Reducing solid waste through waste banks: an empirical study in Kepulauan Riau, Indonesia

W E Yudiatmaja\textsuperscript{1,7}, Edison\textsuperscript{1}, T Samnuzulsari\textsuperscript{2}, Yudithia\textsuperscript{3}, S R I Rezeki\textsuperscript{4}, Suyito\textsuperscript{5}, D Akbar\textsuperscript{6}, and A Alfiandri\textsuperscript{1}

\textsuperscript{1} Department of Public Administration, Faculty of Social and Political Sciences, Universitas Maritim Raja Ali Haji, Jl. Raya Dompak Tanjungpinang, Kepulauan Riau 29111, Indonesia
\textsuperscript{2} Department of Sociology, Faculty of Social and Political Sciences, Universitas Maritim Raja Ali Haji, Jl. Raya Dompak Tanjungpinang, Kepulauan Riau 29111, Indonesia
\textsuperscript{3} Secretary Office of the Regional House of Representatives of Kepulauan Riau, Pulau Dompak, Tanjungpinang, Kepulauan Riau, Indonesia
\textsuperscript{4} Batam Tourism Polytechnic, Jl. Gadjah Mada Tiban, Batam, Kepulauan Riau 29425, Indonesia
\textsuperscript{5} Faculty of Applied Social Sciences, Universiti Sultan Zainal Abidin (UniSZA), Kampus Gong Badak, Kuala Trengganu 21300, Malaysia
\textsuperscript{6} Department of International Relations, Faculty of Social and Political Sciences, Universitas Maritim Raja Ali Haji, Jl. Raya Dompak Tanjungpinang, Kepulauan Riau 29111, Indonesia

\textsuperscript{7} Corresponding author: wayuguci@umrah.ac.id

Abstract. To overcome the solid waste problem, many city governments initiate and facilitate waste banks. Various studies have sought citizen participation in waste banks, but there is little attention to understanding how the coexistence of social capital can encourage waste banks’ practice. This study, therefore, aims at examining the social capital of the urban communities in the business process of waste banks. We looked in-depth at the practice of six waste banks in Tanjungpinang City, Kepulauan Riau, Indonesia. A series of interviews were carried out on the stakeholders of waste banks, such as management, customers, citizens, and households. We suggest that a number of social capitals shape the business process of waste banks, including trust, norms, social networks, and gotong royong. This research has a novel for the study of community-based waste management by considering the urban community’s social capital. Our study also has a worthy recommendation to the local government in managing waste management by corroborating social capital.

1. Introduction

The Indonesian government issued Law No. 18 of 2018 about solid waste management transforming waste dumping to waste recycling [1]. It also regulates the involvement of individuals and the community in waste management. In Indonesia, community participation in waste recycling activities is called as waste banks [2]. A waste bank is a place that is used to collect sorted waste. The sorted waste collection results will be deposited to the place where the handicrafts are made from rubbish or to the rubbish collector. The waste bank is managed using a system like banking carried out...
by volunteer officers. Depositors are residents who live in the vicinity of the bank and receive a savings book such as saving at a bank. All activities in waste banks are conducted with the principle of, by, and for the citizen. Like a conventional bank, waste bank likewise has system and management in which the community operates its operationalization. It uses the role of neighborhood relationships. Waste banks can provide an economic impact to society.

Like many cities in Indonesia, Tanjungpinang currently also faces the problem of environmental pollution induced by waste. Relied on the data of the Ministry of Public Works, Tanjungpinang city has 203,008 people and yields 1,055,6-ton waste per day [3]. The greater part of the waste is organic rubbish, mostly 37 percent. It has generated severe pollution in Tanjungpinang because the government has a limited capacity to dispose and process the waste. The government of Tanjungpinang city can merely pick up the debris as much as 76,8 m$^3$ each day. Tanjungpinang city has Local Government Regulation No. 14 of 2019, arranging about waste management systems in order to reduce solid waste. City government of Tanjungpinang has promoted waste banks based on communities’ initiative to achieve the objectives of the regulation. The government offers technical and funding support and waste banks are charged such target as its compensation. Waste banks are operated almost in all over regions in Tanjungpinang to support the goal.

![Figure 1. Location of waste banks in Tanjungpinang](image)

Although previous studies have sought waste banks in the context of community participation, there is relatively few research focusing on the community’s social capital in the management and business process of the waste banks. If many economists emphasize the essential role of economic capital in determining social life, social scientists regard the importance of social natures coexisted in such a society or nation-state. Social capital is closely related to non-economic capital influencing economic development. Despite remaining a variety of debates on its definition, many scholars believe social capital as social features encouraging the process of the economy, politics, socio-culture within the community or society. It includes relationships, network, participation, civic engagement, trust, and norms [4]. This paper aims at addressing the research gap in the recent literature of waste management by applying the social capital lens. It is crucial to be adjusted to illuminate the case of waste banks because waste banks involve individuals, citizens, and communities with such values and cultures. Both values and cultures have been implemented in the business process of waste banks.

2. Methods

This research was conducted in Tanjungpinang, capital of Kepulauan Riau, Indonesia. We checked six community-based waste banks around the city (see Figure 1 and Table 1). The research used a qualitative case study to achieve research’s objectives. Using case study, this research aimed to explain a specific case of waste banks. Specifically, the case study was applied to understand the phenomenon of social capital existing and practiced by the management and community in the waste banks. Case study research not only answered the questions from research on 5W (what, when, where,
who, whom) and 1H (how), but also was more comprehensive, namely about how (how) and why (why) about the subject, why it happened, and why it is referred as a case. We reached numerous waste bank’s stakeholders to obtain notable information about the management and business process of waste bank. The interviews were carried out to the owner and management, the customer, community’s leader, and the Office of Cleaning and Gardening Services of Tanjungpinang. Secondary data, such as statistical information, were gathered from official websites of the Central Bureau of Statistics of Tanjungpinang. The data were analysed using thematic analysis. It is a tool used to define, analyse, and report trends (themes) within the data.

3. Results and Discussion

3.1. The existing condition of waste banks

Waste banks are voluntarily established by such a community. The establishment of a waste bank is conducted through an agreement between the government and a group of citizens. There are officially six waste banks located all over regions in Tanjungpinang. Waste banks serve a number of customers in each area involving subdistrict. Because of covering large areas, Subdistrict East Tanjungpinang has two waste banks serving 805 customers. In the other side, Waste Bank of Kalpataru is the smallest waste bank with coverage of merely 52 customers. All waste banks receive more than one hundred tons of waste in Tanjungpinang (see Table 1). Because Waste Banks of Amad has the most customer, it has the most perceived waste, as much as 3 tons every month. Much of the debris consists of plastics or inorganic rubbish.

| Name         | Customer | Amount of waste | Address                      |
|--------------|----------|----------------|------------------------------|
| Amad         | 700      | 3 tons/month   | Potong Lembu Street         |
| Semesta      | 130      | 500 kg/month   | Palm Hills Residence        |
| Kalpataru    | 52       | 150 kg/month   | D.I Pandjaitan Street Km. 10|
| Gurindam Seraya | 105      | 58 kg/month   | Sungai Carang Bus Station   |
| Dahlia       | 110      | 250 kg/month   | Sultan Mahmud Street        |
| Cermai       | 90       | 1.8 tons/month | Arif Rahman Hakim Street    |

Source: The results of data processing (2020)

![Figure 2. The volume of waste of Tanjungpinang 2012-2016](image)

The waste bank is a system of collective dry waste management, encouraging the community to take an active role in its processes. The waste bank will accommodate, sort, and distribute economic value waste to the market (collectors) so that people can obtain economic benefits from saving waste. Waste deposited by customers should ideally be divided into general categories, such as paper, glass, metal, and plastic. Waste categorization must be adjusted to the ability and willingness of the people who become customers. If the community wants, even the categorization of waste can be made in
more detail, such as plastic bottles, plastic cups, white paper, blurry paper, and so on. Each category of waste has its own price. In this way, the community will desire to sort waste and it will become a new culture in the community [5], [6]. Therefore, the system of waste banks consists of five activities, covering sorting, depositing, weighing, recording, and transporting. It involves several actors cooperated with each other, such as waste bank coordinator, customer, collector, broker, and facilitator.

The existence and function of waste banks have a positive effect on the environmental condition in Tanjungpinang. As seen in Figure 2, we can see that the volume of waste in Tanjungpinang significantly decreases from 2013 to 2016. If the total waste in 2013 was 204,400 tons, the number shrinks until 40,150 tons in 2016.

3.2. The practices of social capital in waste banks

Our findings obviously show that social capital is embedded in all activities of waste banks in Tanjungpinang. There are four types of community’s social capital of the community encouraging waste banks, including norms, trust, network, and cooperation. There are norms regulating waste banks, both written and customary. If written norms constitute standard operational work procedures (SOP), customary norms are service features to the community regarding waste banks. These norms can strengthen the rules in achieving the objective desired by the community in order to stay organized and move according to their functions. Related to the norms applying in the community in waste banks, there are several social punishments for the community, including the pattern of not littering, the norm of not throwing rubbish on riverbanks, and the norm for planting trees in the yard as urban farming. It has led to rules in society, creating awareness and participation all citizens must-have.

Regarding the trust, it is manifested by the positive response from the community in waste banks. The community becomes motivated in carrying out waste management because adequate facilities have been provided in all places in the city. In addition, currently the community has implemented the waste-free area (Kawasan Bebas Sampah) programme by carrying out waste sorting activities in stages, starting from the household level to the village level. However, there are still a limited number of people capable of sorting waste at the household level. Waste banks have promoted a sense of trust in community empowerment and participation. Before the existence of a waste bank, people preferred to throw rubbish in the river basin. However, after the presence of a waste bank, the community became more concerned and involved in waste bank management through 3R (reuse, reduce, and recycle) activities.

In waste bank management, a social network is found that there are social relationships and social relations referring to the aspects of bonding, bridging, and linking. The dimension of bonding is indicated by the similarity of backgrounds, namely Malay ethnicity and Islam. The social relations which can exist because of the same background, namely ethnic Malays. Furthermore, in religious equality, social ties are formed when there are congregational prayer activities and routine recitation activities in the neighbourhood held twice a month. Other informal activities such as sports and collective recreation also result in strong social bonds formed through interaction and communication. The bridging aspect, namely the cooperation between the waste bank and community groups, such as the youth organization, community groups, and women’s group (Pemberdayaan Kesejahteraan Keluarga, PKK). In Indonesia called as gotong royong, cooperation is established because of the existence of common rules which have to be obeyed, so that communication or coordination is established among these groups to achieve the goals [6]. The linking element is the existence of a cooperative relationship among the waste banks, community groups, organizations, and government agencies in establishing agreements and cooperation. Besides, waste banks are likewise coordinated in promoting the waste-free area programme. It is aimed to bring rubbish from homes to waste banks effectively.

3.3. Discussion
Citizen participation is a crucial factor in influencing waste management in Indonesia [7]. Our findings are similar to prior studies analyzing community-based waste banks in Indonesia. For instance, Dhokhikah et al. examined community participation in waste management in Surabaya. They pointed out that there were several strategies to enhance citizens’ engagement, such as training, dissemination, regeneration, and the maximization of waste banks’ function [8]. Pandebesie et al. examined the factors determining participation of the urban community in electronic waste administration by the household in west Surabaya. Pandebesie et al. showed that several aspects affecting household participation, including a willingness to manage and willingness to pay [7]. Most currently, Asteria and Herdiansyah looked in-depth the practice of women’s involvement in waste banks in Tasikmalaya. They underlined the role of women in supporting the process of waste management in the community. They additionally suggested the social cohesion for women in the community as an important factor to effectively manage waste banks [9].

Prior works have not recognized social capital in the process of waste management and waste banks. Therefore, the current research adds to the body of knowledge on the study of community-based waste banks by considering the social capital of the urban community [10], [11]. The urban community has embedded social capital implementing positively in the whole subsystems of waste bank administration. In practical terms, our study contributes to the government in managing waste banks. Because of no strict regulation, we suggest to the local government to make a regulation compelling the citizens to deposit their useful daily rubbish in the waste banks. Moreover, we encourage two recommendations to the management of waste banks in dealing with the social capital of the urban community. First, the administration should strengthen trust among the member of waste banks in order to enhance the togetherness in governing waste banks. Lastly, the management should preserve the spirit of cooperation among the communities by maintaining a spirit of collaboration.

4. Conclusion

The intention of this paper is to investigate the social capital of the urban community in the process of waste banks. By looking at in-depth case studies of six waste banks in Tanjungpinang, we identify whether the features of social capital persisted. In addition, we inspect how they are embedded and practiced by the community. The findings of this work identify several elements of social capital coexisted and implemented by the urban community, including trust, norms, social networks, and cooperation. The present study adds our knowledge of the waste bank’s administration in the urban community through a social capital point of view. We recommend that the local government strengthen waste banks in Indonesia by offering a favorable regulation related to funding and management of waste banks.

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