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Social Engineering Attempt with Inter-Organization Participation of Waste Bank Program in Batam City

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Abstract— This study aimed to discuss the problems of waste management in urban areas, especially in Batam City which borders the neighboring countries. The launch of the waste bank program in Batam City is one of the government's waste reduction efforts. The attempt of social engineering through the waste bank program aims to build awareness and independence of the community with the hope of social change. This study is qualitative descriptive research. The data were collected from key informants which were selected through the purposive sampling method. In addition, documentation and observation were also conducted to gather relevant data. Then, the researchers identified and mapped the attempt of social engineering through the waste bank program in Batam City using a formal evaluation approach. The results of this study described the dimensions that play the most dominant role in the waste bank program in Batam City.

Keywords— Waste Bank, Social Engineering, Formative Evaluation.

I. INTRODUCTION

A city is a center of economic activities or high productivity, and it has complete infrastructure so that people are interested to work in a city with the hope of achieving a better living. There are many economic benefits as a result of the growth and development of an urban area due to an increase in the number of economic activities. However, in the future, these benefits will reduce due to the increase in social costs.

In this condition, to achieve economies of scale, the social costs will certainly be expensive. The increase in the social costs of each economic activity in urban life will result in a deterioration in the quality of the city environment. Examples of a deterioration in environmental quality are traffic congestion, air pollution, vehicle engine noise, slums due to municipal waste and industrial waste.

Waste is a very crucial issue. Waste issues are deeply entrenched in the urban community. The most common problem is unsorted waste (organic and nonorganic whose decomposition is not good for environmental health [1], [2]. The increasing social costs of each economic activity in urban areas, especially in Batam City, will cause a deterioration in the environmental quality. Examples of a deterioration in environmental quality are traffic congestion, air pollution, vehicle engine noise, slums due to municipal waste and industrial waste, poorly managed parks, etc [3].

Waste is a common issue in big cities, and infrastructure development in big cities is always followed by an increase in population. The increasing level of human needs certainly

requires a variety of products whose packaging becomes waste that piles up in big cities [4]. Waste is a familiar term and when people hear the term waste, it usually creates an impression of a pile of waste that gives off a very pungent foul smell.

Waste is unwanted residual material after the end of a process that damaging the surrounding environment. In a natural process, there is actually no concept of waste, but it is a product produced after and during a natural process [5]. The more population a city has the more public consumption and activities. It causes an increase in the volume and type of waste. Waste generated from public consumption and activities becomes an environmental problem that must be solved by the government of every city with support of the community [6].

Waste management in developing countries one of which is Indonesia needs a lot of improvement. Changing the waste management paradigm is an important thing to do as an attempt to adapt to the increasing amount of waste generated every year. Various policies have been implemented to solve this problem. Indonesia has a target entitled "Indonesia Free from Waste 2020" [7], [8] keep the city clean, there should be a system that manages waste disposal from the collection to the transportation to the landfill [9], [10]. The amount of waste is increasing day by day along with the increasing city population. Therefore, it needs more effort to deal with waste issues.

A waste bank is a good solution even though it has not been conducted effectively and efficiently. The attempt to keep the city clean should be conducted effectively and efficiently following the fast increase of waste amount. Therefore, it is necessary to apply a strategy to improve the quality of waste management by encouraging the community to actively participate both directly and indirectly [11]–[13].

Community empowerment is an attempt to make the community independent through the realization of their potential capabilities [14]. In community empowerment, there are two interrelated groups that are the empowered community and the empowering community. The empowering party has the willingness and courage to change, participate, increase participation, increase motivation, increase the effectiveness and efficiency of the program, and grow competence.

The concept of empowerment is that the community is not treated as the object of various development projects, but the

community is the subject of the projects. Therefore, empowerment must follow the following strategy.

1. The program is aimed directly at those in need with the program designed to solve their problems and according to their needs.
2. The program must directly involve or even be implemented by the target community.
3. Using a group approach because the poor will find it difficult to solve the problems they face individually [15].

Waste management in urban areas requires social planned or what is called social engineering. Defines social engineering as regulating and distributing environmental and social forces to create a great likelihood of an effective social action. Social engineering is proven to bring large-scale changes in social life. These changes occur according to the preconceived ideas [16].

Social engineering is carried out because the social situation is not in accordance with what is expected by the government and then, social engineering is believed to provide an idea that is more attractive and acceptable to the society [17]. Social change through social engineering must first begin with the change of mindset. Social change will not go in the direction it planned with wrong mindset. Social engineering is carried out because there are social problems. Social problems arise because of a mismatch between expectation (*das sollen*) and reality (*das sein*). Social engineering can be started from changes in individual attitudes and values, especially in understanding the existence of a communication technology [18], [19].

The main objective of establishing the waste bank is to improve the effectiveness of the waste management in Batam City. The second objective of the waste bank is to make people aware of a healthy, neat, and clean environment. The waste bank was also established to convert waste into something that has economic value, such as handicrafts and fertilizers [20]. Based on the concept of social engineering, the waste bank in Batam City attempts to change the community mindset that the waste can be reduced, recycled, and reused. (<https://arsipskpd.batam.go.id/batamkota/skpd.batamkota.go.id/kebersihan>)

The government of Batam City makes the Regional Regulation of Batam City Number 11 of 2013 concerning Waste Management. It contains regulation concerning the prohibitions and criminal provisions in article 64 and 69. The government actively socializes and implements the regulations to make the public comply with these regulations. One of the attempts to reduce waste in Batam City is through the waste bank program.

The social engineering as a social plan with the objectives mentioned above was evaluated using formative evaluation. This evaluation model investigated how the attempt of social engineering through the waste bank program was implemented to achieve a social change in handling waste issues in Batam City. State that formative evaluation is an evaluation that is carried out while the program is still running [21]. Therefore, the researchers conducted a study through a formative evaluation of the social engineering to find out the

dimensions that play the most dominant role in the waste bank program in Batam City.

II. METHODOLOGY

This study was conducted with a descriptive method and a qualitative approach. Research of this kind investigates phenomena that the researchers encountered [22]. Qualitative research will produce descriptive findings in the form of words (written or spoken) from the research object and then, the words can be studied in depth [23]. Then, the results are explored and classified as a form of social reality so that the qualitative research method has non-hypothetical elements and value laden [24].

Qualitative research basically figures out and interprets the context and content of phenomena. The dimensions of qualitative research are the subject under study and a collection of various empirical data or case studies, personal experiences, introspection, life experiences, interviews, observational, historical, interactional, and visual texts that describe moments and meanings of everyday life or problems in someone's life [25].

III. RESULT AND DISCUSSION

A. *The Strategy of the Social Engineering Attempt through the Waste Bank Program in Batam City*

Waste are unwanted or unusable materials. Waste is any substance which is discarded after primary use, or is worthless, defective and of no use. A by-product by contrast is a joint product of relatively minor economic value. Waste management covers the activities of collecting waste, put it in temporary dumpsites, and put it in landfills. Before being destroyed, the waste can be recycled or reused first to reduce the volume. Based on its characteristics, waste processing is carried out in various ways that are composting, incineration, or using industrial waste that has cement-like character to make building materials.

Then, a waste shelter is an individual or communal container that functions to temporarily accommodate waste. A waste shelter is needed to make the waste not scattered and to simplify the process of waste collection. Scattered waste pollutes the environment. A waste shelter is needed to place waste temporarily before transported to landfills.

The design of a waste shelter have to enable people to throw waste based on its type. A dark-colored container is for organic waste such as leaves, vegetables, rind, leftovers, etc. A light-colored container is for inorganic waste such as glass, plastic, metal, etc. A red-colored container with a special symbol is for household waste of hazardous toxic materials (Ministry of Public Works, 2002).

Waste collection is the process of collecting waste from waste shelters to a temporary dumpsite. The temporary dumpsite is usually a container with the capacity of 10 m³, 6 m³, 1m³, a drop-off depot, a brick trash bin, a drum with a volume of 200 liters, etc. Waste collection is carried out every certain period. The schedule of waste collection is usually determined based on the time of decomposition, which is approximately 2-3 days. It means that waste collection is

carried out at least every 3 days.

A waste bank is not a conventional bank or a financial institution. A waste bank is a bank where people exchange their waste for money. Waste is generally discarded, but a waste bank can make it economically valuable and useful. Its customers can save waste and get money at a later date. Batam City has initiated waste management through the waste bank program which is managed directly by the Sanitation and Gardening Agency of Batam City and is assisted by Adijaya Cooperative. The following is the data about the amount of waste in every month deposited in the waste bank in Batam City.

TABLE 1. The data about the amount of waste in every month deposited in the waste bank in Batam City

No	Bank Sampah	Jml Unit Bank Sampah	JML Hasabah (per Feb. 2016)		Jumlah Pemilahan Sampah An-Organik (Kg)						Total (Kg) per unit
			Jan	Feb	Mar	Apr	Mei	Jun			
1	Kec. Batu Aji	38	1.712	8.519.38	10.207.75	11.916.54	11.213.74	11.973.43	10.151.31	54.846.15	
2	Kec. Sagulung	32	894	7.790.89	7.972.48	8.021.32	9.725.58	11.415.97	892.40	45.759	
3	Kec. Sekupang	18	517	4.253.20	2.385.65	4.569.81	4.069.03	5356.55	225.60	20.859.84	
4	Kec. Sei Beduk	10	439	1.495.73	1.136.91	510.40	727.00	0	1.106.45	4.945.49	
5	Kec. Lubuk Baja	2	90	1.791.1	1.322.4	1.453.80	3.280.80	2250.5	640.50	10.719.1	
6	Kec. Batu Ampar	7	311	3.053.45	1.274.9	2.598.85	3.357.91	4.451.73	-	14.738.74	
7	Kec. Bengkong	10	254	2.089.55	763.15	2.075.39	1.668.20	1.752.83	304.85	8.574.0	
8	Kec. Batam Kota	15	362	4.431.14	5.065.13	5.486.76	6.467.48	7.137.8	-	28.588.31	
9	Kec. Bulang	1	25	-	304.00	-	496.2	-	-	584.80	
10	Kec. Belakang Padang	1	34	-	-	-	-	-	-	-	
11	Kec. Nongsa	1	20	124.6	-	459.70	247.30	593.8	-	1.425.4	
12	Individu	0	0	2.865.6	3.714.38	995.90	-	606.4	1.503.90	9.806.18	
13	Sekolah	12	0	1.413.40	574.17	160.40	-	271.4	-	2.419.37	
14	Puskasmas	1	0	746.20	2.090.25	2.585.39	-	3.300.99	1.556.27	2.836.45	
	Jumlah	147	4,658	38,564.24	36,810.17	40,834.26	41,233.14	46,111.40	7,788.06	206,880.64	

Source data : Bidang Kebersihan

Source: the Sanitation and Gardening Agency of Batam City 2019

The waste bank is like a general bank. It has saving books, deposit slips, and deposit master book. Also, it has a note that is useful for checking the price of waste sold to collectors or the recycling industry. The waste consists of 70% organic waste, 20% inorganic waste, and 10% hazardous and toxic materials.

Waste banks today generally only receive inorganic waste such as paper, cloth, aluminum, and plastic. This is in accordance with the Minister of Environment Regulation No. 13 of 2012 concerning the Guidelines for the Implementation of Reduce, Reuse and Recycle through Waste Banks. This regulation was issued on August 7, 2012. The main objective of the waste bank program is to improve the effectiveness of the waste management in Batam City.

The second objective of the waste bank program is to make people aware of a healthy, neat, and clean environment. The waste bank is also established to convert waste into something which has economic value, for example handicrafts and fertilizers. The following is the working mechanism of the waste bank (1) The customer separates the waste according to the type, (2) The customer deposits the waste to the bank, (3) The customer applies for registration, (4) The waste is weighed, (5) The officer records the data, (6) The customer receives a saving book, (7) The officer keeps the waste.

Currently, Batam city produces as much as 900 tons of waste per day through the activities of tourism industry, electronics, and household. The activities in the main waste bank are managed by the Environmental Agency, which supervises more than 200 waste bank units. It results in the reduction of 9.42 tons of paper waste per month, 6.37 tons of plastic waste per month, 2.40 tons of aluminum waste per

month, and 12.81 tons of cardboard waste per month. The total reduction in waste per month is 31 tons. This is the way of the Batam city government to reduce waste.

Social engineering is basically part of social action. Social action is collective action to reduce or overcome social problems. In this study, the social engineering is described by identifying these indicators that are cause of change (the goals that are expected to provide solution to the social problems), agent of change (the individual, group, or organization that carries out the social engineering), target of change (the individual, group, or community that becomes the target of the social engineering), channel of change (media used as a channel to support the attempt of the social engineering), strategy of change (the strategies used to carry out the social engineering).



Figure 1. The model of the waste bank service in Batam City

Source: modified by the researchers, 2021

B. The Organizations That Participate in the Waste Bank Program in Batam City

The waste management in Batam city is conducted in a collaborative manner as mandated in Batam Mayor Regulation Number 35 of 2012 Chapter III Article 13 concerning the Cooperation in Sanitation Management. The government of Batam City carries out the sanitation program in collaboration with some organizations with the following guidelines.

1. The sanitation coaching and management are carried out by the Sanitation and Gardening Agency by involving the government in sub-districts and villages.
2. The sanitation management can be cooperated with business entities that are legal and have the ability or qualifications to carry out sanitation management based on the applicable provisions concerning regional government and private institution cooperation.
3. The sanitation management that can be cooperated with third parties based on paragraph (2) covers:
 - a. The waste management that covers collecting and transferring waste from waste shelters to temporary dumpsites
 - b. The waste management that covers waste transportation from temporary dumpsites to landfills, both household waste and household-like waste
 - c. The waste management at landfills

d. Waste utilization

Aldrich and Benson et al., adopting the framework of Hjern and Porter (1081) states that the implementation should be analyzed in the context of an “institutional structure” composed of a “series” of actors and organizations. A program is viewed as something that is implemented by a set of organizations.

A program will involve many local and national organizations, public organizations, private organizations, business organizations, labor organizations, etc. The main characteristic of inter-organizational exchanges is that the exchanges is voluntary interactions that is carried out in order to achieve the goals of each organization [20]. In the power dependency model, organizational relations are based on dominance and dependency while exchange is based on mutual interests.

Although an agent may depend on central resources, it is possible that the central agent will also depend on the local agents to implement policy objectives [26]. The program cannot be implemented by one organization. There are some organizations that have an interest in waste bank management. The following is the actors in the model of waste bank service:

- Government

Good government will develop a good policy as a way to solve problems. The current social problems are very complex, so the government must involve the community as a form of public openness [27]. The social engineering that was initiated to deal with the issue of waste in Batam city has been going on for quite a while. The government of Batam City shows its commitment to improve the quality of waste management under the Batam Mayor Regulation Number 35 of 2012. The attempt finally arrived at the idea of establishing waste bank in 2016. The attempt to encourage the community to be aware of waste problem is a tough challenge that must be confronted.

The facilitation program carried out by the government was done with a collaborative approach through the regional apparatus organization that are the Sanitation and Gardening Agency and the Environment Agency. It is supported by the government of district and sub-district for coordination. The effort to improve the quality of waste bank management is carried out by the related institutions.

This study finds that there is coordination and collaboration between the agency officers and the activists of waste bank units in Batam City. Relevant government agencies organize mentoring and training programs for the waste bank units in Batam City related to the management of the waste bank units to reduce, reuse, and recycle waste.

The officers of Sanitation and Gardening Agency and the waste bank officers in Batam city which are responsible to manage all waste bank units in Batam City will come regularly based on the schedule for sorting and weighing waste. The waste bank in Batam city publishes a waste price list which is updated regularly. The list is the reference price for all waste bank units and customers.

The price list is always updated according to the market price development. The government and the management of the waste bank understand very well that competitive prices are a very important factor in encouraging people to actively participate in depositing waste.

- Society

The optimistic scenario proposes that the implementation of a waste bank that involves the community is a right step to increase the community knowledge of waste problems from year to year [28]. The implementation of the waste bank program to make people aware of waste problems have to involve the community actively. The community is not only an object (customer) but also an active subject in managing and socializing the waste bank program and turning waste into economic value. The mission of the waste bank program is of course not to gain short-term benefits or money but for environmental health.

This program will not be successful if the government is not involved the society actively. The power of the community is an important resource that supports the management and sustainability of the waste bank in Batam City. The support from community is given by regular social gathering groups, islamic religious forums, Empowerment of Family Welfare, the Wives Association of State-Owned Enterprises of Riau Islands Province, etc.

Many events and activities of the mentioned organizations are held with collaboration of the waste bank. The waste bank units also encourage the community in their environment to recycle waste so that it can have economic value. For example, they make various handicrafts from plastic waste or process their organic waste into compost. Because the waste bank units in Batam City successfully change waste into something that has economic value, it becomes the attractive factor for the community to deposit their waste in the waste bank.

- Private sector

Waste is a logical consequence of population growth and infrastructure development. Waste management is not only the responsibility of the government. The private sector as one of the three interlocking elements in governance (state, private sector, and civil society) plays a strategic role. The private sector participates in supporting the waste bank in Batam City by conducting the activities of corporate social responsibility. For example, PT Mcdermott provided composting training and composting equipment for several productive waste bank units in Batam City.

Some companies also offer cooperation programs with the waste bank units. The Pegadaian company cooperates with the waste bank of Batam City by providing a program that enables the customers to exchange their waste for gold. This innovative program makes the community interested in depositing their waste in the waste bank.

The private sector gives support to the waste bank

program to be run successfully. The positive attitude of the private sector to take part in this program will support the realization of changes in people's behavior in treating waste. The participation of the private sector certainly should not be an option but a necessity because basically a company is a big waste contributor. This certainly will have an impact on other parties involved.

- Academics

Waste problems also require scientific investigation from the academics. The involvement of educational institutions will solve the waste problems in Batam City. The contribution given by the academics to the waste bank is through mentoring and training activities in the the waste bank management and training in transforming the waste into something that has economic value. It is clear that the academics must take a role to improve the quality of the of the waste bank management based on their research findings. The academics must also provide real education such as training, workshops, seminars, discussion groups, etc.

- Capital

The waste bank program is not very profitable in investment perspective. This is the reason why it is so difficult to get capital support. Only few parties want to invest in this program. The main value of this waste bank is environmental health. To make this program gains many profits is very difficult because of its low economic value. This weakness becomes homework for the government of Batam City. The capital to conduct this waste bank program is from the government. This means that its source of capital is mainly from the government. The government should do more effort to establish a partnership with more institutions. It is clear that running the waste bank program requires innovative breakthroughs so that it can attract people who are more interested in profit-oriented programs.

IV. CONCLUSION

The waste bank in Batam City shows a good performance. Although not all of the waste bank units are active, the consistent efforts made by the waste bank of Batam city have a big enough impact on the continuation of the social engineering attempt. It is possible to identify institutions that play a role in supporting the existence of the waste bank in Batam City.

However, there has been no initiation to create an integrated pattern to synergize these roles. This means that there are many institutions that carry out their roles and participation in supporting this waste bank, but they are carried out in their own style. The collaboration has not run effectively so that the development and popularity is not as good as the waste bank units in Java which have become the best practice. The researchers suggest the following strategy:

1. The government must set performance targets related to the development and expansion of the waste bank business scope. It is necessary to do a realistic

formulation to calculate the potential for at a later stage to set targets for the formation of new waste bank units.

2. The waste bank activists need to become actors with interesting jargon to socialize this program. The example is the jargon of "gold waste". The activists can use digital media to promote this program.
3. The collaboration between the private sector and the waste bank needs to be encouraged. One of the ways is by establishing cooperation related to the production of the private partners.
4. Encouraging the academics to be part of the waste bank management through cooperation agreements.
5. Increasing the capital by synergizing the management of waste bank with a the cooperative.

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