

Participation of the Customers of Rangka Mekar Waste Bank in the Implementation of Waste Bank

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Abstract - Managing domestic waste is very crucial to protect environment. To do that, participation from community is needed to decrease the volume of waste. Bogor City implements Waste Bank Program to help decreasing the volume of waste produced by the people. The research's objective is to analyze participation of the customers of Rangka Mekar Waste Bank in the implementation of reduce, reuse, recycle and the factors influence participation of the customers of Rangka Mekar Waste Bank in the implementation of reduce, reuse, recycle. Variables observed in the research were customer's characteristics, supports from the external agencies, customer's perception, and participation of the customers in reducing, reusing, recycling. Participation in the implementation of reduce, reuse, recycle consist of: involvement in waste bank activities (planning, implementation, evaluation and utilization of result and implementation of reduce, reuse, recycle. The research's results show that participation on planning and evaluation are categorized low. On implementation and utilization of results are categorized medium. The implementation of reduce is categorized high, on implementation of reuse and recycle are categorized low. Participation of the customers is significant-positively influenced by the support from the external agencies such as public figure, the availability of information, government support, extension education support, and group support. Therefore the higher of the support from the external agencies (public figure, the availability of information, government support, extension education support, and group support) can increase customers participation in the implementation of reduce, reuse, recycle.

Keywords - Participation, Implementation Of Reduce Reuse Recycle, Waste Bank.

I. INTRODUCTION

Population growth and change in consumption patterns in Indonesia have an impact on increasing the volume of waste (Undang-Undang Republik Indonesia Nomor 18 Tahun 2008) [1]. In 2018, the amount of Indonesian's waste reaches 64 million tons / year and as much as 75% has not been processed by the community (Kementerian Lingkungan Hidup dan Kehutanan, 2018) [2]. The average volume of plastic waste found in the sea is 3,2 million tons / year so that Indonesia rank is the second largest which contributes plastic waste to the sea after China (Jambeck et

al., 2015) [3]. Kementerian Lingkungan Hidup dan Kehutanan (2016) [4] states that plastic bag waste produced by members of the Indonesian Retail Entrepreneurs Association reaches 10,5 million pieces every 1 year. This community behavior shows that public awareness and participation in waste management is still low (Hardiatmi, 2011) [5].

In a society in which the people are able to manage waste, there should be no waste found because waste is handled directly from the source. Waste that is not managed wisely has an impact on the deterioration of the quality of

the environment (Zulkifli, 2014) [6]. Unprocessed organic waste can be a source of disease, cause foul odors, disrupt aesthetics, and produce liquid wastes that pollute groundwater and produce methane gas which causes global warming (Nugraha et al., 2018) [7]. Inorganic waste such as plastic is difficult to decompose and often clogs waterways causing floods (Hardiatmi, 2011) [5].

Community participation in environmental maintenance including waste reduction is very necessary. Community participation is one indicator of success in waste management (Undang-Undang Republik Indonesia Nomor 18 Tahun 2008) [1]. Participation is the involvement of individuals, groups, societies, and communities in development activities from the stage of decision making or planning, implementing, utilizing of results, and evaluating (Cohen and Uphoff, 1977) [8]. Arnstein (1969) [9] suggested that participation can be group seen from the intensity and degree of participation there are eight levels of participation, namely: manipulation, therapy, information, consultation, conciliation, partnership, delegation and control by the community.

Bogor is one of the densely populated cities in Java and has experienced very rapid development because it is located close to Jakarta Capital. The population of Bogor in 2017 increased 6,7% (1,1 million people) over the past 5 years (Badan Pusat Statistik, 2018) [10]. Population increase has an impact on increasing the volume of waste by 18% or 2.939 cubic meter (m³) / day and the waste transported to the final dump is still 74%. The Government of Bogor City expects that 24% of un-transported waste to be managed by the community (Dinas Lingkungan Hidup Kota Bogor, 2018) [11].

Bogor City Government encourage community to develop waste bank to manage the waste. This is in accordance with Peraturan Menteri Negara Lingkungan Hidup Republik Indonesia Nomor 13 Tahun 2012 [12] regarding the implementation of reduce, reuse, recycle (3R) through waste bank. Waste bank is a place for sorting and collecting recyclable waste that has economic value. Reduce, reuse, recycle (3R) activities are activities that are able to reduce things that can cause waste, reuse of waste that is worth using for the same or different functions, and process waste to become a new product. The waste bank program is expected to be able to reduce the volume of waste disposed to the final processing site, because waste is handled directly from the source (household). According to Basriyanta (2007) [13], more than 60% of the waste sent to the final processing site comes from household waste.

There are 80 waste banks in Bogor City and 34 are active banks (Dinas Lingkungan Hidup Kota Bogor, 2018) [14]. One of the active waste banks is Rangga Mekar Waste Bank. Rangga Mekar Waste Bank has been managed since 2015 and is able to overcome the waste problem in Rangga Mekar residential area which does not have a temporary disposal site. Rangga Mekar Waste Bank is the only waste bank in Bogor integratively manage the 3R waste treatment plant. The bank has represented the City of Bogor for a comparative study of waste management in Japan in 2016 in collaboration with the Japan International Cooperation Agency. Until now, there are 65 active customers.

Research by Hermawan et al. (2017) [15] found that participation was determined by the level of formal education, non-formal education, and group support factors. Amanah (2007) [16] and Hermawan (2011) [17] revealed that the implementation of extension education (non-formal) carried out in accordance to the needs and managed in a planned, programmed, and sustainable learning program can facilitate behavioral changes of the people.

In this case it is suspected that participation of the customers of the Rangga Mekar Waste Bank is influenced by three aspects which are customer's characteristics, support from the external agencies, and customer's perception. This becomes important to study so that the purpose of the study is to analyze participation of the customers of Rangga Mekar Waste Bank in the implementation of reduce, reuse, recycle and the factors influence participation of the customers of Rangga Mekar Waste Bank in the implementation of reduce, reuse, recycle.

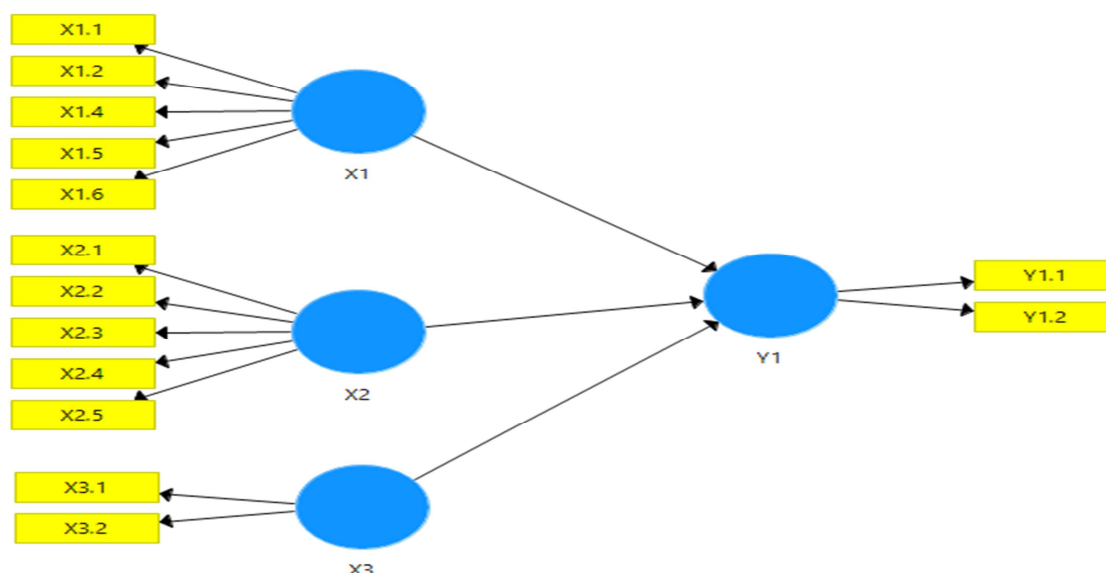
II. RESEARCH METHOD

Rangga Mekar Urban Village was chosen intentionally considering that only this village integrated with a 3R waste treatment plant and once represented the City of Bogor for a comparative study of waste management in Japan in 2016 in collaboration with the Japan International Cooperation Agency. Data was collected for a month in October 2018. A census to customers of Rangga Mekar Waste Bank (65 persons) was conducted to get data and information about waste bank. According to Arikunto (2010) [18], if the research subjects is less than 100, it is better to include everyone in the population so that the research is population research or census.

Primary data were obtained from respondents through interviews using questionnaires and in-depth interviews and field observations. The variables studied included: (1) customer's characteristics (age, formal education level, non-

formal education level, total income, length of time being a customer, and number of family dependents); (2) support from the external agencies (public figure, availability of information, government, extension education, groups); (3) customers perception (accountability and transparency); (4) participation (involvement in waste bank activities and implementation of 3R). Secondary data was obtained from the data of the waste bank, the Urban Village office, and the Environmental and Hygiene Agency of the Bogor City.

Data were analyzed descriptively to provide an overview of customer's characteristics, support from the external agencies, customer's perception, and customer participation using summarizing data such as categorization (scoring) and presented using frequency distribution tabulations and inferential analysis to test the research hypothesis using Partial Least Square (PLS) with the SMARTPLS3 application. The picture of the PLS model is:



Picture 1 Partial Least Square (PLS) Model

The results of the validity and reliability test show that questionnaire is valid to used in instrument to collect data (r count value of $0,438-0,998 > r_{\text{tab}} 0,361$) and reliable (cronbachs alpha value is $0,645-0,991 > 0,6$).

III. RESULTS AND DISCUSSION

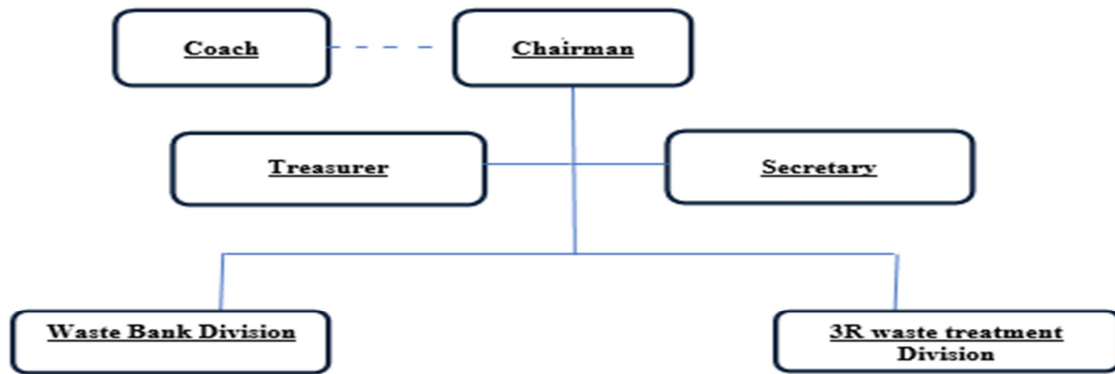
1.1 Rangka Mekar Waste Bank: from, by, and for the Community

Rangka Mekar Waste Bank was established in March 2015 by the residents of Rangka Mekar Urban Village. The waste bank has two operates: conventional waste bank and mobile waste bank. Conventional waste bank have a system in which customers directly deliver waste to a waste bank and serve customers in hamlet 1-13 (except hamlet 10). While the mobile waste bank has a system, in which the managers picks up the waste directly to the customer's home and serves customers in hamlet 10. The types of inorganic waste saved in the waste bank are: metal, plastic, paper and

bottles/glass. Every month this waste bank receive inorganic waste from customers ranging from 450-600 kilogram.

Waste bank administrators come from various communities, school dropouts, and youth in Rangka Mekar Urban Village. The picture of the organizational structure of Rangka Mekar Waste Bank is:

The current number of the managers are 11 people, consisting of: coach, chairman, treasurer, secretary, responsible division (waste bank division and 3R waste treatment division), and division members. Currently there are 65 waste bank customers, and the requirement to become customer are: provide photocopies of identity cards, fill out registration forms, and bring waste to be saved.



Picture 2 Rangga Mekar Waste Bank Organizational Structure

1.2 Customer Participation in the Waste Bank Activities Involvement

Table 1 shows the overall stages of the customer participation in the waste bank and there are no stages in the high category. This is because the waste bank programs

are designed by the waste bank administrators. Categorization is based on the category according to Arnstein (1969) [9]: the low category is *non participation*, the medium category is *tokenism*, and the high category is *citizen power*.

Table 1 Customer Participation in the Waste Bank Activities Involvement

No	Description	Category	Total (People)	Percentage (%)
1	Planning	Low (1-2)	62	95,4
		Medium (3-5)	0	0
		High (6-8)	3	4,6
2	Implementation	Low (1-2)	0	0
		Medium (3-5)	65	100
		High (6-8)	0	0
3	Evaluation	Low (1-2)	62	95,4
		Medium (3-5)	2	3,1
		High (6-8)	1	1,5
4	Utilization of result	Low (1-2)	2	3,1
		Medium (3-5)	59	90,8
		High (6-8)	4	6,2

Note: n=65

The customer participation at the planning stage is in the low category, most customers (95,4%) rarely follow this stage. According to most customers (95,4%) that they had never been involved in the waste bank planning process which included: waste bank program formation meetings, waste bank socialization, guest visit activities, training, and exhibitions. This is because customers do not know the meeting information from the waste bank managers. According to public figure that youth are involved in Rangga Mekar Urban Village as managers to have the

responsibility to attend the formation of the waste bank program meeting. However, they are not active because there is no fixed income or incentives provided from waste bank.

Many customers do not know about socialization because only the representatives of residents are invited. The managers views that the socialization of the waste bank in the Urban Village invited public figure and community representatives from each hamlet. The customer is not involved in preparing the guest visit, the customer is aware

of the activity because they are conducting a savings transaction in a waste bank. The meeting usually just involve Farmer Women Groups, Family Empowerment and Welfare, and Integrated Health Service because of the managers does not want to interfere customer activities. Preparation of training held by the waste bank only involve the managers because they already comprehend. They get a training invitation or exhibition from various agency such as: service, company, or school every year.

The participation of customers at the implementation stage is in the medium category with a percentage of 100%. Cause the waste bank has the same relative pattern as the bank in general, customers only save and follow the rules, methods, funds, facilities that have been provided by the waste bank managers. Customers are not directly involved in the activities of other waste banks such as: weighing, recording, sorting inorganic waste again, processing organic waste into fertilizer and biogas. However, customers are involved in sorting out organic and inorganic waste in their homes. The role of the managers as a facilitator needs to be improved because in the implementation phase there is a space for dialogue with customers.

The participation of customers at the evaluation stage is in the low category with a percentage of 95,4%. Because most customers (95,4%) are not involved when evaluating waste bank activities. The customer views that evaluation meeting was the responsibility of the managers. The managers never invited customers to participate in monthly or annual evaluation meetings of the waste bank because it was internal management.

The participation of customers at the stage of utilization of results is in the medium category with a percentage of 90,8%. This is because by most customers (90,8%) that the knowledge and skills about sorting and saving waste that have been obtained are used so that the environment is clean and gets additional income from daily needs. Before there waste bank was there, customers had difficulty in disposing waste because there was no temporary dumping place in the urban village, so customers dumped litter in rivers, sewers and gardens. The waste savings obtained by most customers each month ranges from IDR 20.000 to IDR 30.000 for 15-20 kilogram of waste.

3.3 Customer Participation in the Implementing of Reduce, Reuse, Recycle (3R)

Table 2 shows the implementation of reduce, reuse, and recycle by waste bank customers. The reduce is in the high category with the customer percentage of 40%. This shows that customers have been very good at reducing waste even though there is no direct education conducted by the management. The reduce behavior that has been done by most customers is buying products such as durable and easily recycled plates and cups (97%), carrying bottles (92%) and food supplies (77%) while traveling, and carrying their own bags when shopping at shop (62%). The customers do this because they started with small things so they have the awareness and willingness to reduce the things that cause waste. This is in line with Yuliastuti's research (2013) [19] which revealed that high community willingness could increase community participation in waste management.

Table 2 Customer Participation in the Implementation of Reduce, Reuse, Recycle (3R)

No	Description	Category	Total (Person)	Percentage (%)
1	Reduce	Low	17	26,2
		Medium	22	33,8
		High	26	40,0
2	Reuse	Low	30	46,2
		Medium	17	26,2
		High	18	27,7
3	Recycle	Low	28	43,1
		Medium	16	24,6
		High	21	32,3

Note: n=65

The implementation of reuse and recycle is in the low category with the percentage of customers at 46,2% and 43,1%. This is because the administrators does not directly

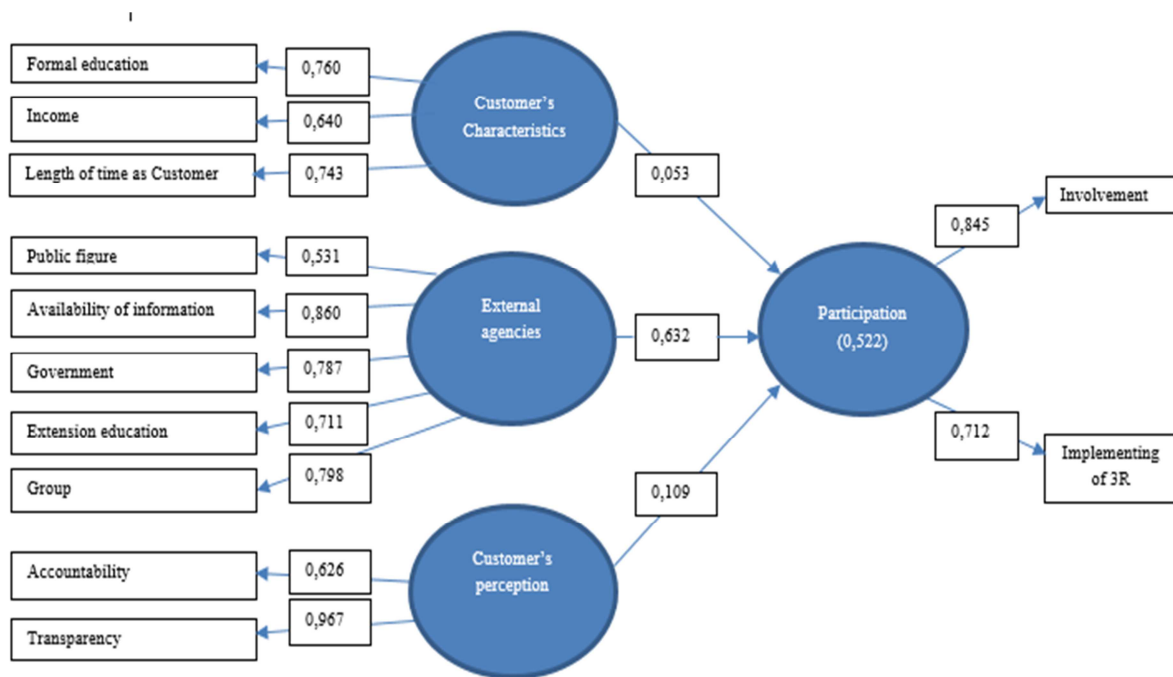
educate customers about the utilization and processing of waste, so that until now customers only carry out savings activities and the the managers assessment that the

education training received was limited to sorting and saving waste. The reuse behavior carried out by most customers is to reuse plastic bags (74%), utilize organic waste for animal food (70%), use empty paper sides (66%), and utilize household waste such as newspapers and cardboard for household use (66%). The customer recycle activity is to use beverage bottles as flower pots (40%) and process organic waste into fertilizer (26%). In accord with customers that to reuse and recycle requires awareness, expertise, and perseverance and needs special training. This is in line with what was conveyed by Reni (2011) [20] in the study that the application and utilization of waste is still

weak in farmer groups so that it requires a learning process for group members.

3.4 Factors that Influence Participation of the Customer in the Implementation of Reduce, Reuse, Recycle (3R)

Evaluation of measurement and structural models conducted on the results of Partial Least Square (PLS) analysis shows that support from the external agencies affects the level of participation of waste bank customers in implementation of reduce, reuse, recycle. The measurement model (outer model) is presented in Picture 3 and structural models (inner model) is presented in Table 3.



Picture 3 Measurement Model (*outer model*)

The R^2 value above of 0,522 shows that 52,2 % of waste bank customer participation is influenced by factors being studied in this research, which are customer's characteristics (formal education level, total family income, and length of time being a customer), support from the external agencies (support from public figure, availability of information, government support, extension education support, and group support), and customer's perception (accountability and transparency). While 47,8% is influenced by other factors outside of this study.

Support from the external agencies (support from public figure, availability of information, government support, extension education support, and group support) positively and directly has a significant effect on customer participation (Table 3). This means that the higher the support of public figure, the more availability of information, the higher the government's support, the higher the extension education support, and the higher the group support, all are able to increase customer participation in Rangga Mekar Village.

Table 3 Significant Value of the Latent Variable Customer Participation

No	Description	Path coefficient	T-count	Significance
1	Customer's characteristics influence the participation	0,053	0,479	Not significant
2	Support from external agencies influence the participation	0,632	6,546	Significant
3	Customer perception influence the participation	0,109	1,113	Not significant

Note: t-count value > t-table (1,96) = significant, $\alpha = 5$ percent

3.4.1 Support from Public Figure

Public figure play an important role in supporting the participation of waste bank customers in implementation of 3R. Public figure are respected people and trusted by customers so they are able to invite customers to participate in implementation of 3R. According to Rogers and Shoemaker (1995) [21] public figure are people who have the ability to influence the attitudes and behavior of others. Customer states the figure who was very determine in inviting customers to save at the waste bank was the neighbourhood/hamlet chairman and integreted health service cadres. Most customers (63%) represent that the neighbourhood/hamlet chair invite customers to save waste and provide information about the benefits of sorting and saving (60%). Information was given by the head of the neighbourhood/hamlet in the form of a notification during the recitation, an Islamic holiday such as Rajaban and Isra Miraj. Customers (43%) assessment integreted health service cadres have a role in appealing to customers and providing information about waste bank. Integreted health service cadres appealed in the form of notifications at the Integreted health service post, during social gathering, and gymnastic activities. Rogers and Shoemaker (1971) [22] states that the characteristics possessed by informal leaders or public figure that influence the adoption of innovations are: much in relation to mass media, cosmopolitan, often related to agent reformers, large social participation, high socio-economic status, more innovative from his followers. The great social participation shown by public figure in research is to help deliver customer waste to waste bank if needed. This research support by Radjabaycolle and Sumardjo (2014) [23] which stated that the support of public figure was very important in changing people's attitudes towards watershed management. People are respected and trusted by the community so that leaders are able to encourage and encourage people to participate in watershed management activities.

3.4.2 Availability of Information

Information provides knowledge to someone about something, so that if information about waste management is widely available, it will increase the knowledge of customers and they will be interested in participating. The availability of information on waste management is obtained from various sources, for instance : (1) informal sources (waste bank managers, neighbors, friends, colleagues, neighbourhood, hamlet, community clinic cadres, religious leaders), (2) government sources (The Urban Village office and Environmental Service), (3) media (television, newspapers / magazines, internet, social media, and radio. Neighbourhood, hamlet, integreted health service cadres provide waste bank information in the form of appeals. Most customers (80%) views that waste bank the managers are spreading information to customers through extension education with urban village office and services, waste bank, and neighbourhood/hamlet houses, and 69% of customers get information from television that provides information about waste bank, manufacturing handicrafts from waste, fertilizer making, and sorting inorganic and organic waste, referring to the opinion of Sumadiria (2010) [24] that news from regular media such as television provides important information and is able to attract attention and the interests of the audience. The news is able to motivate customers to make the decision to get involved in saving in a waste bank. This is in line with Johanto's research (2010) [25] which shows that the more housewives have sources of information about waste management, the better the way to manage waste. Nurdianti's research (2014) [26] explains that maximizing the role of communicator is one of the keys to success in influencing someone so that its role needs to be maximized.

3.4.3 Government Support

Government support is very important in increasing customer participation. The government is the urban village

office and the environmental agency. Customers (28%) assessment the urban village was very supportive of waste management activities in facilitating socialization activities by the waste bank the managers, helping to produce craft and fertilizer products during Rangka Mekar's birthday event. The environmental agency socialized waste banks with residents, helped market waste bank products in exhibitions, and provided assistance in the form of scales, plastic bags, savings books, and brochure sorting bins for customers when launching a waste bank. The government's high role is able to make customers participate in waste banks because they get direct support from the government. This result is in line with Ruhimat's (2013) study [27] which represent that government support is the most important and dominant aspect that will influence the level of community participation in the implementation of development policies and priorities.

3.4.4 Extension Education Support

Extension Education very helpful to increase customer participation in the implementation of 3R activities. Most of the customers (26%) stated that independent extension education agents (managers of waste bank) play an active role in helping them solving problems related to waste management in customers residential area because there is no temporary shelter so that customers difficult to dispose their waste. According to the customer (15%) the waste bank managers conducted extension education 3 times in the first year of the establishment of the waste bank. The first was conducted in the Urban Village office with presentation by them and discussions with residents. The media used for communication is audiovisual media. The second was carried out when launching the waste bank, they practiced directly about sorting organic and inorganic waste, and there were inorganic waste samples that could be saved using visual media or real objects. The third was carried out at the neighbourhood/hamlet house, the managers explained the benefits of the waste bank and practiced how to sort out waste to residents in each hamlet. According to the customer (12%) the extension education material delivered was useful and fit to the needs of customers and the community. Anantanyu's research (2009) [28] which states that the level of extension education support has an influence on increasing membership participation in groups. Upriy's (2003) study [29] and Ngaruko and Lwezula (2013) [30] also stated that the frequency of contact with extension agents was able to increase participation in groups.

3.4.5 Waste Bank Group Support

Groups play an important role in increasing customer participation because it is the main source of information related to 3R activities. The main role of the waste bank group is to invite customers to save in a waste bank (22%) in the form of direct socialization to residents when in the urban village, waste bank, or at the neighbourhood/hamlet house. They educate about sorting and saving in a waste bank during socialization. This is in line with the research of Ramadoan et al. (2013) [31] that groups can provide benefits to the community. This is in line with Hermawan et al. (2017) that group support influences one's participation in groups.

IV. CONCLUSION

Participation of the customers in involvement aspect in waste bank activities is categorized as low (*non participation*) at the planning and evaluation stage. At the stage of implementation and utilization of results are categorized as medium (*tokenism*). In aspects implementation of reduce reuse recycle (3R); customer participation is high in reduce activities (reduce the production of waste), on reuse (reusing the waste) and recycle (waste recycling) are low.

Participation of the customers of waste bank in implementation of 3R is directly and positively influenced by support from the external agencies such as: support from community leaders, availability of information, government support, extension education support, and group support. This means that the higher of the support of community leaders, the availability of information, government support, extension education support, and group support is able to increase customers participation in the implementation of reduce, reuse, recycle.

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