

Making Requirements for Karanglo Asri Waste Bank Using the User-Centered-Design Method

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Abstract

Since 2017, the Karanglo Asri Waste Bank has been operating with three core managers, including the chairman, secretary, and treasurer, as well as 32 active customers. Residents have been educated on identifying waste that can be resold to collectors or transformed into fertilizers and handicrafts using a waste bank maintained by a local government agency. The staff of the waste bank has continued to write by hand, and each has his or her notebook. Nonetheless, administrative books include hurdles—for instance, errors in recording, destruction, loss, improper computations, and unstructured records. Therefore, the customers must resolve these issues by matching the terms and criteria. The User-Centered-Design method included three phases for determining the requirements of the Karanglo Asri Waste Bank. They generated four user journey maps, four use case diagrams, six activity diagrams, and eighty-four user stories. It was completed for testing by the managers and customers based on requirements derived from the needs of the Karanglo Asri Waste Bank's staff and customers.

Keywords: *Requirement Gathering, Waste Bank, Design, User Centered Design, Unified Modeling Language*

1. Introduction

The issue of environmental pollution is never resolved. Environmental pollution can be perceived from various angles, one of which is accumulating waste. With 264 million inhabitants, Indonesia is the world's fourth most populous country[1]. The higher the pace of population expansion in a location, the higher the level of consumption, leading to an increase in waste. Waste is one of the focal points of unresolved problems due to a lack of care and engagement of each individual in environmental protection[2]. Accordingly, waste accumulates, resulting in a filthy atmosphere. This issue can be solved if each individual understands the significance of managing waste generated by personal usage. In Indonesia, waste management has become a part of waste management law.

Waste processing is a component of waste management. It is described by Law No. 18 of 2008 as altering the form of waste by modifying its features, content, and quantity. Waste processing aims to decrease the quantity of waste while still utilizing the value that remains in it. Several methods can be employed to deal with waste, one of which is transferring it to a waste bank maintained by a community group. The government has sponsored the existing waste bank through the local environmental agency to educate the public on waste classification depending on the type. The environmental agency provides direction in the form of education on how to classify waste, which can be sold to collectors, reprocessed as handicrafts with a selling value, and organic waste that can be reprocessed into fertilizer useful for farmers with a selling value through the waste bank.

The Karanglo Asri Waste Bank, established in 2017, has been engaged in waste classification in the community. It is located in Kabangjo, Sidomoyo, Godean District, Sleman Regency, Yogyakarta. This waste bank has 32 active customers from two hamlets and is governed by a chairman, with the help of a secretary and a treasurer. The activities of this waste bank include announcements, meetings, weighing, depositing, and recording. A visit to the Karanglo Asri Waste Bank uncovered that the administration books were still written in handwriting, thereby raising the chance of damaged, lost, miscalculated, unstructured, and human mistake notes. Therefore, this waste bank requires automated administration to decrease mistakes such as human error, which will be simpler if the current requirements are recognized. Indeed, designing an application based on the terms and criteria specified by the user necessitates the use of requirements. Hence, preparing requirements is necessary to make the design result correspond to user needs. Then, the requirements are adjusted to the needs of the waste bank. Thus, this research aims to resolve manual administrative difficulties with the danger of damage, loss, miscalculation, and writing errors.

Researchers performed in developing their E-Thesis system has stages that initiate needs user. Stages of the plan are carried out to ensure the system is developed will be according to the needs of the users themselves [3]. In realizing an orderly administration still manual which will be changed in the form of computerization that they do maker by collecting data directly related to real users or potential users through interviews to find out and fulfill the user's wishes [4]. in designing system applications waste bank using analysis of the needs of customers and bank management rubbish. They conducted interviews to gather the problems that usually happens in the garbage bank [5]. After the results of the interviews were obtained, they perform an analysis which then the results of the analysis are modeled in the form UML (Unified Modeling Language). They did all the steps to fit with the needs of the user and can solve problems that exist in the bank rubbish.

1.1 Waste Bank

According to the Regulation of the Minister of State for the Environment of the Republic of Indonesia Number 13 Years 2012 Garbage Bank is a place for sorting and collecting waste that can be recycled and/or reused which has economic value.

1.2 Karanglo Asri Garbage Bank

Karanglo Asri Garbage Bank located in Kabangjo, Sidomoyo, Godean District, Sleman Regency, Special Region of Yogyakarta and stood since 2017. The Karanglo Asri Garbage Bank is led by a chairman who accompanied by a secretary and treasurer. This garbage bank has There are 32 active members who are a combination of the two hamlets. Bank Karanglo Asri Garbage has activities such as; announcements, meetings, weighing, depositing and recording.

1.3 Requirements

Requirement is a statement that refers to something that specific about what the system should have. So that requirements can implemented, the required requirements must be clear, detailed and not ambiguous [6].

1.4 Requirements Making Process

To create a requirement there are several steps that can be done as :

- a. Gather various sources of requirements. Many ways can be done to collect one of the requirements by how to interview and looking for various kinds of documents.
- b. The next thing that needs to be done is writing requirements.
- c. From the results of writing the existing requirements can be arranged based on need. There are a few things to consider when compiling requirements can describe the

external nature of the work done. Requirements that have been obtained should be easy to change accordingly with situations and conditions.

- d. Combine the requirements that have been prepared with the system user and software [7].

1.5 User Journey Map

User Journey Map is a diagram that is used for compile user and role steps in analyzing to achieve something objective. The User Journey Map is also a great design tool it is important to describe the visualization taken to achieve the goal his [8].

1.6 UXPressia

UXPressia is a set of online tools for visualizing customer experience. It helps you create a customer journey map, user/buyer or marketing personas, and impact maps without engagement graphic designers or messing up slides, spreadsheets, or sticky notes. UXPressia can be used through the available official website, users can register to get an account later used to start using the available features. UXPressia contains Customer Journey Map which is used to design requirements equipped with Personas. At UXPressia users can collaborate with friends for group work.

1.7 Unified Modeling Language

Unified Modeling Language is a language for specifying, visualize, build and document artifacts (part of information used to be generated by the device manufacturing process software, the artifact can be a model, description or software) of software systems, as in business modeling and non-systems other software. software) of a software system, as in business modeling and other non-software systems [9].

Use Case Diagram describes a number of external actors and relation to the use case provided by the system. Use cases are descriptions functions provided by the system in text form as documentation of use case symbol but can also be done in activity diagrams. Use cases only described from the outside by the actor (state of the system environment). what the user sees) and not how it functions in the system.

Activity Diagram describes a series of flows from activities, used to describe the activities formed in an operation so it can also be used for other activities such as use cases or interaction.

1.8 Visual Paradigm

Visual Paradigm is a software tool designed for teams development of software for modeling business information systems and managing the development process. Visual Paradigm supports Languages and standards major industry modeling such as Unified Modeling Language (UML), SoaML, BpMN, XMI, and others. Visual Paradigm offers software for capture requirements, process analysis, system design, database design, etc. others[8].

1.9 Interview

The interview is a method that is located in the research methodology section. The function of the interview is to get the information that the participants are looking for researcher. Interview activities were carried out by a researcher through a sample of available respondent population as research subjects. Interviews have several types including personal interviews, interviews structured, and in-depth interviews[10].

2. Method

This study employed the User-Centered-Design (UCD) method, involving stakeholders in its design. The required information was gathered face-to-face and online. Afterward, the information was assessed before being validated to the stakeholders, as described in the following section.

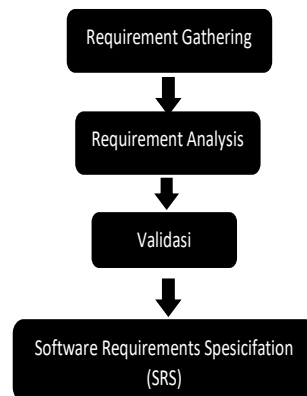


Figure 1 User Centered Design (UCD)

- a. Requirement gathering refers to collecting all information about the needs of stakeholders, resulting in five phases: announcements, meetings, weighing, depositing waste, and recording.
- b. Requirement analysis represents the examination of stakeholder needs compiled into a User Journey Map. Then, the analysis results were validated.
- c. The validation aimed to confirm that the analysis results have met the needs of the stakeholders.
- d. After obtaining stakeholder validation, the Software Requirement Specification (SRS) was the subsequent step. The validation findings were placed into a system sketch using Unified Modeling Language (UML).

3. Results

3.1 Chairman

The results and discussion on the analysis of the seven chairman's needs are as follows.

1. Announcement requirements: These requirements aligned with the needs since they could address the chairman's and the customers' problems. Realizing these requirements would greatly assist when making announcements.
2. Requirements for photo notes: These requirements would be extremely useful in the future, as they could eliminate the problems of notes that occasionally fell, slipped, and became damaged.
3. Table waste list requirements: These requirements satisfied the needs of the bank's managers and customers.
4. Savings requirements: These requirements conformed with the needs of the chairman to monitor waste bank transactions.
5. Minutes requirement: These requirements were sufficient to read the uploaded minutes from the secretary.
6. Annual report requirements: Because it was the first year that a waste bank would have an annual report, these requirements, if executed, would be quite beneficial.

7. Requirements for weighing results: These requirements were in line with the needs of the waste bank, given that the prior weighing results contained inconsistent data.

3.2 Secretary

The following are the results and discussion of the analysis of the eight chairman's needs.

1. Waste list requirements: These requirements have met the needs of waste bank managers and customers.
2. Minutes requirements: These requirements have met the secretary's needs, considering that previously minutes were rarely distributed to customers.
3. Requirements for weighing results: These requirements have been able to meet the needs between the managers and the waste bank because previously, some customers did not know the results of weighing the deposited waste.
4. Announcement requirements: These requirements followed managers' and customers' needs. With the announcement requirements, customers could see the announcement despite the messages buried in chat.
5. Requirements for photo notes: These requirements followed managers' and customers' needs. The photo note requirement made the archive easier in the future and made it easier to update information about the waste lists.
6. Savings requirements: The savings requirements have met customers' needs. If realized, it would make customers more comfortable in conducting transactions.
7. Annual report requirements: These requirements were under the needs of the waste bank, considering that the waste bank has never had an annual report.
8. Sales requirements: These requirements have met the needs of the waste bank, facilitating the calculation of customer waste sales.

3.3 Treasure

The chairman of the Karanglo Asri Waste Bank represented the test of the treasurer's needs. The results and discussion on the test of the eight treasure's needs are as follows.

1. Requirements for adding sales: These requirements followed the treasurer's needs, considering that the treasurer's and secretary's work was less structured so far. However, the sales results could not be deleted because the sales add results would be entered into the system. As a treasurer's representative, the chairman agreed that the sales add could not be deleted.
2. Requirements for saving-withdrawal balances: These requirements aligned with the treasurer's needs, considering the basics of withdrawing a difficult balance according to the needs of the waste bank.
3. Annual report requirements: These requirements corresponded to the needs of the waste bank.
4. Announcement Requirements: These requirements met the needs of the managers and customers of the waste bank.
5. Requirements for uploading notes: These requirements followed the waste bank's needs, considering that the notes have been lost or damaged several times.
6. Waste list requirements: These requirements aligned with the needs of the waste bank's customers and managers.
7. Requirements of minutes: These requirements satisfied waste bank customers' needs.
8. Requirements for weighing results: These requirements met the needs of customers and managers.

3.4 Customer

After putting seven customer needs into five test samples, the following are the results and discussion.

1. Waste list requirements: These requirements aligned with customer needs and were based on complaints regarding information about the waste list not being well-distributed.
2. Requirement of minutes: These requirements highly corresponded to the needs of the waste bank because, so far, customers have yet to obtain information about the event.
3. Requirements for weighing results: The requirements met customer needs based on complaints. If realized, it could assist customers in discovering information regarding the weighing results.
4. Sales requirements: These requirements met customer needs because they did not know the exact calculation when selling waste at a less stable price.
5. Announcement requirements: These requirements followed customer needs and were based on complaints about announcements always buried in the group.
6. Savings requirements: These requirements aligned with customer needs because they expected to easily access savings in the future.
7. Annual report requirements: These requirements satisfied the needs of the waste bank as it had no annual report.

4. Conclusion

After conducting this research, several things that can be concluded are:

1. The results of the requirements obtained through interviews and testing can be used to build a waste bank administration system that produces 4 User Journey Maps and 84 User Stories.
2. The design of the system in the form of a sketch using the Unified Modeling Language was successfully created by producing 4 Usecase Diagrams and 6 Activity Diagrams consisting of the chairman, secretary, treasurer, and texts of the Karanglo Asri Garbage Bank.
3. With the analysis and design of the waste bank system, it has the potential to proceed to the next stage, namely the design stage.

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