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.

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]. All community members voluntarily and whole heartedly participate in every stage of developing the waste bank system, resulting in sustainable interactions and harmonious relationships that enable the waste bank to run effectively. Factors that influence the success of waste banks from the perspective of leadership, socio-economics, gender issues, and professionalism, show that waste banks can achieve economic, social and environmental goals, so that 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 waste management containers that are organic and inorganic based, which are then managed into compost and hand scrap. Another important thing is that waste management behavior has gradually changed at the faculty, student and local community levels. The Unilak Waste Bank has also contributed to waste management in Pekanbaru through

collaboration with several schools and hospitals in managing non-medical waste at the Arifin Achmad Hospital, as well as making an important contribution by building 11 waste banks in Riau to increase awareness of waste management [4].

Based on the results of interviews with the director of Prama Widayat, SE., M.M, AAAIK, CPHCM, the Unilak waste bank is a real form of empowering the Riau community in waste management, even though it was only founded in 2021 [5]. 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 [6].

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. The public can easily find information related to the Waste Bank. The public can also provide comments or input [7]. However, the website currently running cannot meet the needs of managing customer transactions at the Unilak waste bank.

Websites as one part of an information system can make it easier for humans to search for information by utilizing available data [8]. Organizations and people can gain significant benefits in terms of performance improvements and time savings from the use of good information systems [9]. In a business, information systems function as the main support in carrying out daily activities, managing resources, increasing

creativity, reducing operational costs, and increasing customer satisfaction. In the current digital era, information systems are widely applied as data management media and to help transaction management. In the field of management, information systems are often used in the decision-making process [10].

There are 2 types of transactions carried out at the Unilak waste bank, namely, waste receipt transactions and sales transactions. The waste bank accepts all types of waste that have not been sorted or sorted, therefore waste that cannot be sold is still collected in the warehouse. The Waste Bank processes waste 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 for errors in savings calculations and final production. 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 observing and analyzing the current Unilak waste bank website, it can be concluded that it is necessary to develop the website and management information system for this waste bank. The application does not yet support transaction needs at the waste bank. Even though there are features, they don't work as they should. So this research was carried out to design a waste bank transaction management information system and software that will support business processes at the Unilak waste bank.

METHOD

This research is qualitative research, using information system analysis techniques currently running at the Unilak waste bank, explained through descriptions and supported by several data taken from the research site [11]. The data collection techniques used in this case were observation (direct observation at the Unilak waste bank), interviews with several customers and Unilak customer bank managers. And to sharpen the research analysis, documentation studies are used.

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 (2 in Kampar, 2 in Siak, 4 in Bengkalis, 3 in Pekanbaru). Apart from that, the Unilak waste bank has also collaborated with several parties, both directly and indirectly, such as PHR (Pertamina Hulu Rokan), Arifin Ahmad Hospital, Zainab Hospital, Tabrani Hospital, several schools in the Pekanbaru city area. Until now, the Unilak waste bank has 2 SOPs, namely the incoming waste SOP and the paper shredding SOP :

1. Standard Operating Procedures (SOP) for Incoming Waste.

The waste that enters the Unilak Waste Bank consists of 2 types, namely organic waste and inorganic waste
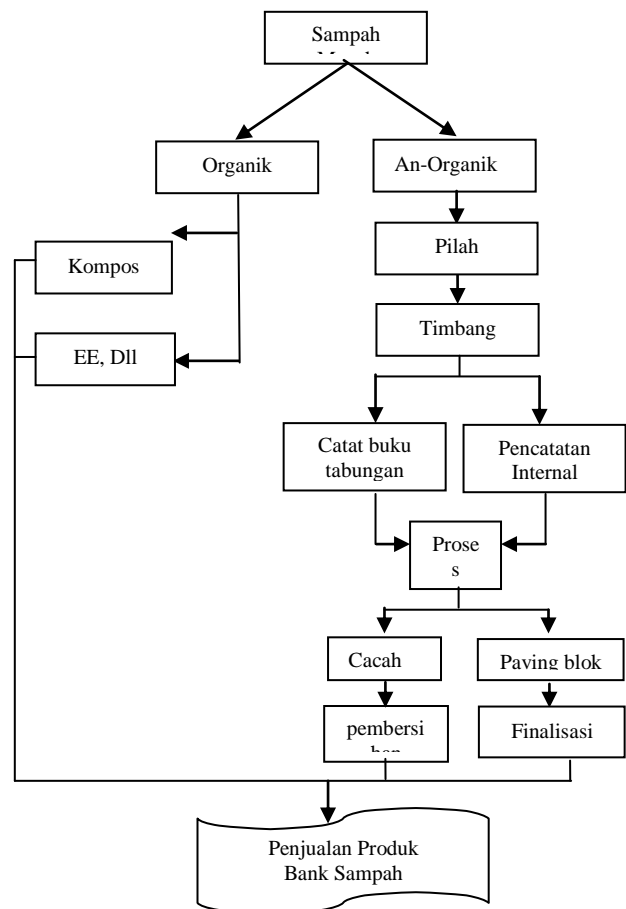

Figure 1. SOP for Incoming Waste

2. Standard Operating Procedures (SOP) for Paper Shredding, starting with document pickup, then sorting:
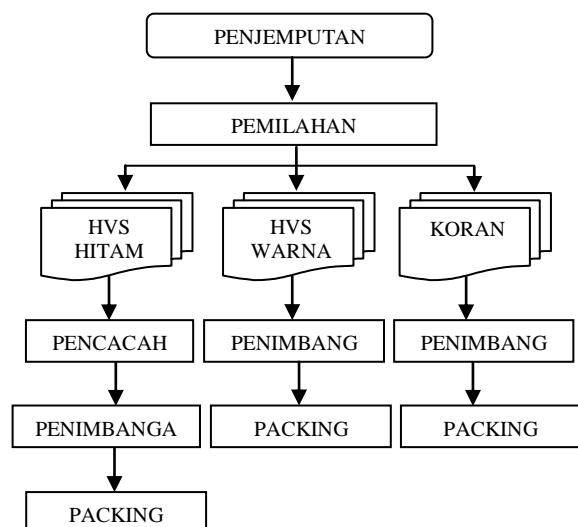

Figure 2. SOP Paper Shredding

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2. Ongoing Website Analysis

Unilak waste bank has an official website with the link https://ebanksampah.unilak.ac.id/frontend/home. Based on observations and analysis of the UI (User Interface) display, it can be seen that this website is very uninformative and unresponsive. Even though there is an information link, it is not updated. Then there is also a registration link, and trash bank savings but it is not database-based. And what is very unfortunate is that this website is not managed by the management of the Unilak waste bank, so it is not being used according to its original purpose. Here's what the website looks like.
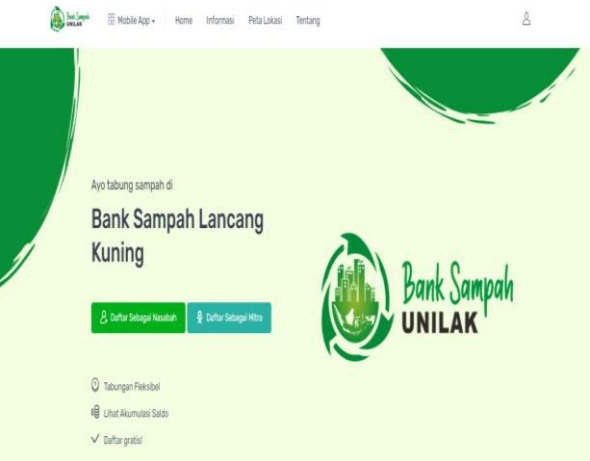

Figure 3. Website of Unilak Waste bank

RESULTS AND DISCUSSION

Based on the analysis of existing data, the software development life cycle (SDLC) development model used is the XP – Extreme Programming (Agile Methodologies) method. 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. Here's the comparison:
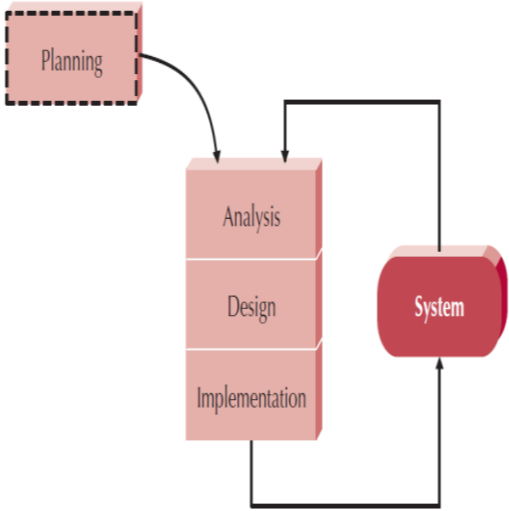
Ability to Develop Systems	Structured Methodologies			RAD Methodologies		Agile Methodologies
	Waterfall	Parallel	Phased	Prototyping	Throwaway Prototyping	XP
with Unclear User Requirements	Poor	Poor	Good	Excellent	Excellent	Excellent
with Unfamiliar Technology	Poor	Poor	Good	Poor	Excellent	Poor
that are Complex	Good	Good	Good	Poor	Excellent	Poor
that are Reliable	Good	Good	Good	Poor	Excellent	Good
with a Short Time Schedule	Poor	Good	Excellent	Excellent	Good	Excellent
with Schedule Visibility	Poor	Poor	Excellent	Excellent	Good	Good

Figure 4. XP development models & the comparison.

1. Planning Stage (Requirements)

The planning stage is a needs analysis regarding the software needed by Unilak waste bank to manage its customer transactions. The planning stage produces a system request as follows:

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Table 1. Planning

System Request – Unilak Waste Bank Customer Transactions
Project Sponsor : Prama Widayat, Director of Bank Sampah Unilak
Business Need : This project can help managers to quickly calculate transactions and process customer data at the Unilak waste bank.
Business Requirements : Using a web-based application to share news information about the Unilak waste bank and manage waste bank customer transactions
Business Value : With the new website application, 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 5-10 minutes) and improve transaction services and customer trust at the Unilak waste bank.

2. Design

This stage uses UML as a system design tool. This design aims to provide an overview of what needs to be done and how the system will look. Following are the results of the design:

Usecase Diagram

Use Case Diagram is a diagram that must be created first when object-oriented software programming modeling is carried out, used to find out who has the right to use these functions.
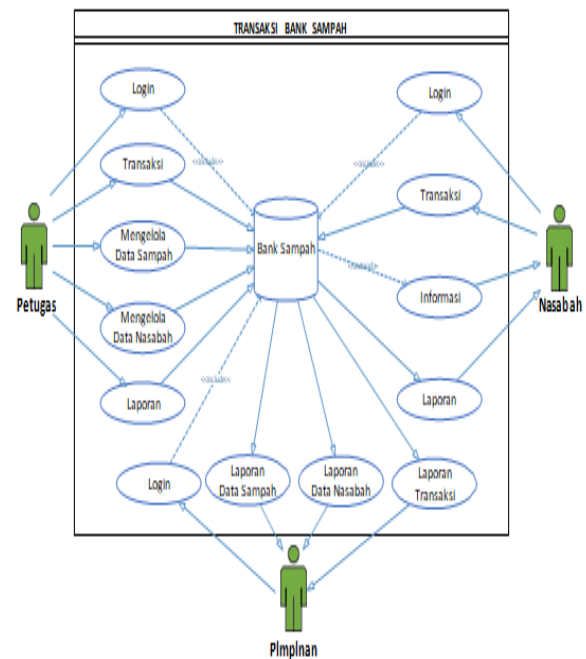

Figure 5. Usecase Diagram

Class Diagram
This diagram describes the state (attributes/properties) of a system, while offering services to manipulate that state (methods/functions):
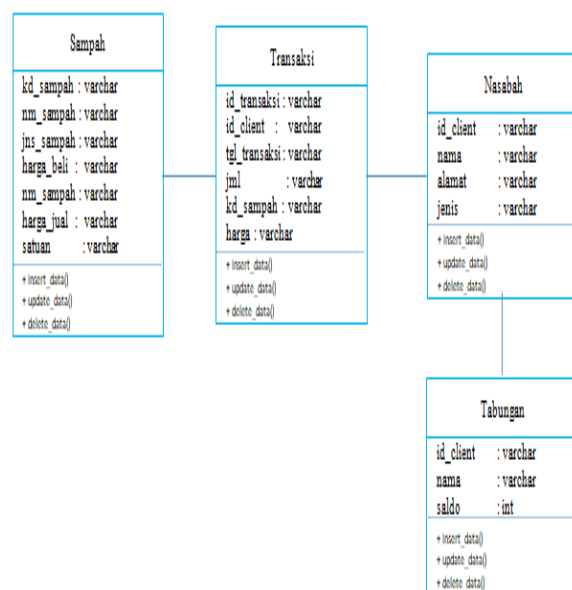

Figure 6. Class Diagram

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:
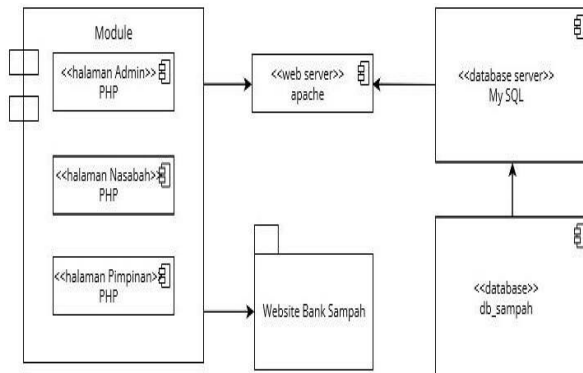

Figure 7. Component Diagram

3. Coding (*Implementation*)

This stage is the process of creating web-based software using the PHP, Javascript, HTML and CSS programming languages to support the design of the website program for the Unilak waste bank. This stage aims to carry out inspections based on the design that was made in the previous stage. The programming created based on the UI design that was designed in the previous stage. On the main page design, the admin can manage data with a menu display, namely the dashboard menu, trash data, customer data, buying and selling menu, notes menu and logout menu.
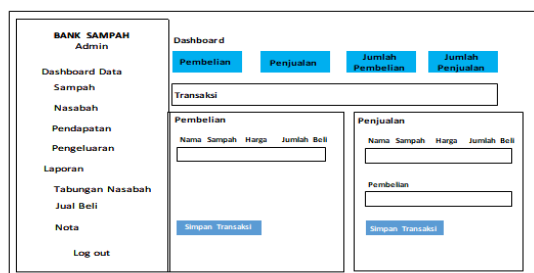
Gambar 8. Desain Halaman Utama

4. Testing and Integration and Testing.

This stage of program 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. Testing using Katalon Studio software.

CONCLUSIONS

The conclusions from this research are: 1). Produce a design for a customer transaction system at the Unilak waste bank to help manage customer activities and transactions at the Unilak waste bank using the SDLC XP method which is simpler and can be completed in a short time, 2). This research has also developed new software or websites that are more powerful and suit the needs of the Unilak waste bank, using UML as a system design tool and the PHP programming language to create web-based software.

BIBLIOGRAPHY

[1]   D. R. Wijayanti and S. Suryani, "Waste Bank as Community-based Environmental Governance: A Lesson Learned from Surabaya," in *5th Arte Polis International Conference and Workshop*, Elsevier, 2014.

[2]   V. Pentangelo, D.D Dario, S. Lambiase, F. Ferruci and C. Gravino, SENEM: A Software engineering-enabled educational metaverse," *Information and Software Technology*, 2024.

[3]   N. Indrianti, "*Community-based Solid Waste Bank Model for Sustainable Education*," in 6th

International Research Symposium in Service Management UiTM Sarawak Malaysia, 2015.

[4] M. Rasyid, Suryanti and A. Juliarti, "Kontribusi Bank Sampah Unilak pada Pengelolaan Sampah di Universitas Lancang Kuning," Green Tech: Jurnal Ilmu Lingkungan, Vol. 1 No. 1, 2023.

[5] P. Widayat, *"Sosialisasi Bank Sampah di Kelurahan Umban Sri Kecamatan Rumbai Kota Pekanbaru"*. Jurnal Bakti Saintek, Vol. 4 No. 1, 2020.

[6] P. Widayat, *"Pembuatan Ecobrik pada Bank Sampah Pematang Pudu Bersih Kecamatan Mandau Duri Kabupaten Bengkalis',* Jurnal Bakti Saintek, Vol. 5 No. 2, 2021.

[7] B. Sekarningrum, D. Yunita and S. Sulastri, *"Pengembangan Bank Sampah pada Masyarakat di Bantaran Sungai Cikapundung"*. Jurnal Pengabdian Kepada Masyarakat, Vol. 1 No. 5, 2017.

[8] Guntoro, A. Ariyanto, D. Setiawan, Hamzah, "Sosialisasi Website Portal Bank Sampah Universitas Lancang Kuning," *International Journal of Community Service Learning*, 2021.

[9] D. Irmayani, " *Rekayasa Perangkat Lunak",Informatika:Jurnal Ilmiah AMIK Labuhan Batu Vol. 2 No. 3*, 2014.

[11] Z. Abdussamad, *"Metode Penelitian Kualitatif", CV. Syakir Media Press*, 2021.