



Mozaik BUMDES Waste Bank Application Development Using Android-Based GPS

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ABSTRACT

In this study, GPS technology was used to determine the location for picking up residents' garbage. Previously, a Website-based Garbage Bank application was built which was used as a waste bank transaction information system, waste price information, and citizen savings book information. However, during the implementation of the Website-based Garbage Bank in Pematang Serai Village, there were problems, namely the lack of waste bank volunteers who run the Garbage Bank, especially in picking up waste from residents' homes. The lack of garbage collection volunteers results in the accumulation of garbage in the community due to time constraints for customers to deliver their waste to the Waste Bank. So the use of geotagging technology on the Global Positioning System (GPS) can make it easier for the public to report the points where garbage is collected that the garbage officers did not know beforehand so that the garbage collectors can easily find the point of the garbage pick-up location. So the old system was developed into a Garbage Bank Application using GPS as a Web-site based waste collection and reporting system. With the marking of locations and transportation of waste, it is hoped that there will be active communication between the community and cleaners so that piles of garbage at points that were previously difficult to reach can be handled more quickly. Minimizing the accumulation of waste in the homes of residents who are customers of the Mozaik Waste Bank to create a beautiful, clean and waste-free environment.

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1. INTRODUCTION

Pematang Serai Village has one tourist attraction, namely geol tourism. Therefore, the people of Pematang Serai Village are required to keep the environment clean from garbage. The Mozaik Waste Bank carries out waste processing and waste selection but encounters various obstacles, namely the lack of waste transport volunteers which results in the accumulation of waste in certain locations and residents' homes. The

accumulation of garbage that occurs can be a source of spreading bacteria that are a source of disease (Widaningsih & Suheri, 2019), (Ramdhan, et al., 2019).s

The problems that occur in the Mozaik Waste Bank can be solved by applying technology, especially the internet (Winarso, et al., 2017),(Guntoro, et al., 2019), (Hariyanto & Wahyuni, 2020). The problem is how this system can locate the location of the complainant from Google Map for the location of temporary waste disposal sites, and that location can be found by the garbage janitor to pick up the garbage and take the garbage to the final disposal site . The system will be built with reporting data by the community for waste that is in place and at the house location to be picked up by the garbage janitor, this location point is given by the community so that the garbage janitor can find the location point and clean up the garbage in the area.

Geographic Information System (GIS) is a computer-based information system for storing, managing and analyzing, and recalling geographically referenced data that is currently developing (Sansprayada et al., 2020), (Sasmito, 2017). The benefits of GIS can provide convenience to users in determining the location of a place (Firmansya, Nurhadi, & Mulyadi, 2019). The existence of a GIS-based application can facilitate location mapping (Wardhana, Tolle, & Kharisma, 2019). Garbage banks are one of the efforts to solve waste problems that occur in various regions and places (Julianto, Hendrik Setyo Utomo, & Herpendi, 2019), (Juliany, Salamuddin, & Dewi, 2018), (Firmansya, Nurhadi, & Mulyadi, 2019), (Sansprayada et al., 2020), (Syahbiba, 2017), (Budilaksono, Oisina, & Kencana, 2021), (Samsoni, Kurniawan, & ..., 2021).

Android is an operating system on mobile phones that is open and based on the Linux operating system. Android can be used by anyone who wants to use it on their device. Android is open source which has an impact on the continuous and significant increase in the number of users and application developers (Sansprayada et al., 2020) (Purnama, dan Silfianti, 2012), (Choiri, Beny, & Nugroho, 2015), (Afuan, Nofiyati, & Umayah, 2021).

2. RESEARCH METHOD

The method used in building the application uses the waterfall method, where the Android-based BumDes Mozaik waste bank application is built according to the needs of the BumDes Mozaik waste bank in Pematang Serai Village. In the application there is a menu for picking up trash location points at residents' homes or garbage location points located in a place or other public facility using the Latitude Longitude distance calculation algorithm. The calculation of the latitude distance and longitude formulas is as follows:

User latitude, destination latitude, user longitude, destination longitude

$$\text{Distance} = (\text{latitude1} - \text{latitude2})^2 + (\text{longitude1} - \text{longitude2})^2$$

$$\text{Distance} = ((\text{lat} + \text{log}) * 111.319)$$

Calculation of distance latitude and longitude:

Latitude1 = 3.580141,

Longitude1 = 98.691521

Latitude2 = 3.575669,

Longitude2 = 98.68723

$$\text{Distance} = (3.580141 - 3.575669)^2 + (98.691521 - 98.68723)^2$$

$$\text{Distance} = (\sqrt{(1.9998783 + 1.8412680)} * 111.319)$$

$$\text{Distance} = 0.6725 * 100 = 6725 \text{ Meters... (1)}$$

2.1 Use case diagrams

The use case diagram of the System on the Website-Based Waste Bank Application occurs as follows:

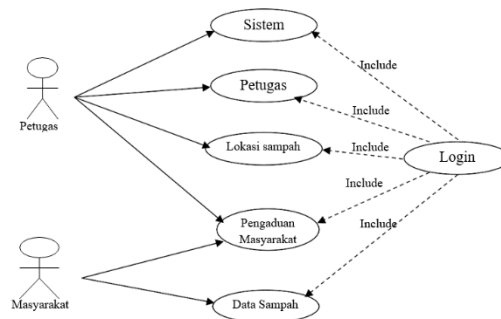


Figure 1. Usecase Diagram

2.2 Actifty Diagram

Activity Diagram is a description of the activities performed by the user on the application. The following is an Android-Based Waste Bank Application Activity Diagram as follows:

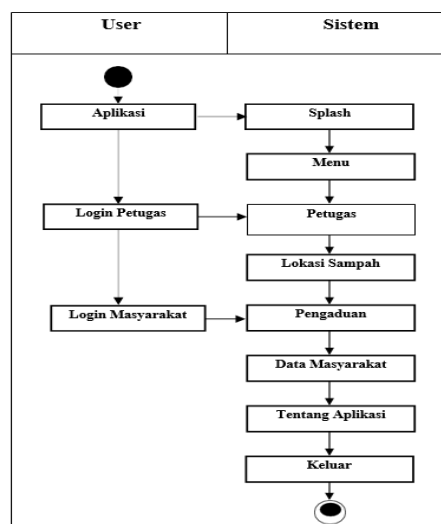


Figure 2. Actifty Diagram

3. RESULTS AND DISCUSSIONS

The BumDes Mosaic Waste Bank application in Pematang Serai Village has been successfully built. Then several stages of application testing and testing have been carried out. Especially the error test for determining the location of the garbage pick-up point. The following is the initial appearance of the Android-Based Garbage Bank Application as shown in Figure 3. As follows:



Figure 3. Home Page View

Information, In the application there are several menus in which there are sub-menu items on the Android-based Mozaik Waste Bank application as follows:

- a. Garbage Pickup Location Menu
On the menu display for the temporary garbage pick-up location, we have to select the location menu.
- b. Complaint Menu
On the complaints menu there is a menu that is used by the public in making complaints to the garbage pick-up officer.

3.1 Officer Login Display

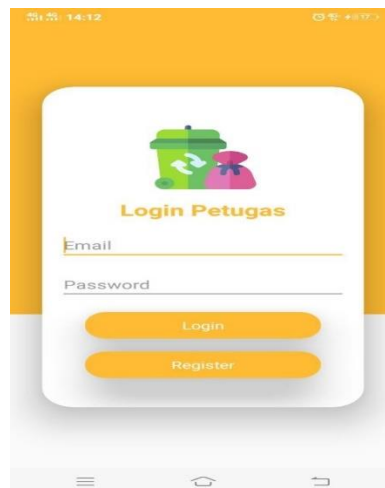


Figure 4. Officer Login Display

3.2 Trash Location View

In the application there is a menu to display the garbage location form containing a brief explanation of the application for the garbage pick-up location, where this menu is used by the garbage collection officer as a guide to the location of the waste to be transported from waste bank customers to be collected at the Garbage Banks or temporary dumps, as shown in Figure 5 as follows:

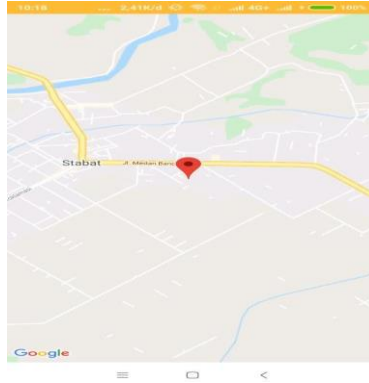


Figure 5. Trash Location View

3.3 Admin Menu Display

In the application there is also a choice of admin access rights, where the admin is part of the Android-based waste bank application user who monitors which garbage has not been or has been picked up, recaps menu menus, inputs, edits, deletes garbage data.

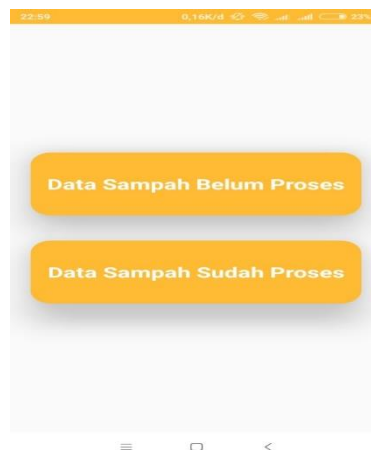


Figure 6. Trash Location View

3.4 Admin Menu Display

In the application there is also a choice of admin access rights, where the admin is part of the Android-based waste bank application user who monitors which garbage has not been or has been picked up, recaps menu menus, inputs, edits, deletes garbage data.



Figure 7. Admin View

3.5 Garbage Pickup Reporting Menu

The garbage pick-up reporting menu is a menu from the application where customers report waste that must be picked up by the garbage pick-up officer. Then the customer determines the location of the house or trash can to be picked up. Furthermore, the garbage pick-up officer will pick up the garbage as shown in Figure 8 as follows :

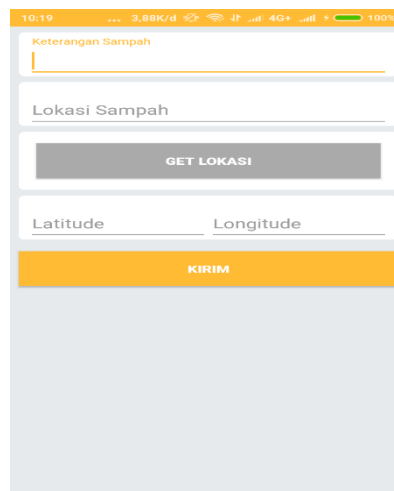


Figure 8. Garbage Location Display

3.6 Customer Main View

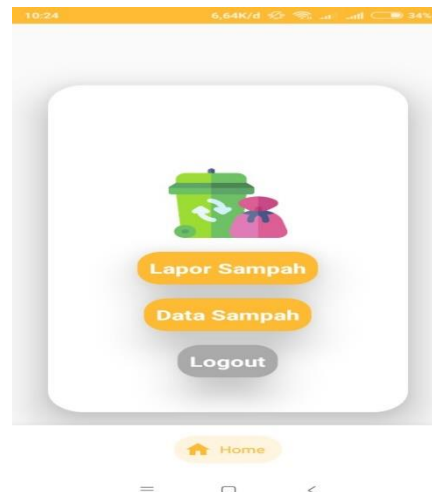


Figure 9. Customer Main View

4 CONCLUSION

The Garbage Bank Application System with Android-based garbage collection makes it easy to store data, access information between garbage officers and customers in picking up garbage with Android-based GPS so it's easier and faster. The waste bank application system that has been built has been adapted to the needs of the Pematang Serai village so that it can assist officers in recording bank savings transactions and make it easier for customers to view their balance data because of the passbook provided without having to come to the waste bank. The application of this waste bank application is expected to make the Pematang Serai village environment cleaner, increase people's income because the sorted waste has economic value. The waste bank application can also support a clean environment that can support Geol tourism objects in Pematang Serai Village. This system only connects waste bank officers and customers, hopefully in the future it can be developed by connecting to collectors directly so that the selling price of waste is higher and minimizes the accumulation of economic value waste at the Waste Bank location.

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