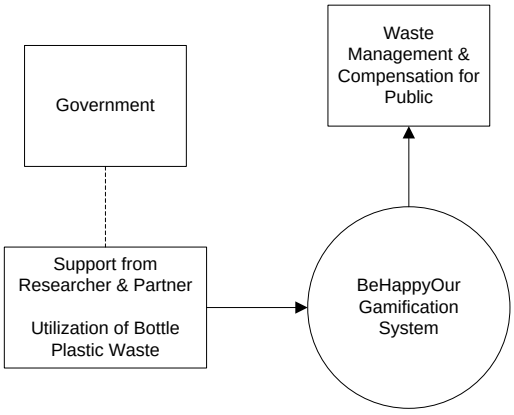

Fig. 3: Science and Technology Approach

Based on Fig. 3, above, government has been supported by researcher and partner for make some regulation about utilization of bottle plastic waste through BeHappyOur System. BeHappyOur is developed gamification system made by researcher to reduce bottle plastic waste problem in Bandung. It used game method to give some rewards to people that could manage their bottle plastic waste.

4. Conclusion

Through this research, residents can make plastic bottle waste as a source of additional sustenance, because they can exchange plastic bottles of garbage with a certain amount into a number of rice by inserting the bottle into a garbage machine / ATM device that has been provided. Waste plastic bottles that are inserted will be directly processed (pressed) by the garbage machine / ATM machine, and the processed products can be utilized by plastic bottle garbage collectors. And through the system, it is expected that the amount of plastic bottle waste can be reduced.

On the basis of existing waste problems, the solutions proposed are:

1. Implementation of the BeHappyOur system through Garbage Machine (ATM Sampah) to make the processing of plastic bottles waste interactive.
   a. This needs to be done to attract residents to sort out their household waste.
   b. Unlike the Waste Bank, the transaction process for calculating balances on garbage ATMs is done digitally.
2. Implement the gamification system on the Garbage Machine (ATM Sampah).
   a. Residents will collect points obtained when plastic bottle waste is inserted into the ATM machine.
   b. Residents can exchange a number of points with basic food provided by the government through research partners.
3. The garbage ATM system is made integrated with each other.
   This needs to be done so that the monitoring process can be carried out centrally by the government.

5. References

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