

Waste Bank As A Waste Management To Establishing Independent Citizen Towards Surabaya Eco-City

Ade Imas Agusningtyas¹, Helmya Hilda Putri Fatima², Edo Dwi Praptono³, Tria Ali Fahrudin⁴.
Universitas Airlangga, Indonesia

Abstract: Surabaya is the second largest metropolist city in Indonesia with a population of 2.967.880 residents until may 2016. Since 2010, Surabaya is called barometer of Indonesian city development under Tri Rismaharini as a mayor government. Several policies have been made to make the city better in any sectors. Tri Rismaharini had settled Surabaya as an Eco-city, to create comfortable, green, clean, and less energy city. However, the abundance of Surabaya population would raise quantity of waste from human activities itself. At the developed country like USA, domestic waste management is done by government or by centralized system. Nevertheless domestic waste management in Indonesia is done by several collaboration systems between government and citizen. Waste Bank is a domestic waste management of Surabaya which is the only participatorial waste management system in the world. The paper is to review Waste Bank as a waste management to establishing independent citizen in Surabaya.

Keywords: Waste Management, Waste Bank, Surabaya Eco-city.

1. Introduction

Surabaya is the second of largest metropolitan city in Indonesia with 52.087 Ha of district space and 2.967.880 of local population had been counted until May 2016 [1]. The growths of citizen in Surabaya city are increased every year. Those things already mentioned and had been supported with the raise of industrialisation rate, urbanisation, and economically development that had been affecting prosperity rate and citizen lifestyle, which indirectly will forcedly produce in increasing of garbage volume [2]. Trash itself are a waste which appearance in solid form or firmly form that is a side product of human, animal, and plant activity with one of the largest components that was came from domestic activity. The increasing of garbage volume will cause damage in the environments, such as ground pollution, water surface pollution and air pollution. Beside that, it's going to be disease vector, the decreasing of aesthetic, water canal blockage which ensue water flooding, then economic and social community influence [3].

Surabaya City as a barometer of town construction in Indonesia under authorisation of Mayor Tri Rismaharini needed a lot of policy effort for create Surabaya city as an Eco-City. To generate those things, Surabaya city should be capable to fulfil several aspects such as city freshness, sanitation, free from pollution, and then be able to reducing the amount of fuel. To behave several domestic garbage problems which have been facing by Surabaya city, so the existence of garbage domestic management which have been integrated is very needful to support Surabaya as an Eco-City. For the developing country like America, the domestic waste management are done by the government with centralised system. The domestic was management in Indonesia are done with a lot of variation system which make up collaboration between several sides, such as government sides, inhabitant, community, public sector and non-agency government. One of domestic waste management system in Surabaya city which not been seeing by another country in the world is Waste Bank system.

This research has a purposes to give an illustration that the presence of Waste Bank system could be used as a tools to develop community social build for creating Surabaya as Eco-City through a level of citizen participation.

2. Waste Bank Towards Surabaya Eco-city

2.1 Methodology

This research was combined by two methods, a method of quantitative and qualitative method. Quantitative method was conducted by using a questioner and field survey, whiles the qualitative method done by interviews.

This research combined by data obtained from the questioner and field survey then supported with the results of the interviews conducted in the respondents of research chosen by random sampling. The requirement data of this paper were brought by interview, any questioners, and field observation on Surabaya for five months; start at August, 2015 to January, 2016.

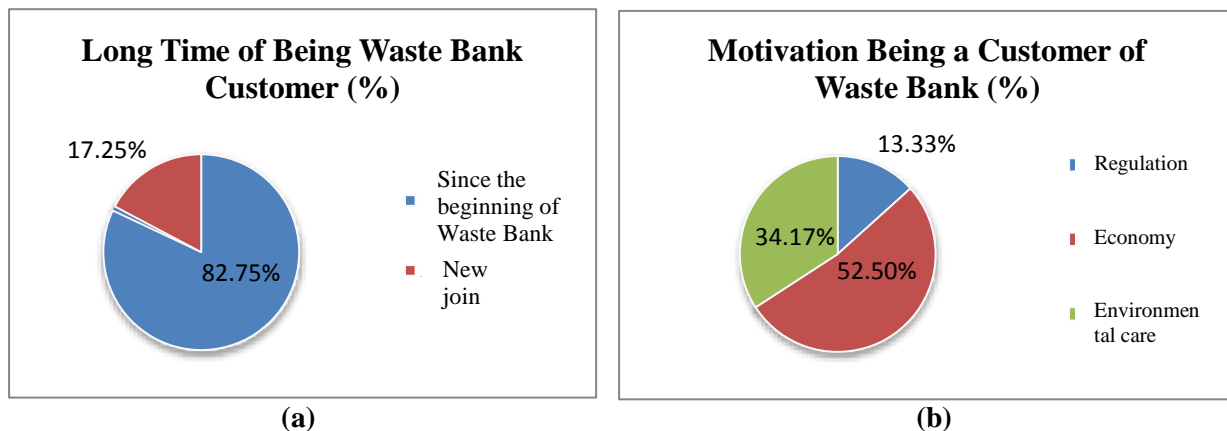
2.2 The Determination Of Research Location And Sample

Surabaya was chosen as the location of the research because the Waste Bank has been developed to apply in some neighbourhoods to reduce the number of waste quantity. Resulted in addition, Surabaya city government had a vision to realize the city of Surabaya as Eco-City with one of this effort, which is to develop the systems of the waste that is integrated and sustainable. The Waste Bank in Surabaya distributed in some areas, 29 Waste Banks in the northern region, 25 Waste Banks in the south region, 21 Waste Banks in the western region, 23 Waste Banks in the east of the country, and 18 Waste Banks in the centre. Determination of the study was conducted at random sampling. Respondents this research which is about 348 people with 116 people (33.33%) a bank, 116 people (33.33%) as banks ' customers, and 116 people (33.33%) as for the Waste Banks managers.

2.3 Collection And Analysis Data

Gathering data of this research was conducted in a period of five months, which is starting from early August 2015 until January 2016 at Surabaya. The gathering data to do with the combination of methods of quantitative carried out by using the questionnaire and survey the field and method of qualitatively to do with interviews. The data collected in this study include the identity of the Waste Bank, the number of emerge and the composition of the waste, the amount of income every bank customers, banking systems of waste that is run, supporting activities in the Waste Bank, the availability of customers, not interested of non-customers to follow the program the Waste Banks, as well as regeneration and sustainability of bank system waste to be implemented. The data collected is in the form of the most recent data for the past 6 months. The data it collects in the form of tables and charts now being analysed and explained in full on the result and discussion.

Based on the results of research conducted, at 82.75% of bank customers refuse to join since its inception the Waste Bank. This indicates a total of 96 of the respondents had known since the beginning, while as many as 17.25% (20 respondents) bank customers waste in after the waste is formed. The customer is due to the dissemination and other activities of the board and long-standing customers (Fig.1a).



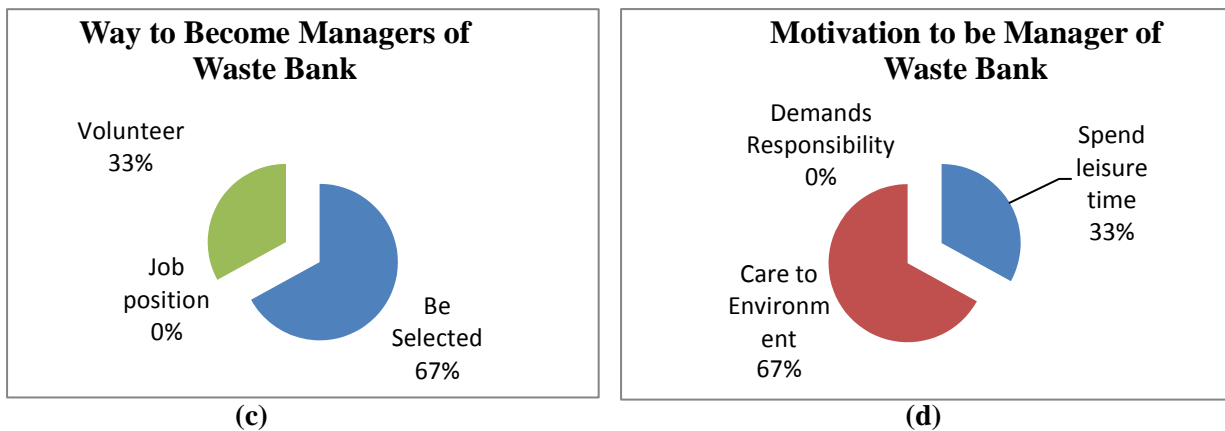


Fig. 1: Long Time of Being Waste Bank Customer (a) Motivation Being a Customer of Waste Bank in Surabaya City (b) Way to Become Managers of Waste Bank (c) The Motivation of Waste Bank's Managers (d)

Based on the results of research conducted, as many as 52.50% of customers in the waste because of the economic needs are less, so it shows that 63 of the respondents to make the Waste Bank as additional revenue to the daily life. As many as 34.17% of customers in the Waste Bank concerned about the environment. A lot of customers who believed that the waste can reduce the amount of waste in landfill (the processing end). This is indicate as many as 41 respondents have been aware that by following the Waste Bank, the environment will be clean of waste, while as many as 13.33% of customers in the Waste Bank because there is the rule of the government held an environmental program to require the participation of society, so that it showed that 16 respondents have helped ensure the success of the government's program (Fig.1b).

Based on the results obtained the reason the board to join in the management of the waste which is about 67% selected, both on the basis of ability in management or because the ability to interact socially. While as many as 33% other volunteered. It was due to several factors, among others, the absence of an incentive so that lower interest, which was done quite complicated and takes quite a lot, environmental awareness, there is no motivation, information that is less comprehensive, individualism and so on (Fig.1c).

Based on the results of study, gained as much as 67% of the motivated to become the Waste Bank because their want to preserve the environment, it indicates that the level of awareness to environment is quite high, while as many as 33% of the other motivated to become the Waste Bank customer that is to spend leisure time. That is because most of the board is a housewife who has free time enough to participate in the management of the Waste Bank (Fig.1d).

2.4 Waste Bank in Surabaya

Waste Bank is a bank that is established by the community. Waste Bank receives recyclable waste from community (as the customer/ client of the Waste Bank). The Waste Bank accepts recyclable waste, such as plastic bottles, plastic glasses, newspaper, magazines, books, plastic bags, corrugated paper, office paper, electrical wires, aluminium cans, ferrous cans, and worn shoes, among others, from clients. Different types of solid waste materials have different prices per kilogram. Each type of solid waste is weighed and then its weight is recorded. Each client obtains a deposit book, which contains the type of waste, weight, price per kilogram and total amount [4].

Waste Bank is a strategy to build the community awareness to be more familiar with waste, so they could get the indirect economic benefits from any waste around them. Waste Bank is a domestic waste management system which managed by people, from people, and for people. Therefore, Waste Bank couldn't establish alone but must be integrated by 4R movements (Replace, Reduce, Reuse, and Recycle) that the benefit could directly perceived for green, clean, and healthy environmental development. Waste Bank could be a solution to achieve comfortably residential. The scheme is allowed people to become more discipline in managing waste also they could possibly get an extra income from the waste they have collected.

The activities of Waste Bank in Surabaya are collecting, sorting, exchanging, managing, and transporting. Waste collecting is done by every customer to the collected spot for the certain times. Sorting waste is done by the Waste Bank Administrator periodically. The waste is sorted based on the type; organic or an organic. Organic waste, such as leaves and leftovers, would be processed into some compost. An organic waste, such as plastic,

paper, iron, etc., would be reused, recycled, or sold to waste collectors. Waste collectors is a third-parties whom able to sell the valuable waste to any recycler industry. From the waste sales, people are able to get an extra income which could be deposited in the Waste Bank account. The residual and hazardous waste would be carried to a landfill. Waste management could be composting, waste recycling, and also second stuff utilizing (reusing waste). Community Waste Bank Systems has several advantage from any aspect, such as the increasing of public awareness to the environmental quality, reducing waste generation on landfill, increasing community health and economic level, increasing the participatory community roles, and also increasing the standard level of a region (Fig. 3).

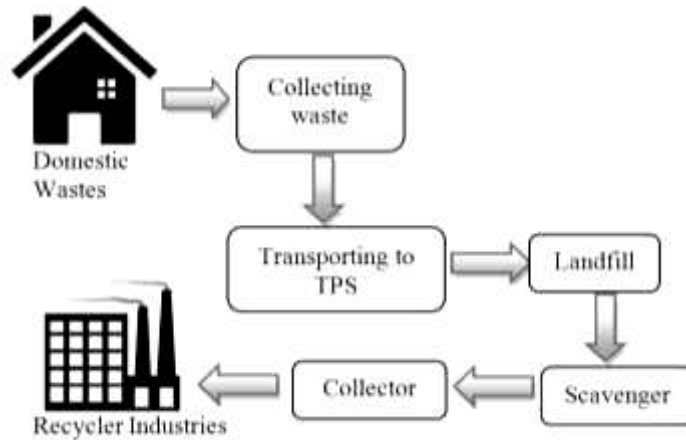


Fig. 2: Plot of Domestic Waste Management without Waste Bank

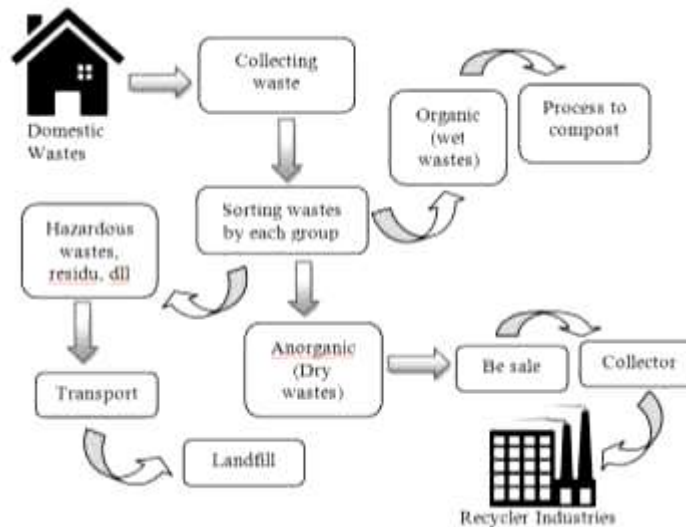


Fig. 3: Plot of Domestic Waste Management with Waste Bank

Based on field observation until 2016, there are 116 active Waste Bank in Surabaya and spread along Surabaya. Based on the research result, several data are earned to get a conclusion. The average amount of Waste Bank customer is 54 of 73 families on the one block, therefore it could be concluded that the community awareness level of Waste Bank is high enough. The average deposit amount of every customer in one year is Rp 178.000,- that could be an extra income for the family itself.

2.5 Sustainable of Waste Bank towards Surabaya Eco - City

The existence of a Waste Bank in Indonesia is supported by legal instrument, namely the Regulation of the Minister of Environment of the Republic of Indonesia Number 13 of 2012 [5] Many Waste Bank were established in 2012 after the regulation was released. Waste Bank also supported the creation of unique handcrafted goods in the community [6], such as by supporting a training program. The key roles in reduction and recycling were the

public awareness [7], and knowledge transfer [8]. Training program can transfer knowledge and technology, and improve the community's level of knowledge, and increase their awareness in solid waste reduction. In addition, level of knowledge can change the awareness to action. Furthermore, the function of waste bank is not only as a media for selling the recyclable waste, but also as a media or organization for transferring the knowledge and technology of solid waste reduction and improving the community's level of knowledge.

Surabaya Eco-city was first coined by the mayor of Surabaya around 2010. The concept was formulated in cooperation with various parties, one of which is a developed country that is Japan, which is then referred to as a sister city of Surabaya. The private sector which has an important role in the realization of the Waste Bank in Surabaya is PT. Unilever Tbk. Eco-city concept is ecologically healthy city is a place where people can live healthy and economically productive lives while reducing their impact on the environment. Eco-city role is to harmonize existing policies, environmental conditions, and market economy as well as business with natural resources is an asset environment. Eco-City acts to involve all citizens in collaborative decision-making and transparent basis as a form of sustainable cities.

Sustainable city has a broader meaning, but often viewed in terms of understanding the context and substance leads to the existence of the city that care for the environment. Although the context and substance of the scope of putting the environment as an important aspect, but also requires a variety of approaches involving other aspects of comprehensive (Fig.4). Regarding the economic and environmental issues had to be considered, where by it is becoming increasingly more difficult to describe a city that has a broad meaning in the cities or remote inland regions that are less clicking town. This is much different from new thinking about the city, where the characteristics of the city as an open system, which is integrated city systems with the systems and the economic environment [9].

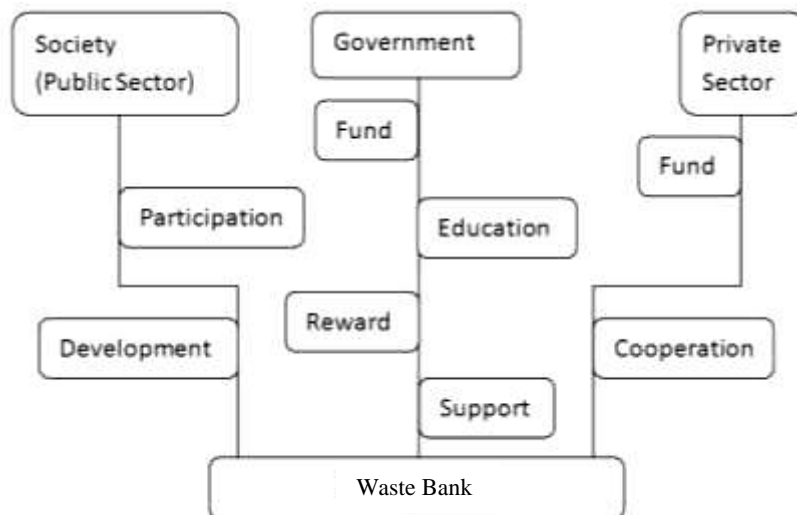


Fig. 4: Plot of Waste Bank Establishment

Waste Bank is a program of waste management's community where the waste is collected and sorted according to its kind and sold to earn money. Saving money that can be taken at any time present as a form of waste management program was created aimed at solving problems in two vital aspects of society, includes economic aspects and the environment. Surabaya which currently has 116 Waste Bank actively driven 100% by the public directly as the perpetrators of waste management to be supported by the government to provide facilities and infrastructure, then the Waste Bank program is the city of Surabaya has great potential improve the environment and economy in which both aspects these are some of the terms eco-city and sustainability of Waste Bank in the future.

Implementation of the Waste Bank system is required sustainability and consistency, both on the board, customers, government, or parties related. Regeneration board and number of clients increased participation also needs to be pursued. Based on research, the majority of the board have not experienced regeneration. In addition, other problems arise from the increase in the number of clients quite a bit each year. Some of these things if allowed a continuous basis will lead to the sustainability of the bank system in dealing with waste bins and to

realize the Surabaya Eco-City will be disrupted. For that, there needs to be a strategy to maintain and enhance the sustainability of Waste Bank system in the city of Surabaya, here is a strategy that can be done:

1. Incentive for Managers

Based on the results obtained, the public interest to take charge of the Waste Bank are minimal, it is due to several factors, including a lack of incentives so that the lower the interest, the task being performed fairly complex and require considerable time, environmental awareness is less, lack of motivation, less rigorous information, individualism properties, and others. For that, we need an effort to increase interest in the regeneration of the board is to give incentives. Given the incentives will boost the morale and motivation because of the incentives provided in accordance with the level of duties performed as Waste Bank officials.

2. Rewarding for Managers and Customers

In 2005, Surabaya organized its first annual green and clean competition, which was followed by more than 500 neighbourhood associations. This program aims to promote the importance of solid waste reduction at the source. Solid waste reduction was initiated by the closing of the final disposal site (FDS) in Keputih at the end of 2001. In this year, the Cleansing Agency of Surabaya City and Unilever Indonesia Corporation supported the initial solid waste reduction program [10].

From 2006 to 2013 Surabaya received Adipura, a national award for clean cities. Surabaya was also awarded the ASEAN Environmentally Sustainable City Award in 2011, and the Environmentally Sustainable City (ESC) Award in 2012. These awards were presented to the city with the best implementation of sustainable environmental regulations. In addition, Surabaya received the City-net award in the category of the best participatory city in the Asia-Pacific region in 2012 [11].

The existence of several competitions held by the government, and won several awards related to environmental sustainability is able to generate interest and motivation of citizens in protecting the environment. It can also be applied in the system of Waste Bank, namely by giving awards to officials, customers, as well as non-customers. For example, by giving the award to the board with a high level of dedication categories, then rewards customers with the highest amount of savings, and incentive for every citizen who wants to become a new customer. The award may include the provision of food, cash, as well as everyday utensils.

3. Credits Union

The savings and credit cooperatives in the community is needed, because the system is applied in a cooperative lending is simpler and less demanding compared to other lending system. So that people in general are more often borrowing money in savings and credit cooperatives. Saving customers from the sale of waste can be used to loan money for savings and loans on the condition that the borrower must be a customer of the Waste Bank, so that when non-customers want to borrow money to be incorporated first as a bank customer. In addition, it can also increase the sense of mutual cooperation and foster a sense of mutual caring and helping others.

4. A School of Garbage

The education related about Waste Bank should be introduced early, especially for children and adolescents. One effort to educate is the presence of school garbage. Education about waste is for all ages, children, adolescents, and adults. The garbage Schools teach about the importance of protecting the environment, the correct way of sorting waste, healthy lifestyles, recycling, knowledge of sanitation, and so on. School of waste is carried out at certain times in which presenters can collaborate with educational institutions such as universities to provide knowledge related to some of these things. So the synergy between all the parties in favour of the Waste Bank can run well. Their school can educate the cadre of environment for future generation of Waste Bank.

5. A Mass Media Promotion

Information related to the Waste Bank needs to be promoted and campaigned continuously and comprehensively to the whole community. Dissemination of information can be done by the government and the public through social media, print media, television media, and so forth. The information is presented in an interesting and can be easily understood, for example using pictures, animations, video, and so on. With the sale is expected to attract people, so the amount of Waste Bank and customers can be increased which can indirectly increase environmental awareness and to help realize the Surabaya Eco-City.

2.6 Conclusion

Participation and active collaboration between the sides, both the government, society, community, the public sector, and the non-government needs to be done in a synergistic to the sustainability of the Waste Bank to stay continuous. But in reality, the level of participation in society still tends to be less, so that the regeneration of

the board or customers is quite alarming. Based on the results, obtained the reason the board to join in the management of the Waste Bank which is about 67 % as elected, and 33 % other volunteered, and as many as 67 % of the motivated to protecting the environment, 33 % other just to spend leisure time. It was due to several factors, among others, the absence of an incentive so that lower interest, which was done quite complicated and takes quite a lot, environmental awareness, there is no motivation, information that is less comprehensive, individualism and so on Based on this research also found that as many as 82.75% of bank customers refuse to join since its inception the Waste Bank, while 17.25% of customers join up with other after the waste has been formed. It indicates the information that is less thorough related to the presence of the Waste Bank. In addition, the members of the people to become bank customers due to several factors, namely as many as 54.50% of customers because the economy, lack of 34.17% by concerned about the environment, and 13.33% due to government regulations. There are some strategies to maintain and improve the sustainability of Waste Bank system in the city of Surabaya, among others, namely by giving incentives to officials so as to increase motivation, the award to the board and also customers on a periodic basis, the establishment of cooperative, the establishment of the school crap for the formation of cadres, and the dissemination of information related to the waste through the mass media. So, by means of a system of the waste sustainably were able to develop social skills the public either in terms of revenue, environmental awareness, environmental education, an increase in social relationships, and so on. Therefore the development of social community towards Surabaya Eco-City can be achieved by a system of waste management are synergistic, integrated, and sustainable

3. Acknowledgements

The Authors would like to acknowledgment and very gratitude to Miss Nita Citra Sari for her support of this research, and all of the Waste Bank in Surabaya.

4. References

- [1] The Central Bureau of Statistic of Surabaya, www.bps.go.id (accessed 10.07.16, 2016).
- [2] Dhokhikah, Y., Trihadiningrum, Y., "Solid waste management in Asian developing countries: challenges and opportunities," *J. Appl. Environ. Biol. Sci.* 2 (7), pp 329–335, 2012
- [3] Riama, Vivid, "Pencemaran Lingkungan. Universitas Indonesia," Hal 7-10, 2010.
- [4] Dhokhikah, Y., Trihadiningrum, Y., "Community participation in household solid waste reduction in Surabaya, Indonesia," *Resources, Conservation and Recycling* 102 (2015) 153–162, 2012.
- [5] Minister of Environment of the Republic of Indonesia Number 13 of 2012 or KLHRI (Kementerian Lingkungan Hidup Republik Indonesia). *Rapat Kerja Nasional Bank Sampah*. Hal 6-7.
- [6] Triwardani, R., Sarmini, Acculturation of character caring environment through waste banks in Duwet Village, Subdistrict Bendo, Districts Magetan. *Kajian Moral Kewarganegaraan* 1 (3), 470–484, 2013.
- [7] Hotta, Y., Aoki-Suzuki, C., "Waste reduction and recycling initiatives in Japanese cities: lessons from Yokohama and Kamakura," *Waste Manage. Res.* 32 (9), pp 857–866, 2014.
- [8] Valaencia-Vazquez, R., Perez-Lopez, M.E., Vicencio-de-la-Rosa, M.G., Martinez-Prado, M.A., Rubio-Hernandez, R., "Knowledge and technology transfer to improve the municipal solid waste management system of Durango City, Mexico. *Waste Manage. Res.* 32 (9), pp 848–856, 2014.
- [9] Perloff, Harvey S. "*The Quality of Urban Environment, Essay on New Resources in Urban Age*, 1969.
- [10] Trihadiningrum, Y., "Reducing potential of domestic solid waste in Surabaya City, Indonesia. In: *Proceedings of the 4th International Symposium on Sustainable Sanitation*," Bandung, 4–6 September, 2006.
- [11] Surabaya City Government Awards received by the City of Surabaya. www.surabaya.go.id (accessed 25.11.14.)