SOFTWARE ENGINEERING OF COSTUMER SAVINGS AT LANCANG KUNING UNIVERSITY WASTE BANK

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Abstract: Based on observations and analysis of the current information system and website of the Unilak waste bank, it can be concluded that it is necessary to develop the software and information management system of this waste bank. The application does not yet support the transaction needs at the waste bank. Although there are features, they don't run as they should. This was also complained about by the director and staff of the Unilak waste bank. Therefore, this study was conducted to design a waste bank transaction management information system and software that will support its business processes, starting from calculating waste prices, managing customer savings to final reports. The research method used is qualitative, using information system analysis techniques and websites that are currently running at the Unilak waste bank. While for the SDLC (software development life cycle) development method, the XP Agile Methodologies cycle is used which is simpler and can be completed in a short time. There are 4 stages, namely Planning (requirements), design, implementation and testing. This study resulted in a customer transaction system design and software development that can help manage customer transaction activities at the Unilak waste bank.

Keywords: costumer; savings; software engineering; waste bank.

Abstrak: Berdasarkan observasi dan analisis terhadap sistem informasi dan website bank sampah Unilak yang berjalan saat ini, dapat disimpulkan bahwa perlu dilakukan pengembangan terhadap perangkat lunak maupun sistem informasinya. Aplikasi belum mendukung kebutuhan transaksi di bank sampah. Meskipun ada fitur-fiturnya, namun tidak berjalan sebagaimana mestinya. Hal ini juga dikeluhkan oleh direktur dan pengelola bank sampah Unilak. Maka penelitian ini dilaksanakan untuk merancang sistem informasi transaksi nasabah bank sampah dan perangkat lunak yang akan mendukung proses bisnisnya, yaitu mulai dari perhitungan harga sampah, pengelolaan tabungan nasabah hingga laporan akhir. Metode penelitian yang digunakan adalah kualitatif, menggunakan teknik analisis sistem informasi dan website yang sedang berjalan di bank sampah Unilak. Sedangkan untuk metode pengembangan SDLC (software development life cycle) menggunakan siklus XP Agile Methodologies yang lebih sederhana dan bisa diselesaikan dalam waktu singkat. Terdapat 4 tahap yaitu planning (requirements), analys, design, dan implementation. Penelitian ini menghasilkan rancangan sistem transaksi nasabah dan pengembangan perangkat lunak yang dapat membantu pengelolaan aktivitas transaksi nasabah di bank sampah Unilak.

Kata kunci: bank sampah; nasabah; rekayasa perangkat lunak; tabungan.

INTRODUCTION

Waste banks as community-based environmental management are valuable economic commodities and savings, have instruments that involve the community in waste management [1]. Waste banks can be an opportunity to earn income for the surrounding community. The approach used to develop this waste bank includes training and outreach to the community, establishing a waste bank system, as well as monitoring and evaluation [2]. Waste banks demonstrate good achievements with economic, social and environmental goals, so they are able to support local communities financially in a sustainable manner [3].

The Unilak Waste Bank has contributed to waste management efforts on campus, especially in providing organic and inorganic-based waste management containers, with a contribution to waste management in Pekanbaru through collaboration with several schools and the Arifin Achmad hospital (non-medical waste management), as well as making an important contribution by building 11 waste banks in Riau [4]. Based on research, the public can easily search for information related to waste banks, provide comments or input on the website, but can't count the right weight and price for the waste that brought by costumer [5].

The results of an interview with the director of Prama Widayat, SE., M.M, AAAIK, CPHCM, the Unilak waste bank is a real manifestation of empowering the people of Riau in waste management, even though it was only founded in 2021 [6]. The construction of this waste bank is the result of collaboration between Unilak through the Research and Community Service Institute and PT. Chevron Pacific Indonesia. To date, the Unilak waste bank has many customers, consisting of individuals from the community and groups such as hospitals, schools and institutions [7].

Websites as one part of an information system can make it easier for humans to search for information by utilizing available data. Since its founding in 2021 until now, Unilak waste bank has had a website built to provide facilities and convenience for Waste Bank managers in disseminating information on activities and managing customer transactions. However, the website is currently unable to meet the needs of managing customer transaction calculations at the Unilak waste bank [8], even though organizations and people should gain significant benefits in terms of improving performance and saving time from the use of good information systems and applications. From this research, it was found that the initial calculation of incoming waste from consumers greatly influences service satisfaction and the neatness of reports [9]. In the field of management, information systems are often used in the decision making process.

The Waste Bank processes customer transaction data using books, pens and calculators as calculating tools, then uses ledgers or planning books to record the documentation. The officer must transfer data from the notebook to the ledger. This activity allows errors to occur in calculating savings and preparing reports. Apart from that, officers also have difficulty finding customer data. The officer must check the names in the savings book one by one. Searching for this kind of data is inefficient, especially since the number

of waste bank customers is large and continues to grow.

After conducting observations and interviews, it can be concluded that it is necessary to develop a website and waste bank management information system using the Agile-XP development method, carrying out needs analysis and feasibility studies. This research was carried out to build software that addresses all aspects of software production, starting from the initial stages of specification, construction design, to testing.

METHOD

This research is qualitative research, using descriptive data from the people involved to explore detailed information which is explained through descriptions and supported by some data taken from the research site [10]. The data collection techniques used in this case were observation (direct observation and viewing the waste counting transaction process at the Unilak waste bank), interviews with several customers and managers of the Unilak waste bank. And to sharpen the research analysis, documentation studies are used.

Apart from that, data analysis (need analysis) and ongoing website analysis are also carried out. This analysis was carried out based on observations and interviews, it was found that several SOPs (Standard Operating Procedures) and applications were already running.

Data Analysis

Unilak waste bank has the vision "To become a science and technology-based waste management center. The first socialization was held on October 15

2019. By 2023, the Unilak waste bank will have 11 fostered partners. Apart from that, the Unilak waste bank has also collaborated with several parties, both directly and indirectly, such as PHR (Pertamina Hulu Rokan), several hospitals and schools in the city of Pekanbaru.

The Unilak waste bank also has an SOP for managing incoming waste, consisting of 2 types, namely organic waste and inorganic waste. When a customer comes to bring trash, a weighing and calculation of the customer's savings is carried out, then an internal trash bank recording report is made:
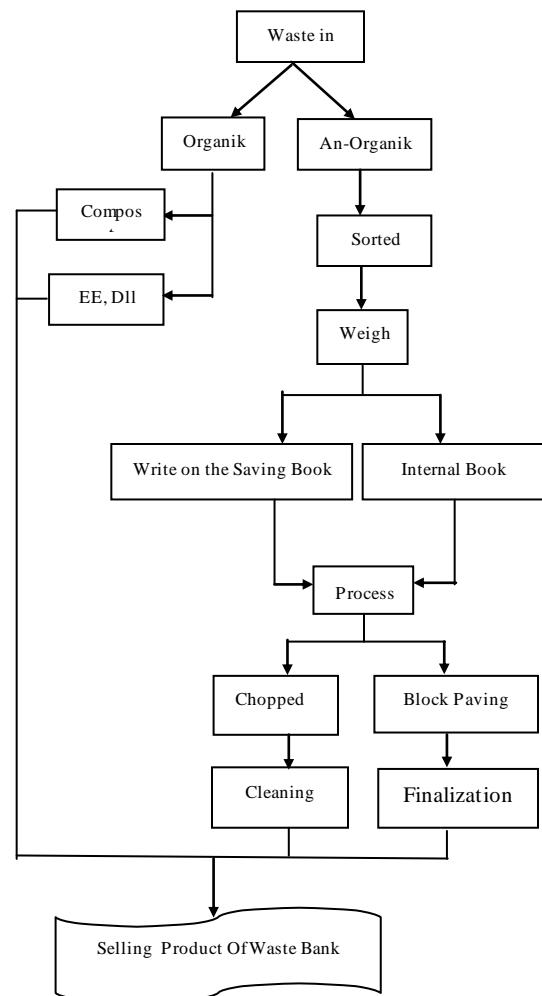

Figure 1. SOP for Incoming Waste

Table 1. The comparison of XP models

Abilility to develop sytems	Structure Methodologies			RAD Methodologies		Agile Methodologies
	Water fall	Paralel	Phased	Proto typing	Throwaway Prototyping	XP
Unclear uwer happiness	Poor	Poor	Good	Excellent	Excellent	Excellent
Unfamiliar technology	Poor	Poor	Good	Poor	Excellent	Poor
That are complex	Good	Good	Good	Poor	Excellent	Poor
That are reliable	Good	Good	Good	Poor	Excellent	Good
With a short time schedulle	Poor	Good	Excellent	Excellent	Good	Excellent
With schedulle visibility	Poor	Poor	Excellent	Excellent	Good	Good

On data analysis, software development is carried out in 4 stages (P.A.D.I), namely Planning, Analysis, Design and Implementation. The software development life cycle (SDLC) development model used is the XP – Extreme Programming (Agile Methodologies) method:
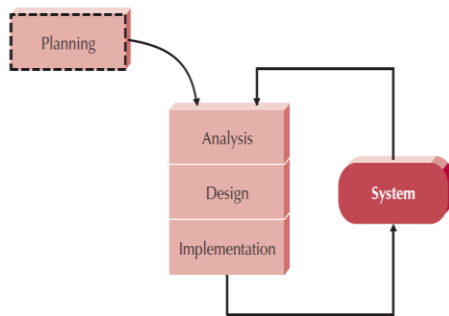

Figure 2. XP Agile development models

This model is a software development model that aims to produce quality application designs that can be created in a short time, without specific needs from the user, with the following comparison:

Website Analysis

The UI (User Interface) analysis on the official link https://ebanksam pah.unilak.ac.id/frontend/home, it can be seen that this website is very uninformative, unresponsive, and not updated. Menu links are still stiff and not database. This website is not managed by the management of the Unilak waste bank, so it is not used according to its original purpose. This website is also not used to calculate customer transactions.

Figure 3. Website of Unilak Waste bank

RESULTS AND DISCUSSION

In accordance with the software engineering stages according to Sommerville, this research discusses all

aspects of software production, starting from the initial stages of specification, construction design, to testing.

Planning (Requirements)

This is the stage of analyzing needs related to software for managing customer transactions. Requirements engineering is the process by which requirements for a software product are gathered, analyzed, documented, and managed throughout the software engineering life cycle.

System Request

System requests are the criteria required by users in an information system. Describes project sponsor, business need, business requirements and business values. Here's the picture:

Table 2. System Request Design

System Request – Waste Bank Unilak
Project Sponsor : Director Unilak waste bank
Business Need **:** Help managers to quickly calculate transactions and process customer data.
Business Requirements **:** Using a web-based application to share news information about the Unilak waste bank and manage waste bank customer transactions.
Business Value : New website, it can be a means of information and promotion for the Unilak waste bank, apart from that, it can provide time efficiency in calculating customer transactions (saving around 5 minutes) and improve transaction services and customer trust at the Unilak waste bank.

Feasibility Analysis:
Technical Feasibility

This is a technical analysis, to see the condition of the application running, the application of technology in the organization, the size of the project, and system compatibility: 1) At the Unilak waste bank, IT managers have standard skills as users only, not developers or database administrators, 2) Size the project is quite small (low budget), 3) The existing website application only uses social media, even though there is a website, it is not updated and is not used in customer transactions.

Economic Feasibility

Cost analysis was carried out using a conservative approach, showing that the customer transaction system has a good opportunity to increase company profits significantly, if managed professionally, and there is an increase in customer satisfaction.

Organizational Feasibility

From an organizational perspective, this project is low risk. The aim of this system is to improve services which will ultimately increase income.

Analysis
This stage uses UML tools:
Usecase Diagram

It is an object-oriented software modeling diagram, knowing the actors who have the right to use the function. There are actors who are waste bank officers, customers who are involved in calculating transactions, and leaders or directors who are responsible for waste bank reports.
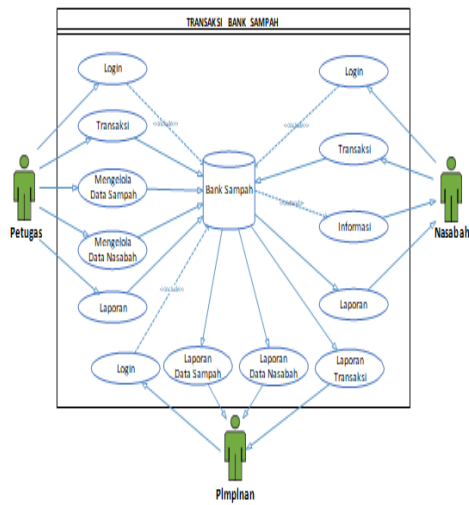
737

Figure 4. Usecase Diagram

Activity Diagram

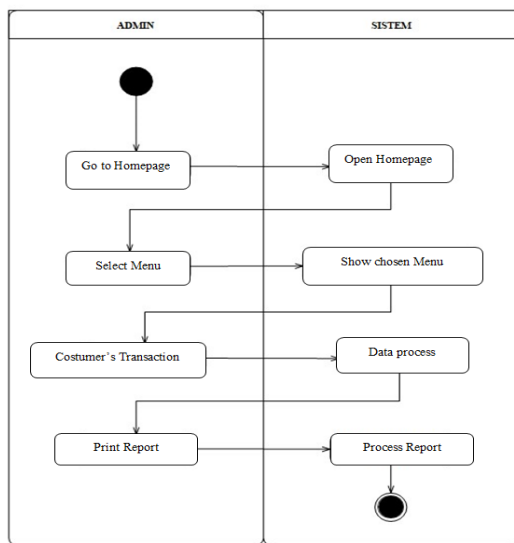The Activity diagram describes the work flow or activities of the customer transaction calculation system.

Figure 5. Activity Diagram

Design

Design software as an estimate before creating the code. System designs can be created using flowcharts, mind maps, etc. It's describe program design, namely class diagrams, component diagrams and deployment diagrams.

Next, by designing the UI (User Interface):

Class Diagrams

Describes the state of attributes/properties of a system, offering services to manipulate that state (methods or functions). There are 4 classes, namely waste, transactions, customers and savings. The following is a picture of the structure of classes, packages, and their relationships:
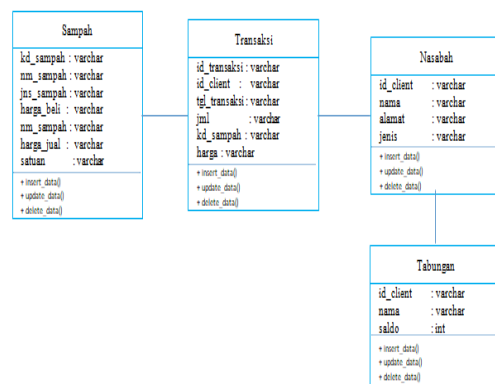

Figure 6. Class Diagram

Component Diagram

This component diagram explains the relationship between software components used in creating the waste bank website. The following is an overview of the component diagram
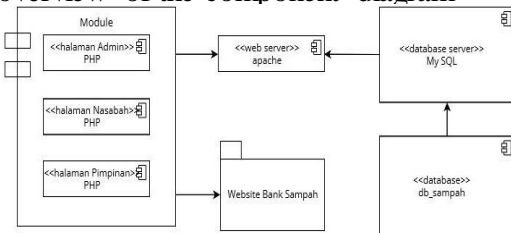

Figure 7. Component Diagram

Implementation (New Software)

This stage is the process of creating web-based software (localhost) based on system analysis and feasibility study. Testing uses the black box method. Namely software testing or

testing the program created to see whether it is appropriate or whether there are still errors that need to be eliminated. Following is the appearance of the program according to the design created:
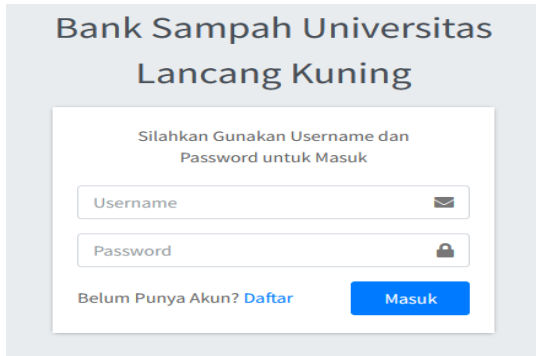

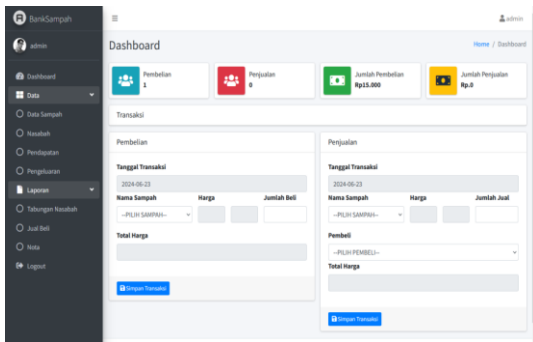
Figure 8. Login page

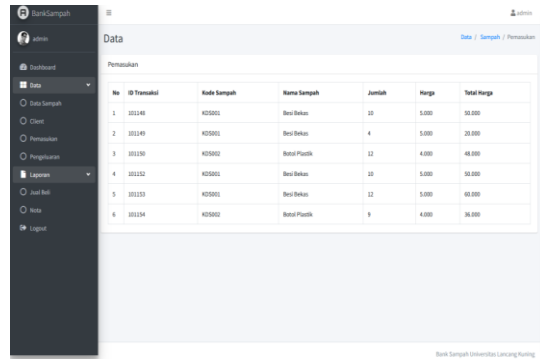Figure 9. Main Menu Website

Figure 10. Costumer's note

Figure 11. Income Report's page

After the software is created, manual testing is then carried out, namely testing the software manually without tools to find bugs in the software. The manual testing steps that have been carried out in this research are analyzing requirements (done), creating a test plan (done), creating a test case (done), executing the test case (done), looking for defects and fixing them (done).

CONCLUSIONS

This research produces customer transaction software at the Unilak waste bank, discussing all aspects of software production, starting from the initial stages of specification, construction design, to testing. Using the SDLC XP Agile method which is simpler and can be completed in a short time, with the PADI stages (planning, analysis, design, implementation). This research has also developed new software or websites that are more powerful and suit the transaction needs of the Unilak waste bank.

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