Web Based Fixed Asset Management Information System Using the Waterfall Method (Case Study: National University)

Listrina Turnip[1], Agung Triayudi*[2], Ira Diana Solihati[3]

Universitas Nasional, Jl. Sawo Manila, RT.14/RW.3, Ps. Minggu, Kec. Ps. Minggu, Kota Jakarta Selatan, Daerah Khusus Ibukota Jakarta 12520

Email: [1]listrina2310@gmail.com, [2*]agungtriayudi@civitas.unas.ac.id, [3]iradiana2803@gmail.com

A R T I C L E I N F O	A B S T R A C T
	Asset Management is one of important keys in institutions. Therefore, each asset that is owned must be optimally, effectively and efficiently managed in order to give proper advantages to Institutions. The National University is the oldest private University in Jakarta. The National university has a lot of assets to support its operational such as computers, air conditioning, vehicles, laboratory equipment and etcetera. Currently the asset management systems at National University is still using Microsoft excel. it causes the process of the asset Recording, asset maintenance and asset Report at national university are less Optimal. it takes longer time to trace the data of the assets. To overcome the issue, an Information system is needed. This Research Uses waterfall method. This information system (of fixed asset management) is created using PHP programming language and using MYSQL as the database. The presence of this website-based (fixed assets management) information systems hopefully can facilitate the general administration officer to work more effective and efficient in managing the assets. .

1. Introduction

Asset management is the process of managing the assets of a company or organization that is important in every financial policy, expenditure and management decision making. Every organization or company will use assets to support its business and operational activities. Asset management can be done by recording assets, bookkeeping, reporting and also the use of assets according to company needs so as to provide benefits for the company in carrying out organizational activities (Hasan, 2019). Therefore, every asset in the company / organization must be used optimally.

In the rapid development of technology in the 4.0 era, it makes us to continue to innovate in technological progress (Ariawan, Triayudi, & Sholihati, 2020). The positive impact of information technology is to provide convenience and speed in obtaining information, delivering information and making it easier to complete tasks or work (Mudiar & Hidayat, 2019). Information systems are used in maximizing data processing into valuable information and used to achieve its objectives. There are three main requirements related to information that is timely, relevant and accurate (Yunita & Devitra, 2017).

Asset management systems are used to carry out administrative control in the management and data collection of goods (Ridwan, Muhammad, & Ramadhani, 2017). The form of optimizing asset management is monitoring assets. Monitoring is carried out not only by recording the asset register but also concerning asset valuation. (Astriyani, Putri, & Widianingsih, 2020). Asset valuation is influenced by the acquisition value, the useful life and also the depreciation value. Physically, assets can be monitored by maintaining assets to maintain the quality and function of the assets owned. Asset maintenance is an activity carried out in an organized manner to ensure the assets that are operated with the best conditions at the lowest cost (Yaakub & Devitra, 2017).

National University has so many assets to support its operational activities such as computers, air conditioners, vehicles, laboratory equipment, etc. Currently the asset management system at the National University is still manually using Microsoft Excel. This causes the process of recording assets, maintaining assets and asset reports at the National University to be not optimal. Manually recorded records also result in searching or tracing asset data for a long time. In addition, interrelated data is not mutually integrated so that duplication of data from repeated input. The absence of an asset management information system also results in limited information to those who make requests for asset acquisition.

Therefore, there needs to be a computerized system to help these problems. Web-based asset management information system is expected to provide convenience, speed, and effectiveness for users in processing data assets.

Limitations in this study are:
a. Case study research in the National University General Administration Bureau
b. The system does not discuss the purchasing process and budget funds.

2. Literature Review

2.1. Understanding Information Systems

Information systems are "a set of interrelated components that collect (or retrieve), process, store, and distribute information to support decision making and control in an organization" (Laudon & Laudon, 2012). In another sense stating "Information system is a system within an organization that meets the needs of processing daily transactions that support the managerial function of the organization's operations with the strategic activities of an organization to be able to provide certain outsiders with the necessary reports" (Sutabri , 2012).

2.2. Definition of Asset Management

Assets are wealth and resources that are owned and can be utilized by an organization. The classification of assets according to their existence is tangible and intangible assets. According to (Hery, 2015) "Fixed assets (fixed assets) are the equipment or property of an organization or company that is used for operations that are physically visible and have a long-term nature (useful life)". Examples of fixed assets are office equipment, machinery, land, factories, buildings, electronic and computer equipment, vehicles, furniture and others. Fixed assets also have depreciation values. The method of depreciation of fixed assets has several variations, one of which is the straight-line method. The straight-line depreciation method is a method of depreciating property, plant and equipment that contributes equally or evenly to the end of its useful life or economic life.

While asset management is an activity of planning, monitoring and organizing in using, repairing, maintaining and buying and eliminating assets physically to maximize services and reduce costs and risks in managing tangible and intangible assets with or without technology in carrying out operational activities.

2.3 PHP Programming Language

PHP (Hypertext Preprocessor) is an open source programming language used by programmers in creating a website (Oktasari & Kurniadi, 2019). PHP is needed to make a web portal attractive, user friendly, responsive and dynamic. PHP is used to access databases such as MySQL and run on a webserver.

2.4 MySQL database

MySQL is a database that connects php scripts using the same query and escaps character commands as php (Muhammad Sadeli, 2014). MySQL is a development of the SQL language (Structure Query Language) which is used for the interaction of program scripts with database servers for data processing. (Sriwahyuni, Oktoria & Dewi, 2019)

2.5 Black Box Testing

One of the activities that need to be done in the process of making a system or application is Testing. Testing a system or application must be done to determine whether every function on the system is running well or there are still bugs or errors. One type of system testing is Black-box testing. Black box testing can be done by the user, programmer or tester by defining a list of system input processes and testing the methods and functions that run on the system (Hidayat & Muttaqin, 2018). The Black Box Testing process is based on test parameters and indicators in the system. In this case tools are needed to collect data called the User Acceptance Test (UAT). This UAT contains a list of functions in the system which are then tested according to the expected results, whether it has been successful or not. (Setiyani, 2019).

3. Research methods

3.1 Method of collecting data

The stages of data collection in this study are:

a. Observation

Observe directly and collect data and information from the General Administration Bureau, and learn firsthand the process of asset management at the National University.

b. Interview

Conduct question and answer directly with the General Administration Bureau to find out data and information needs

c. Literature review

Study and understand theories and previous research related to asset management through books, journals, and websites in order to be a reference and guide in solving problems in research.

3.2 Systems Development Method

In this research, the system development method or model used is the waterfall method. There are several stages to this method, namely:

a. Requirements Analysis

In the initial stages, the process is identifying the needs and expectations and analyzing the system that is being used to obtain solutions to problems.

b. System Design and Design

This stage is the process of making the flow, process, and appearance of a system or application. At this stage, the system design will be built using the Unifield Modeling Language (UML) as a system modeling and using Entity Relationship Diagrams (ERD) for modeling data structures and relationships between data.

c. Implementation

This stage is programming or designing information systems according to the results of the design at the system design and design stages.

d. System Testing

The process of testing or testing the system uses the black box testing method, if the output does not match or there is still an error then repairs are made until the results are as expected.

e. System Installation and Maintenance

At this stage, applications that have been developed are installed for normal use and perform system maintenance.

4. Results and Discussion

4.1 Current Systems Analysis

Analysis of the existing system or which is being used, that is, the Admin does all the asset management in the building, room and floor. Starting from the submission of asset expenditure, recording data on assets, the process of maintaining an asset and reporting data on assets. Submission of assets can be done by the general administration department or from the faculty, after the submission is completed the approval will then wait for the assets to be received. When an asset has been purchased, it will be recorded by the BAU admin. Then the existing assets will be inspected and maintained periodically.

4.2 Proposed System Design

The researcher carries out the Analysis phase of the proposed system to provide solutions and also solutions to the existing or currently in use system. The proposed system design is illustrated by activity diagrams, class diagrams and usecase diagrams.

a. Use Case Diagrams

Use case diagrams on the National University's fixed asset management information system as follows:

Fig 1. Use Case Diagrams

In Figure 1. It can be seen that the design system created has 2 actors namely admin and user. Admin can run the system by logging in, managing asset request data, managing category data, managing vendor data, managing building data, managing floor data, managing room data, managing asset data, managing maintenance data, managing user data, printing reports, and logging out. Users can log in, make asset requests, and log out.

b.   Activity Diagram

Following is the presentation of activity diagrams on the design of the National University's fixed asset management information system. Activity diagram of the asset master input can be seen in Figure 2. Input of asset data can be done by the admin after a successful login.
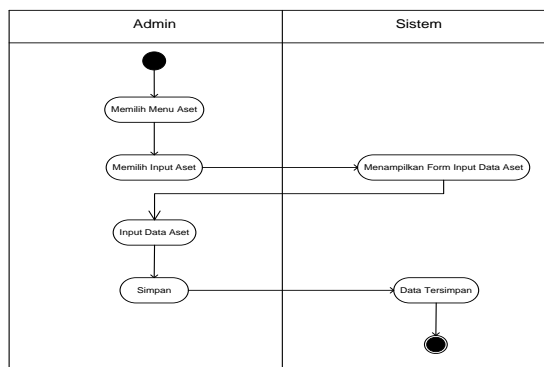
Fig 2. Activity Diagram of asset data input

Activity diagram of asset maintenance data input can be seen in Figure 3. Input of asset maintenance data can be done by the admin after successfully logging in.
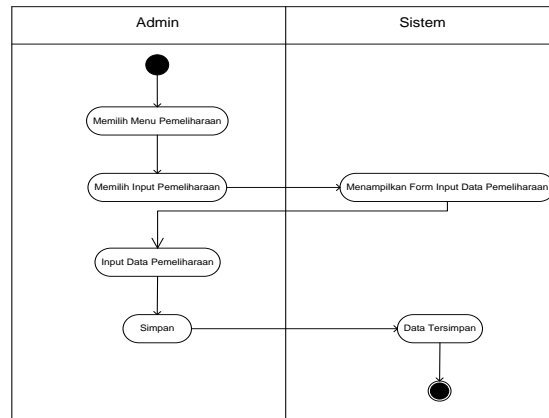
Fig 3. Activity Maintenance data input diagram

Activity diagram of building master input can be seen in Figure 4. Input of building master data can be done by the admin after successfully logging in.
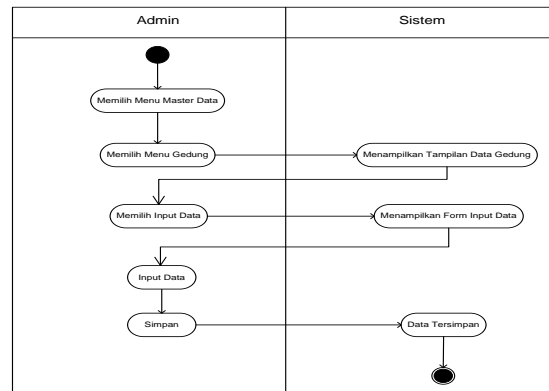
Fig 4. Activity Diagram of building master data input

Activity diagram input master data categories can be seen in Figure 5. Input of asset category data can be done by the admin after a successful login.
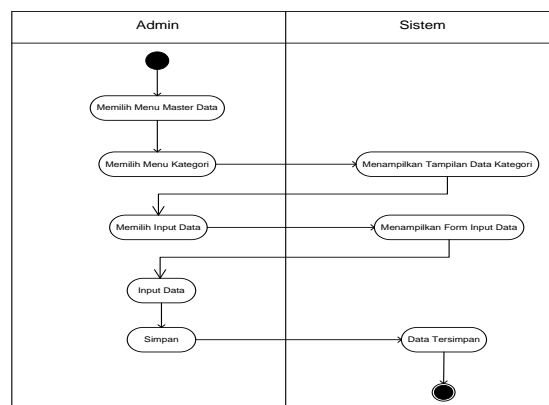
Fig 5. Activity Diagram master input data categories

Activity diagram for inputting asset demand data can be seen in Figure 6.
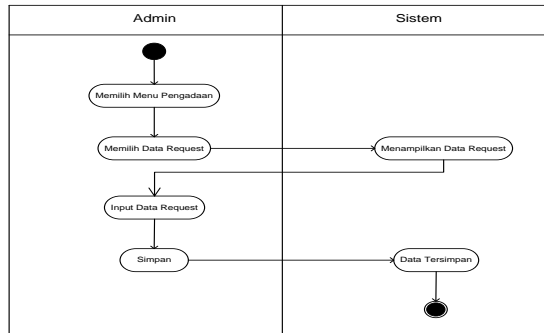
Fig 6. Activity Diagram of the input of asset request data

c.   **Class Diagram**
Class diagrams created on this system can be seen in Figure 7.
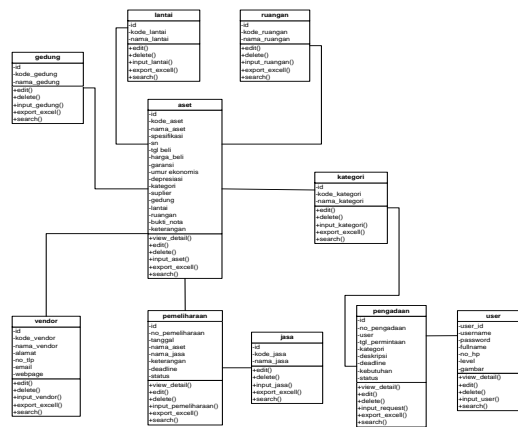
Fig 7. Class Diagram

4.3   Implementation results
The results of implementation in this study are a web-based information system using the PHP programming language and using a MySQL database. Below this is the display of the system that has been built.
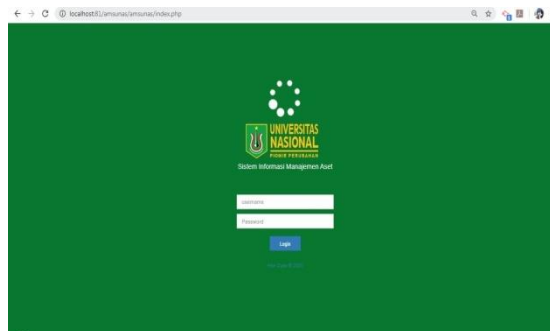
Fig 8. Display login page

In Figure 8. It is a login page, where users will enter their username and password to enter the main system page.
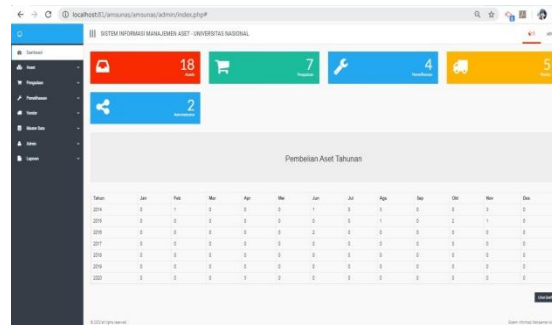
Fig 9. Main Page Display

In Figure 9. Is the main page of the system where there are dashboard menus, assets, procurement, vendors, master data, admin, and reports.
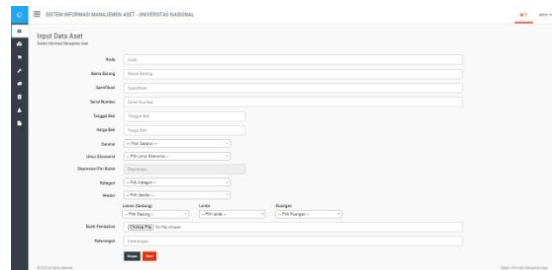
Fig 10. Asset data input menu page

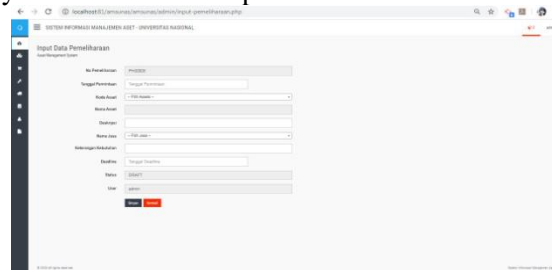In Figure 10. Is the display of the asset data input form on the asset menu.

Fig 11. Maintenance Data Input Menu

In Figure 11. It is a display of the maintenance data input form in the maintenance menu
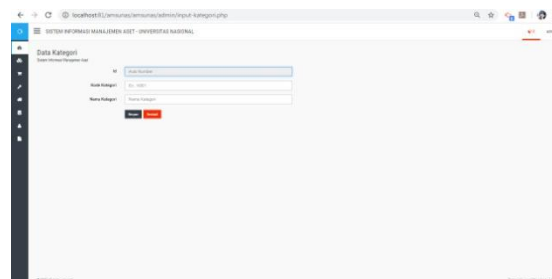

Fig 12. Category Data Input Menu

In Figure 12. It is a display of the category data input form on the master data menu

Fig 13. Asset Procurement Requests Report

In Figure 13 Is a display report on the demand for asset procurement

Fig 14. Asset Maintenance Report

In Figure 14. Is a view of the Asset Maintenance report

Fig 15. Asset Data Report

In Figure 15. Is a display of data asset reports from export excell results

4.4 System Testing

The results of testing using the blackbox method can be seen in table 1.

Table 1
Testing Results Table

Test Case	Test Scenarios	Expected results	The results obtained	Conclusion
Login	Enter the correct username & password.	The system will show the main page.	The system shows the main page.	[✓] Received [ ] Rejected
	Incorrect username & password input	The system prevents access.	The system prevents access.	[✓] Received [ ] Rejected
	Only input one of the username or password	The system will prevent login access by displaying the message "please fill out this field".	The system will prevent login access by displaying the message "please fill out this field".	[✓] Received [ ] Rejected
Main course	Select the asset menu	The system will show menu choices: asset data, asset input.	The system shows menu choices: asset data, asset input.	[✓] Received [ ] Rejected
	Select the procurement menu	The system will show menu choices: procurement data, input requests	The system shows the menu options: procurement data, input requests	[✓] Received [ ] Rejected

Test Case	Test Scenarios	Expected results	The results obtained	Conclusion
	Choose the maintenance menu	The system will show menu choices: maintenance data, maintenance input.	The system shows menu options: maintenance data, maintenance input.	[✔] Received [ ] Rejected
	Select the vendor menu	The system will show menu choices: vendor, vendor input.	The system shows menu options: vendor, vendor input.	[✔] Received [ ] Rejected
	Select the master data menu	The system will display menu options: category, building, floor, room, service.	The system shows menu choices: categories, buildings, floors, rooms, services.	[✔] Received [ ] Rejected
	Choose the admin menu	The system will show menu options: admin, admin input	The system shows menu options: admin, admin input	[✔] Received [ ] Rejected
	Select the report menu	The system will display menu options: asset data reports, procurement request reports, maintenance reports, master data reports.	The system shows the menu options for asset data reports, procurement request reports, maintenance reports, master data reports.	[✔] Received [ ] Rejected
Asset Data Menu	Click Input Data	The system will show the input data form.	The system shows the data input form.	[✔] Received [ ] Rejected
	Click Details	The system will show detailed asset data.	The system will show detailed asset data.	[✔] Received [ ] Rejected
	Click Edit, Click Delete	Data will be changed.	Data changed.	[✔] Received [ ] Rejected
	Click export excel	Will show the results of data export in excel form.	Will show the results of data export in excel form	[✔] Received [ ] Rejected
	Click search	The system shows the data sought.	The data sought was found successfully.	[✔] Received [ ] Rejected
Procurement Menu	Click Input Data	The system will show the input data form.	The system shows the data input form.	[✔] Received [ ] Rejected
	Click Details	The system will show detailed procurement data	The system will show detailed procurement data	[✔] Received [ ] Rejected
	Click Edit, Click Delete	Data will be changed.	Data changed.	[✔] Received [ ] Rejected
	Click Export Excel	Will show the results of data export in excel form	Will show the results of data export in excel form	[✔] Received [ ] Rejected
	Click Search	The system shows the data sought	The data sought was found successfully	[✔] Received [ ] Rejected
Maintenance Menu	Click Input Data	The system will show the input data form.	The system shows the data input form.	[✔] Received [ ] Rejected
	Click Details	The system will show detailed maintenance data	The system will show detailed maintenance data	[✔] Received [ ] Rejected
	Click Edit, Click Delete	Data will be changed.	Data changed.	[✔] Received [ ] Rejected
	Click Export Excel	Will show the results of data export in excel form	Will show the results of data export in excel form	[✔] Received [ ] Rejected
	Click Search	The system shows the data sought	The data sought was found successfully	[✔] Received [ ] Rejected
Vendor Menu	Click Input Data	The system will show the input data form.	The system shows the data input form.	[✔] Received [ ] Rejected
	Click Edit, Click Delete	Data will be changed.	Data changed.	[✔] Received [ ] Rejected

Test Case	Test Scenarios	Expected results	The results obtained	Conclusion
	Click Export Excel	Will show the results of data export in excel form	Will show the results of data export in excel form	[✓] Received [ ] Rejected
	Click search	The system shows the data sought	The data sought was found successfully	[✓] Received [ ] Rejected
Menu Master Data Categories, Buildings, Floors, Spaces, Services	Click Input Data	The system will show the input data form.	The system shows the data input form.	[✓] Received [ ] Rejected
	Click Edit, Click Delete	Data will be changed.	Data changed.	[✓] Received [ ] Rejected
	Click Export Excel	Will show the results of data export in excel form	Will show the results of data export in excel form	[✓] Received [ ] Rejected
	Click Search	The system shows the data sought	The data sought was found successfully.	[✓] Received [ ] Rejected
Admin Menu	Click Input Data	The system will show the input data form.	The system shows the data input form.	[✓] Received [ ] Rejected
	Click Details	The system will show admin data details.	The system will show admin data details	[✓] Received [ ] Rejected
	Click Edit, Click Delete	Data will be changed.	Data changed.	[✓] Received [ ] Rejected
	Click Search	The system shows the data sought	The data sought was found successfully.	[✓] Received [ ] Rejected
Report Menu	Asset Data Report	Will show export data excell	Shows export data excell	[✓] Received [ ] Rejected
	Procurement Data Report	Showing pdf printouts	Showing pdf printouts	[✓] Received [ ] Rejected
	Data Maintenance Reports	Showing pdf printouts	Showing pdf printouts	[✓] Received [ ] Rejected
	Vendor Data	Showing pdf printouts	Showing pdf printouts	[✓] Received [ ] Rejected
	Category Data	Showing pdf printouts	Showing pdf printouts	[✓] Received [ ] Rejected
	Building Data	Showing pdf printouts	Showing pdf printouts	[✓] Received [ ] Rejected
	Floor Data	Showing pdf printouts	Showing pdf printouts	[✓] Received [ ] Rejected
	Room Data	Showing pdf printouts	Showing pdf printouts	[✓] Received [ ] Rejected

5. Conclusion

Based on the results of implementation and testing, a conclusion can be made that the web-based fixed asset management information system can simplify work, provide convenience in recording, tracking, reporting and monitoring of assets. The system development using the waterfall method successfully produces the system as expected. Suggestions for further research are expected to be developed more broadly into systems that can be integrated with other information systems and can also be developed into programming

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