



## Innovation Diffusion of Digital Application in Supporting Waste Management in Sidoarjo Regency

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### Article Info

#### Article history:

Received 27 November 2023

Received in revised form 16

January 2024

Accepted 22 January 2024

#### Keywords:

Waste

Waste Bank

Innovation Diffusion

### Abstract

Indonesia's waste management capabilities are still weak. The majority of waste is still handled by collecting-transporting-disposing and even many are still not handled. This has caused many landfills to experience over capacity, including those in Sidoarjo Regency. However, the process of Reduce, Reuse, Recycle (3R) waste is also being carried out by the people of Sidoarjo Regency. Waste banks apply these principles and contribute significantly to reducing waste entering the landfill. Therefore, there needs to be an effort to improve the performance of waste banks, for example through training on the use of digital waste bank applications. The process of innovation diffusion is important so that work processes become more efficient and data can be stored properly. However, there are many obstacles in diffusing these innovations. This study aims to examine the diffusion innovation of digital application in supporting waste management in Sidoarjo Regency. Authors adopt qualitative research methods. The result shows that the innovation diffusion process encountered quite a lot of obstacles both from the change agent and from the client, in this case the waste bank administrator. Therefore, the objectives of the innovation diffusion have not been achieved.

## Introduction

Waste banks play an important role in realizing the circular economy. Therefore, in its strategic plan (2020-2024), the Ministry of Environment and Forestry stipulates that there needs to be facilitation and guidance for waste banks, increasing the income of waste bank customers, and strengthening the commitment of local governments to handling and reducing waste in accordance with the targets of the National Policy and Strategy (Jakstranas) through budget provision, increasing technical, institutional and human resource capacity of waste managers. In addition, the Regulation of the Minister of Environment and Forestry Number P.75/MENLHK/SETJEN/KUM.1/10/2019 concerning Roadmap for Waste Reduction by Producers stipulates that Producers can cooperate with waste banks registered with the Government and / or Local Government in terms of providing shelters.

Sidoarjo Regency is one of the districts facing waste management problems. The growth of waste generation in the district is in line with the growth of residential areas (Final Draft of the Sidoarjo District Environment and Hygiene Office Strategic Plan 2021-2026). Many workers work in Surabaya City but have homes in Sidoarjo Regency. The waste problem in this district is caused by several things including (1) Lack of waste handling in landfills and waste reduction in TPST; (2) Still low waste management based on the 3R principle; (3) Lack of public awareness of environmental cleanliness (Final Draft of the Strategic Plan of the Sidoarjo District Environment and Hygiene Office 2021-2026). In addition, the demand for waste transportation services is increasing, but the budget for procuring additional waste

transportation facilities and infrastructure is not yet available; some villages have not made maximum reductions from the source level; the budget for procuring or maintaining TPST facilities and infrastructure in several villages is not yet available (Final Draft of the Sidoarjo District Environment and Hygiene Office Work Plan 2023).

The existence of waste banks in Sidoarjo Regency also continues to grow and has an important role in reducing the burden on landfills. Currently, the Jabon landfill is experiencing over capacity (news.detik.com). Waste banks are able to reduce the amount of waste brought to the landfill. Based on information from one of the administrators of the Srikandi Waste Bank Association, in 2019, the number of waste banks was around 180 units. Unfortunately, the existence of waste banks has received less attention in program planning at the Sidoarjo District Environment and Hygiene Office, both in the Final Draft of the Sidoarjo District Environment and Hygiene Office Strategic Plan 2021-2026 and the Sidoarjo District Environment and Hygiene Office Work Plan 2023.

Several other trainings were initiated by parties outside the government, both from companies and Non-Governmental Organizations (NGOs), especially training on the use of waste bank applications. This is based on the realization that the importance of using technology in encouraging the performance of waste banks. Previous research (see Nandayani 2018; Ardiantoro, 2019; and Afuan et al, 2021) shows the importance of building an information system in the governance of the waste bank. The study also shows that a web-based information system in the waste bank can make it easier for waste bank officers to manage waste bank data and improve the quality of service to customers and waste partners.

Meanwhile, the study of Budilaksono et al (2021) revealed how a simple android-based digital application about waste bank management can make customers see their savings at any time. The study conducted by Ediana et al (2021) also confirms that designing a waste bank savings management application information system can make it easier for waste bank officers to input customer data, collect and sell to print reports will be easier with data that has been recorded properly. The use of digital applications can provide information according to the data needed, starting from the management of student waste bank savings to the transactions needed by customers, including a recapitulation of customer savings balances, savings transaction reports and inventory reports. In 2018, Unilever partnered with PT Wallezz Finansial Teknologi and NGO Spektra in order to encourage waste bank administrators to use applications to facilitate the work process of waste banks, for example in recording customers, types of waste, amount of waste, and value of waste deposited. PT Wallezz Finansial Teknologi has developed the Online Banking Bank Sampah (Obabas) application. In this activity, NGO Spektra acts as a trainer for the use of the application.

Training on the use of the waste bank application is a form of innovation diffusion to assist the environmental governance process. In some literature, the term innovation diffusion is interchangeable with technology diffusion. According to (Lechman, 2015) from a socio-economic perspective, the diffusion of both innovations and new technologies is very important, as it triggers major changes in society and the economy, impacts shifts in productivity and education, and transforms markets and organizations, among other things. Rogers (2010) defines innovation diffusion as the process by which innovations are communicated through specific channels over time among members of a social system. According to him, an innovation process within organization consist of five stages namely agenda setting, matching, redefining/restructuring, clarifying and routinizing. Mansfield (1971) emphasized the unique role of two-stage communication of knowledge exchange between users and non-users about the advantages of new technology. Furthermore Greenhalgh (2005) argues that critical success factors in the change agent role for instance (1) effort; (2)

client orientation; (3) compatibility with client's needs and resources; (4) empathy; (5) homophily; (6) credibility; (7) use of opinion leader; (8) demonstration; (9) client.

However, the process of innovation diffusion is not easy. Many obstacles were faced in carrying out the process. The majority of waste bank administrators are elderly, making it difficult for them to understand and use the waste bank application. In addition, other problems were the lack of availability of an adequate internet connection at the waste bank site, the design was considered less user-friendly and the waste bank administrators did double recording, both in the application and in the book, so they felt burdened by this innovation diffusion process. In addition, the Obabas application is no longer active. So that some waste bank administrators who have used this application feel disappointed because they have previously felt the benefits.

There has not been much research that examines the diffusion of innovations in waste banks. Some previous studies have examined community service activities in the form of training on the use of applications to support waste bank management (Rosadi et al, 2019; Agustin et al, 2020; Silfiah et al, 2021). Other research related to the waste bank application focuses on developing the application (Marali et al., 2018; Wardhana et al., 2019; Sansprayada and Mariskhana, 2020). The development of the waste bank application intends to make it easier to record waste and find waste pickup locations. Based on the previous explanation, the diffusion process of the waste bank application innovation is not always smooth. In fact, this activity finds many obstacles so that many waste banks ultimately do not use the application. Therefore, this study aims to examine how digital application innovation diffusion process in supporting waste management in Sidoarjo Regency.

## Methods

This research can be categorized as a qualitative approach by collecting both primary and secondary data (Bandur, 2019). Data collection, both primary and secondary, was obtained from several sources. Interviews were conducted with several parties including waste bank administrators, assistants from Spektra NGO, parties from Unilever Indonesia Foundation, and assistants from PT Wallezz Financial Technology. Secondary data used included Regulation of the Minister of Environment and Forestry No. P.75/MENLHK/SETJEN/KUM.1/10/2019 on the Roadmap for Waste Reduction by Producers, Regulation of the Minister of Environment and Forestry No. 14/2021 on Waste Management in Waste Banks, Final Draft of the Sidoarjo District Environment Department Work Plan 2023, Final Draft of the Sidoarjo District Environment Department Strategic Plan 2021-2026, Ministry of Environment and Forestry Strategic Plan 2020-2024, books and journal articles on the topic of innovation diffusion and environmental governance, and several archives owned by the parties involved.

Data analysis was conducted using thematic analysis techniques. Thematic analysis is a way to analyze data with the aim of identifying patterns or finding themes through the data that has been collected by researchers (Braun & Clarke, 2006). The data analyzed are data from interviews and data from other literature. The stages of this method are (1) Understanding Data; (2) Arranging Codes; (3) Finding Themes (Heriyanto, 2018). The themes obtained are then narrated to answer research questions.

## Results and Discussion

### Online Banking Bank Sampah (Obabas) Training

Obabas application training is at least conducted using three approaches, namely Obabas socialization and simulation, mentoring, and competition. The socialization and simulation of the Obabas application was carried out by PT Wallezz Finansial Teknologi. This activity was

carried out to both waste bank administrators, Spektra and Obabas Ambassadors at different times. Obabas Ambassadors are volunteers who assist the company in assisting waste bank administrators. Obabas Ambassadors come from waste bank administrators. The socialization and simulation of the application by the company was carried out only once for waste bank administrators and Spektra. As for the Obabas Ambassador, the socialization and simulation were carried out about 2-3 times. After socialization and simulation, followed by creating a Whatsapp Group. This Whatsapp group contains waste bank administrators and assistants from Spektra, Duta Obabas and PT Wallezz Finansial Teknologi. This is done to facilitate coordination in carrying out the next activity, namely mentoring.



*Figure 1. Socialization and Simulation of Obabas Application*

*Source: Obabas Report, 2018*

Meanwhile, Spektra conducts waste bank mentoring by visiting the villages where the waste banks are located. In addition to mentoring, Spektra also has an interest in ensuring that waste bank administrators have inputted data on the application or not. This must also be reported to the Unilever Indonesia Foundation. In this activity, Spektra is also usually assisted by Obabas Ambassadors. In addition, PT Wallezz Finansial Teknologi is very open if Spektra or waste bank administrators want to consult online. Assistants from PT Wallezz Finansial Teknologi usually also use video calls when assisting mentoring. The mentoring process by several parties was carried out over a period of 15 months.

The third form of training is competition. This competition was held in commemoration of the National Waste Awareness Day which coincided on February 21. This competition is divided into several categories, namely competitions related to waste bank units with the most tonnage, customers with the most tonnage, and customers with the most rupiah value collected. This kind of competition encourages waste bank administrators to use the Obabas application. Some waste bank administrators enthusiastically participated in this activity.

### **Agent of Change in Innovation Diffusion Process**

In term of Obabas application innovation diffusion, Unilever Indonesia Foundation, PT Wallezz Financial Technology and Spektra are agents of change. This change agent seeks to realize changes in waste bank management, especially in bookkeeping, from manual to digital. This is of course intended to make the bookkeeping process more practical and efficient. Some important things that need to be considered by change agents so that their efforts can achieve their goals have been conveyed by Greenhalgh, et al. (2005) The following authors will review some of these important things:

#### ***Effort***

The communication between PT Wallezz Finansial Teknologi and Spektra is not only limited to one-day training activities. But they also provide easy access for waste bank administrators to ask about the constraints of using the application via telephone. In addition, they also visit waste banks regularly to guide the use of the Obabas application. So that the information

conveyed by the change agents is in accordance with the needs of the waste bank administrators.

### ***Client Orientation***

Agent of change are able to position themselves as partners in improving the performance of waste banks. Therefore, the design of the application should be relevant to the needs of waste bank administrators. According to the recognition of some waste bank administrators, this application is considered quite helpful for the performance of waste banks but still requires improvement, for example related to the addition of waste type features. There are even those who think that the use of the application does not have a significant effect in improving the performance of waste banks.

### ***Compatibility with client's needs and resources***

The training design is considered quite good because it comes to the place of the waste bank management directly. Although during the training with the company, there were waste bank administrators who were not present, they were visited by Obabas Ambassadors and trained to use the Obabas application. However, there are still those who are not satisfied with the training because it is considered not able to motivate waste bank administrators to carry out their duties. Furthermore, most administrator did not have a well-suited smartphone, email address and internet connection to access this application.

### ***Empathy***

Waste bank administrators have been doing bookkeeping manually for a long time. They do not easily replace this method with the use of digital applications, so they need more help from change agents. Change agents in this case are considered to be able to understand these constraints. However, not all obstacles can be overcome by change agents, for example related to the addition of features on the types of waste included in the application.

### ***Homophily***

Successful change agents have the same socioeconomic, professional, and professional status, background, education level, and social similarities as their clients. The education levels of both waste bank administrators and change agents are relatively the same. Of the two parties there are also those who have taken undergraduate degrees. There are even Obabas Ambassadors who provide assistance from waste bank administrators.

### ***Credibility***

Successful change agents are seen as credible in the eyes of clients. The facilitators are considered to understand well the function and use of the Obabas application. This can be seen from the facilitators' efforts to be open to various questions regarding the use of the application. They are also willing to go directly to the waste bank management place.

### ***Use of opinion leader***

Successful change agents work through opinion leaders. Opinion leaders are those who are considered capable of convincing the importance of this Obabas application. The involvement of waste bank administrators in conducting Obabas application training activities indicates that there are opinion leaders in the training. However, many do not believe that the use of this application is important and want to use it.

### ***Demonstration***

Successful change agents are those who conduct demonstrations of innovations to increase their visibility and observability to clients. Based on the previous description, it shows that the

change agent not only tells the innovation of the application but also has simulated the use of the application.

### ***Client***

The success of the change agent depends on the client's ability to evaluate the innovation. The waste bank administrators have conveyed the obstacles they face when practicing the use of the Obabas application. This also received a good response from the application trainers. The application trainers tried to visit the waste bank administrators to assist the process of using the application. However, the obstacles faced by the waste bank administrators have not been able to be overcome by the application trainers and also PT Unilever, for example related to the absence of adequate supporting facilities.

### **Constraints in the Diffusion of Waste Bank Application Innovations**

In the process, the innovation diffusion faced various obstacles. The obstacles faced come from both the waste bank management and the application development company. The majority of waste bank administrators are elderly. They do not keep up with technological developments, especially smart phones. Many of their smart phones are inadequate for the installation of the Obabas application. The application can be installed if the android version is at least 5.0. Meanwhile, many waste bank administrators have smart phones with android specifications below 5.0. In addition, the installation procedure requires specifying the waste bank location point and email address. This is also considered quite difficult for administrators. Moreover, many administrators are elderly, many of whom do not have email or social media as one of the requirements for installation.

In addition, obstacles also come from PT Wallezz Financial Technology. The company has not yet received economic benefits from users. The company has difficulty in determining on what kind of features they can get these benefits. Until in the end because no profit was obtained in the development of the Obabas application, this application was then not reactivated until now.

At that time, not many waste bank administrators in Sidoarjo Regency used the Obabas application. According to Triana, a Waste Bank Facilitator from Spektra NGO, that of the many waste banks that were given training, not 30% of them used the Obabas application at that time. Based on the activity program report prepared by PT Wallezz Financial Technology, it is known that there are 18 waste bank units in Sidoarjo Regency that use the Obabas application.

But now all waste bank administrators in Sidoarjo Regency no longer use the Obabas application. The application is not activated by the company because the company does not get economic benefits. Actually, the company has a core business in e-money and this is one of the features in the Obabas application. Although e-money is not the main need of both waste bank administrators and customers. In addition, the waste bank digitization program is also no longer a concern for the Unilever Indonesia Foundation. Although the Obabas application training program held in Sidoarjo Regency was not successful and the waste bank administrators also evaluated the program. So this program seems like an unsustainable activity

### **Conclusion**

The Obabas application diffusion innovation aims to improve the performance of waste bank administrators and improve services to customers. The form of this activity consists of socialization and simulation, mentoring and competition. This activity was carried out by agents of change, namely the Unilever Indonesia Foundation, PT Wallezz Financial Technology and Spektra. In general, the innovation diffusion activities they carry out are quite good but pay less attention to client resources. Waste bank administrators do not have adequate facilities, such as relevant smart phones and stable internet connections. In addition, the

company does not get economic benefits from using the Obabas application. Unilever Indonesia Foundation no longer pays attention to the sustainability of the waste bank digitization program.

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