Revolutionizing Waste Management: The Garbage Bank Solution and Its IT-Driven Implementation for Eco-Friendly Hygiene

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Abstract

The high yield of domestic household waste is a significant problem for environmental hygiene, where waste management is still not a top priority to provide profit opportunities for the community and the government. Thus, to campaign for ecological hygiene solutions by applying information technology in the form of a Garbage Bank, which can help deal with domestic waste, especially plastic waste. The Waste bank application is built using the CodeIgniter framework, which has the concept of Model, View, Controller (MVC), which has functions such as a model for the database framework, views of the system view and controllers as actions for executing user commands. The system was also developed using the extreme programming method with the advantage of being fast in development, simple and object-oriented. The resulting system has conducted a feasibility test to conclude that it is following its function. This research resulted in a system of three parts: the admin section, which can manage data on partners, customers, pick-ups to withdraw funds and reports. The partner section manages customer data, waste, pick-up and reports, and the customer section registers, views the history of saving waste, withdraws funds, and view types of waste and partners entirely done online.

Keywords: Application, Waste Bank, Codeigniter

1. Introduction

Waste is the residue of human daily activities or solid natural processes. Waste often refers to waste material that is unwanted or not beneficial to humans after the end of a domestic activity or process. The role of information technology is an innovation to facilitate the processing of waste waste, especially domestic waste in the community. The lack of public awareness is the main factor in the accumulation of waste that can have an impact on the environment, both health and disasters.

Based on data from the Environment Agency (DLH) in Lampung province, it assumes that waste production in 2018 is 0.4 kg / person / day with a potential waste...
generation of 978 tons / day. From the generation of waste, plastic waste is a major concern because it includes organic waste that cannot be decomposed. Consumption of plastic waste is estimated at 17 kg / person / day with a potential consumption of 41,557 / day. If the assumption of the ratio of plastic waste is 50%, the potential for plastic waste caused is 20,778 tons / year or 58 tons / day, so that it can have an impact on pollution and infectious diseases and can threaten the socioeconomic life of the community.

Over time with the increasing waste waste, of course, information technology is needed as an innovation in handling and providing waste treatment solutions. Currently, waste processing is still not a top priority to provide profit opportunities for the community and the government. Therefore, to campaign for environmental hygiene solutions, namely by applying information technology in the form of Waste Banks that can be useful in handling domestic waste, especially plastic waste. Waste Bank innovation can play a role in building public awareness in domestic waste treatment, where the community as customers can be done by collecting waste with a predetermined type, then given to the Waste Bank operator for data, weighed and can get payments based on waste categories. So that these efforts can provide benefits for customers or the community and participate in maintaining the cleanliness of the environment. As the research conducted by (Aji Dedi Mulawarman et al., 2022) (Ain et al., 2021)(Suparmini & Junadi, 2018) states that the existence of waste banks not only provides benefits in terms of environmental cleanliness, but also provides economic benefits for the community.

**Waste Bank**

Waste banks represent a method for handling household-level waste, focusing on fostering community involvement in the management of domestic waste. Functioning as collection points, waste banks enable the segregation of waste based on its categorization. The waste deposited within these banks holds a monetary worth due to its economic potential. This approach underscores the empowerment of local communities while efficiently addressing waste management concerns. (Wulandari et al., 2017)(Dare et al., 2022)(Kenny & Priyadarshini, 2021).

Waste Bank is a banking system whose activities are the same as banking in general, inorganic waste contained in the household, school, public sector can have economic value if the community can sort the waste properly. Not all types of inorganic waste can be purchased by waste banks, there are several types of waste that can be purchased such as aluminum, bottles, paper, duplex and others (Utama et al., 2022). As outlined in The Law of the Republic of Indonesia Number 10 of 1998 dated November 10, 1998, which addresses matters related to banking, the concept of a bank refers to a
corporate entity entrusted with the task of accumulating financial resources from the general populace through deposits. Subsequently, these amassed funds are allocated back to the public in diverse manners, including the provision of credit and potentially other avenues, all with the overarching objective of elevating the overall quality of life for a substantial segment of the population. (Pamungkas et al., 2020).

**CodeIgniter**

CodeIgniter is a Framework for PHP programming languages, which Rick Ellis created in 2006. CodeIgniter has many features that help PHP developers to be able to create applications easily and quickly and have a flexible nature of being able to develop in web devices, desktops and mobile (Kuswandi et al., 2021).

Based on this presentation, a solution is needed such as designing and building a Waste Bank using the codeigniter (CI) framework. The application of codeigniter (CI) frameworks in system building has the advantage of being able to learn and build systems easily and quickly in a short time. The method used to support system development is carried out using the Rational Unified Process (RUP) method with the advantage of being flexible if the user wants to make changes at each stage of development.

2. Research Methods

This stage of research is also the development of the research framework, and it is further divided into several sub-menu sections. The stages of the study can be seen in Figure 1.

![Figure 1. Stages of Research](source)

2.1. Collecting Data

Pamungkas et al. (2020)
The data collection process was carried out using three approaches, namely a field study to the waste bank to see the current business processes. Interviews to find out the problems faced by customers and observations to ensure data and information are synchronized.

2.2. Development System

Application development starts from planning related to the purpose of building the system, design related to the UI that will be used, Coding is the implementation of the design and Testing to test the application.

2.3. Evaluation

This process is to ensure that the application runs perfectly with blackbox testing.

3. Results and Analysis

3.1. Data Collection

The data collected is in the form of information in the Rejomulyo sub-district, providing input regarding the design of the application to be built. Currently, information media related to waste are collected late, the amount of funds in the waste bank is not yet available.

3.2. System Development

The initial stage of formulating the development of the system is providing information on waste collected, funds owned, and dashboards that can be used by sub-districts to monitor the system. The next stage is the design of the waste bank system as follows:

a. Login

The display on the login menu is part of being able to enter the next section which can be seen in Figure 2.
b. **Partner Menu**

Partner views are views used to add, change, delete and display data as shown in Figure 3.

Source: Research Result (2023)

Figure 3. Partner Menu Display
c. **Customer Menu**

The display on the customer menu is a view used to manage data such as displaying, changing, deleting and adding data that can be seen in Figure 4.

![Customer Menu Display](image)

Source: Research Result (2023)

Figure 4. Customer Menu Display

d. **Garbage Type Menu**

The display on the garbage type menu is a view used to display, add, change and delete data as shown in Figure 5.

![Junk Type Menu](image)

Source: Research Result (2023)

Figure 5. Display of the Junk Type Menu
e. **Pick Up Confirmation Menu**

The display on the pick-up confirmation menu is the view used to confirm the data as shown in Figure 6.

![Dashboard](image1.png)

*Source: Research Result (2023)*

**Figure 6. Display of Pick-up Confirmation Menu**

f. **Withdrawal Menu**

The display on the withdrawal menu is a display used to confirm the withdrawal of funds by the data customer as shown in Figure 7.

![Dashboard](image2.png)

*Source: Research Result (2023)*

**Figure 7. Withdrawal menu display**
g. **Junk Menu**

The display on the junk menu is a view used to display, add, change and delete data as shown in Figure 8.

![Figure 8. Trash Menu Display](image1)

Source: Research Result (2023)

h. **Pick Up Menu**

The display on the pick-up menu is a view used to display, add, change and delete data as shown in Figure 9.

![Figure 9. Pick-up Menu Display](image2)

Source: Research Result (2023)
i. **Garbage Type Menu**

The display on the garbage type menu is a view used to display data as shown in Figure 10.

![Garbage Type Menu](image1)

Source: Research Result (2023)

**Figure 10. Display of the Junk Type Menu**

j. **Garbage Storage History Menu**

The display on the waste saving menu is a view used to display data as shown in Figure 11.

![Garbage Storage History Menu](image2)

Source: Research Result (2023)

**Figure 11. Display of the Garbage Storage History Menu**
k. Display

The display on the withdrawal menu is a view used to manage data such as displaying, changing, deleting and adding data that can be seen in Figure 12.

![Withdrawal Menu Display](image)

Source: Research Result (2023)

Figure 12. Withdrawal Menu Display

4. Conclusion

The conclusion of the research resulting from designing and building the Waste Bank application with the application of the codeigniter (CI) framework resulted in a system consisting of 3 parts, namely the admin section that can manage partner, customer data, pick-up to withdrawal of funds and reports. The partner department manages customer data, garbage, pick-ups and reports, and the customer section registers, views the history of saving waste, withdraws funds, sees the type of waste and partners. The waste bank application is built using the codeigniter framework which has the MVC concept with an object-oriented concept that simplifies the coding process. The system is also developed using extreme programming methods with the advantage of being fast in development, simple and object-oriented.

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Author Contributions
Kaesar Azra Putra Zeva proposed the topic and designing. MS Hasibuan and Firmansyah and Sutedi conducted testing and implementation.

Author Contributions

The authors declare no conflict of interest.

Reference


