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# Development of an Integrated Information System for Regional Revenue and Asset Management in East Nusa Tenggara Province

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**Abstract**

The Regional Revenue and Asset Agency (BPAD) of East Nusa Tenggara (NTT) Province faces various challenges in asset management, such as delays in data updates due to manual processes, which result in low efficiency, transparency, and accountability. To address these issues, this study developed SiTepadNTT, a web-based Integrated Information System designed to centralize asset data and enhance the effectiveness of asset management. The system was developed using the Waterfall (SDLC) methodology and is equipped with role-based access control features, namely administrator (user signer) and operational staff (user maker), to support the effective management of assets such as land, buildings, equipment and machinery, roads and networks, assets under construction, and other assets. Effectiveness testing conducted with 15 respondents showed that the use of the web-based application (SiTepadNTT) achieved an effectiveness rate of 97%, significantly higher than the 83.8% achieved by the Excel application. Thus, it can be concluded that SiTepadNTT provides a 13.2% improvement in asset management effectiveness. These findings not only demonstrate the success of technology implementation in improving asset governance but also contribute to the development of digital governance theory and offer a replicable solution for other regions in Indonesia facing similar challenges.

***Keywords***: *Asset management; digital governance; integrated information systems; operational efficiency; transparency.*

## 1. Introduction

East Nusa Tenggara (NTT) is one of the provinces in Indonesia consisting of 624 islands, with diverse natural and social potential [1] The NTT Province is led by a governor who oversees various regional government institutions, one of which is the Regional Revenue and Asset Agency (BPAD). Based on the NTT Governor Regulation Number 25 of 2022, BPAD is tasked with assisting the governor in carrying out supporting functions for government affairs in the field of regional revenue and assets under the authority of the region [2].

BPAD plays a strategic role in ensuring that asset management runs effectively and efficiently. However, the NTT Provincial Government faces challenges in asset management, namely the uncertainty of asset data quantities. Based on 2023 data, the NTT government owns assets in the form of land (1,000,000 m²), buildings and structures (4,294), equipment and machinery (188,773), roads, irrigation, networks (214), other fixed assets (379,829), and construction in progress (92) [3]. However, data updates require one year because the data collection system is not yet online-based, making it difficult to conduct accurate inventory and asset management.

To address this issue, the implementation of the Integrated Information System at BPAD NTT Province (SiTepadNTT) is expected to be an effective solution. This system is designed to integrate information related to regional asset management, making information access easier, transparent, and centralized. The system supports more efficient monitoring and evaluation processes, with real-time reporting, enabling the regional government to respond to existing conditions more quickly and accurately. This is supported by research conducted by Saputra and Hamdani (2024) titled "Management Information System for Goods and Regional Assets of Banyuwangi Regency," which shows that manual regional asset management causes obstacles in data verification, monitoring, and reporting. Thus, the implementation of a web-based asset management information system developed in the study successfully integrated asset management processes digitally, with automated - automated verification, real-time monitoring, accurate asset value calculations, and structured digital archiving, thereby increasing efficiency, transparency, and accountability in regional asset management [4].

Based on the above description, the implementation of the Integrated Information System at BPAD NTT Province (SiTepadNTT) is expected to be a strategic solution to address the challenges of regional asset management that are still conducted manually. SiTepadNTT facilitates digital asset data management, verification, and monitoring, ensuring rapid and transparent processes. Beyond simply improving efficiency, SiTepadNTT supports accountable and responsive governance, while also strengthening public trust in regional asset management that is aligned with the development needs of NTT.

## 2. Methodology

In this study, the development of the "Integrated Information System of the Regional Revenue and Asset Agency of East Nusa Tenggara Province" was carried out by applying the System Development Life Cycle method. The System Development Life Cycle (SDLC) is a common methodology used in the development of systems or software. SDLC has descriptive and prescriptive characteristics in the software development process, which includes various phases and parts starting from planning, analysis, design, implementation, testing, to system maintenance [5]. As for the approach used, it is the waterfall model approach. This model uses a systematic and sequential approach, where each development stage is completed in an organized manner and begins only after the previous stage is finished, starting from planning to management (maintenance) carried out gradually [6].

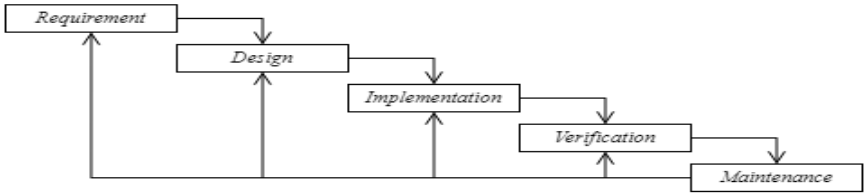


**Fig. 1**: Waterfall model

## 3. Result and Discussion

### 3.1. System analysis

The system is designed to meet user needs in managing regional assets efficiently and in a structured manner. Based on the identification results, the system requirements include functional and non-functional requirements. The system focuses on processing various types of assets data and managing user access rights with different authorization levels. The main features that must be available in the system include the ability to log in using email and password, management of assets data (land, equipment and machinery, buildings and structures, roads and networks, other fixed assets, and assets under construction), as well as administrative data such as regency, sub-district, village data, and data of regional apparatus organizations (OPD), technical implementation units (UPT), and asset descriptions. Additionally, the system must enable data verification and approval processes by users with specific access rights.

From the non-functional aspects, the system must have an adequate level of security, including support for encryption of sensitive data such as passwords, and the implementation of role-based access control to maintain data integrity and confidentiality. As an initial step in development, the integrated information system of BPAD NTT Province is designed using an object-oriented approach by utilizing the Unified Modeling Language (UML), such as use case diagrams and class diagrams as the basis for designing the system to be developed.

### 3.2. Design

#### 3.2.1. Use case diagram

As an initial step in development, the integrated information system of BPAD NTT Province is designed using an object-oriented approach by utilizing the Unified Modeling Language (UML), such as use case diagrams and class diagrams as the basis for designing the system to be developed. A use case diagram is a UML diagram used to describe the interactions between actors and the system, as well as to illustrate the functions (use cases) that can be performed by the actors [7]. Below is the use case diagram for the user signer and user maker.

1. Use case diagram of user signer

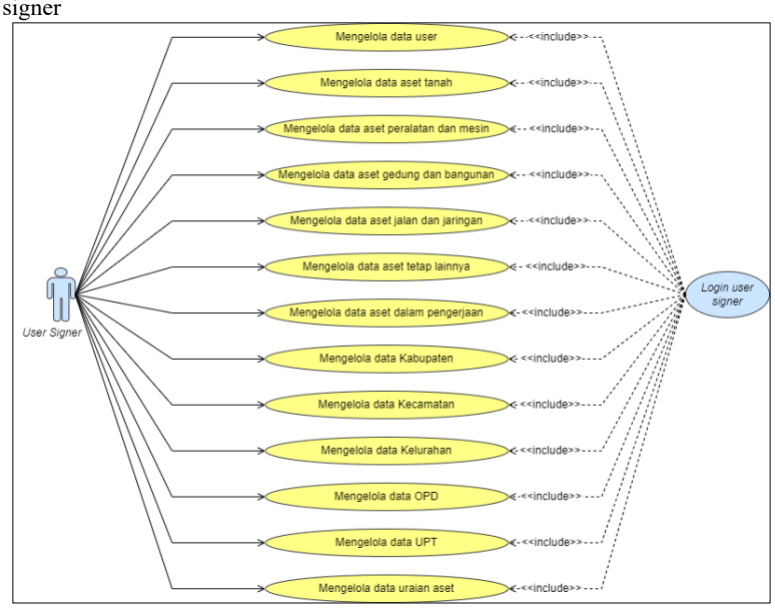


**Fig. 2**: Use case diagram of user signer

The use case diagram for the user signer illustrates the process of system usage by the user signer, which begins with logging in to gain access to various data management features. The user signer can manage user data that has access to the system, as well as assets data covering various categories such as land, buildings, roads, equipment, other fixed assets, and assets under construction. Additionally, the user signer is responsible for managing administrative region data such as regencies, sub-districts, and villages, as well as data of Regional Apparatus Organizations (OPD) and Technical Implementation Units (UPT). The asset description serves to provide specific coding for recorded assets. All these features are interconnected to ensure efficient and integrated data management.

2. Use case diagram of user maker

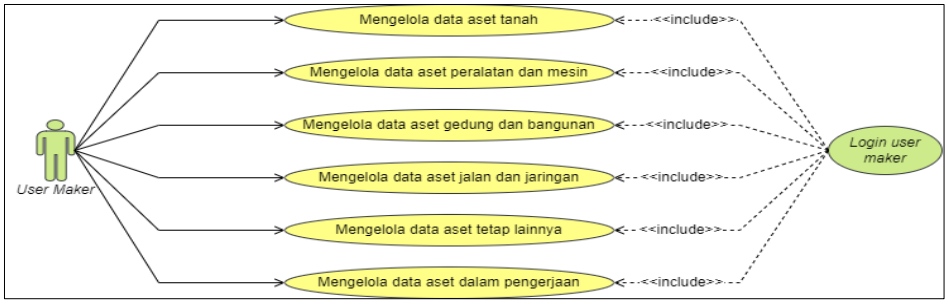


**Fig. 3**: Use case diagram of user maker

The use case diagram for the user maker illustrates the role of the user maker in the asset data management system. As an initial step, the user maker must log in to the system to gain access to various asset management features. After logging in, the user maker can manage various asset categories, such as land assets, equipment and machinery, buildings and structures, roads and networks, other fixed assets, and assets under construction. Each managed asset category is interconnected through the <<include>> relationship, indicating that these functions depend on the login process. The role of the user maker focuses on the recording, updating, and direct management of asset data, with the aim of supporting the integrity and accuracy of data within the system.

### 3.3. System Implementation

In this section, we present the realization of the user interface (UI) design for each page of the developed system. This implementation includes layout, navigation elements, and interactive functionalities designed to provide an intuitive and efficient user experience. Each web page is designed with consideration for user needs, visual aesthetics, and ease of access, as described in the following section.

1. Login page

   The user login page is the initial page designed to authenticate users before entering the regional asset monitoring system. This page displays a simple form with two main fields for entering email and password, along with a "Remember Me" option to save the login session. There is a login button that verifies the user's credentials before redirecting to the system's main page. Additionally, a "Forgot Password?" link is provided to assist users who encounter issues accessing their accounts.

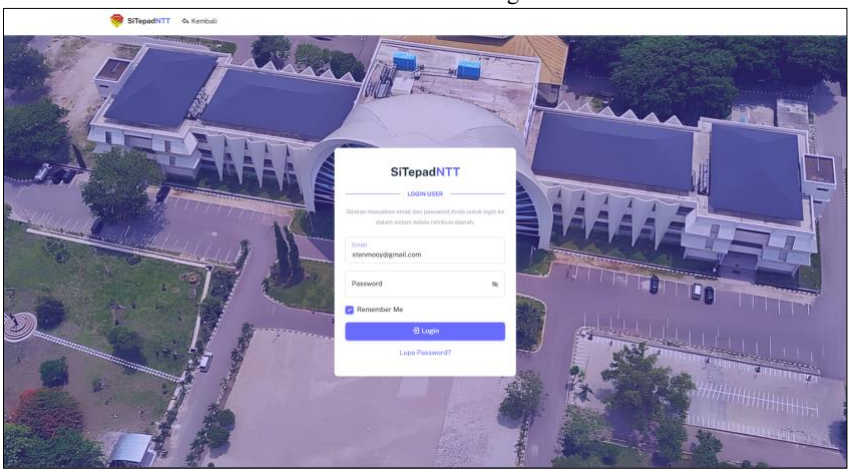


**Fig. 4**: Login page

2. User signer dashboard

   As a signing user, they can view and validate assets in the SiTepadNTT system. The dashboard displays the total number of registered assets. These assets are divided into various categories, such as Land, Under Construction, Other Fixed Assets, Buildings and Structures, Roads and Networks, and Equipment and Machinery. Additionally, there are files awaiting validation. Each asset category shows the number of unapproved files. Users can directly perform validation by clicking the "Validate Now" button next to each category.

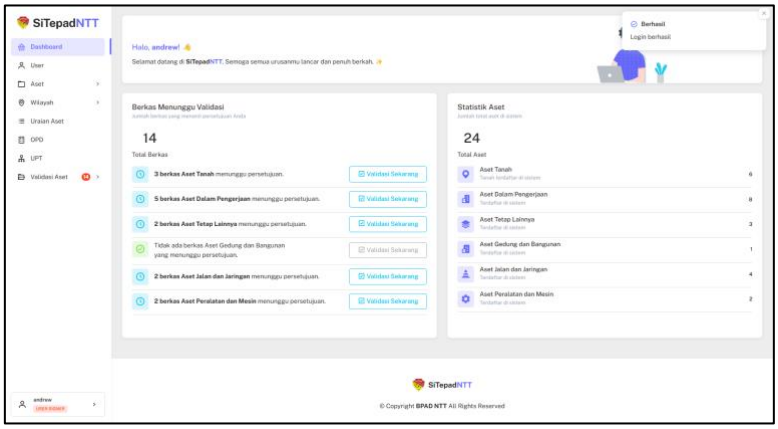


**Fig. 5**: User signer dashboard

3. Land asset data management page

The land asset data management page facilitates comprehensive and systematic oversight of regional government land assets. Users can add, edit, delete, and view detailed land asset information, including OPD name, location, asset name, address, condition, and description. Search and pagination features enhance navigation through large datasets. Separate pages handle other asset types, such as assets under construction, buildings, equipment, other fixed assets, and roads/networks, offering similar functionalities for adding, editing, deleting, and viewing data, along with search and pagination for efficient management.

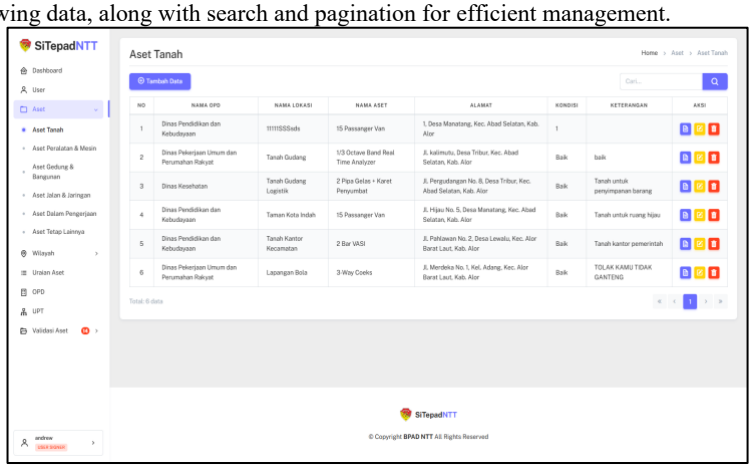


**Fig. 6**: Land asset data management page

4. User maker dashboard

As a user maker, the user plays a crucial role in managing asset data on the SiTepadNTT application. On the dashboard display, the user is greeted with a welcome message and can immediately view statistics of the total assets registered in the system based on the logged-in user's OPD, amounting to 13 assets. These assets are divided into several categories, namely Land Assets, Assets Under Construction, Other Fixed Assets, Buildings and Structures Assets, Roads and Networks Assets, and Equipment and Machinery Assets. This information is presented concisely in the center of the page to facilitate monitoring. On the right side of the dashboard, the user can also view asset data based on status, with a total of 9 verified assets, 0 rejected assets, and information regarding assets that have not yet been verified. Through the menu on the left side, the user maker can select an asset category to view details or perform management tasks. With the access provided, the user maker is responsible for ensuring that asset data is always updated and aligns with field conditions.

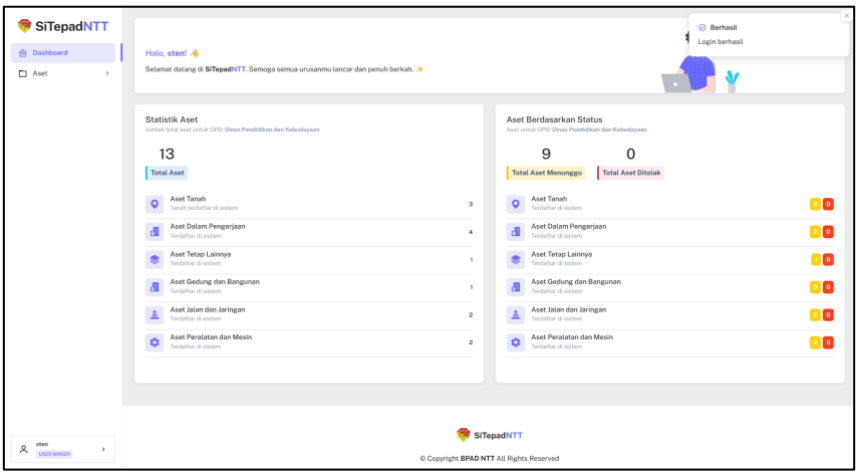


**Fig. 7**: User maker dashboard

### 3.4. Verification

At this stage, an effectiveness test was conducted to calculate the percentage of successfully completed tasks. There were seven tasks assigned, all related to asset management. These tasks were identified through interviews regarding the activities involved in asset management. Users were asked to complete all assigned tasks. Tasks that were successfully completed were marked as "successful" in the research instrument, while tasks that could not be completed were marked as "failed." The effectiveness score was determined based on the total number of successfully completed tasks. The tasks tested are as follows:

**Table 1**: Tested Tasks

| No. | Task |
|---|---|
| 1 | Log in |
| 2 | Add asset data |
| 3 | Edit asset data |
| 4 | Delete asset data |
| 5 | Search for asset data |
| 6 | Validate asset data |
| 7 | Log out |

The test result data for task completion performed by 15 employee respondents are as follows:

**Table 2**: Average task completion effectiveness

| Respondent | Excel Application | | Web-Based Application | |
|---|---|---|---|---|
| | Successful out of 7 Tasks | Effectiveness | Successful out of 7 Tasks | Effectiveness |
| 1 | 6 | 85,7% | 6 | 85,7% |
| 2 | 5 | 71,4% | 7 | 100% |
| 3 | 7 | 100% | 7 | 100% |
| 4 | 6 | 85,7% | 7 | 100% |
| 5 | 5 | 71,4% | 6 | 85,7% |
| 6 | 7 | 100% | 7 | 100% |
| 7 | 5 | 71,4% | 7 | 100% |
| 8 | 7 | 100% | 7 | 100% |
| 9 | 5 | 71,4% | 7 | 100% |
| 10 | 7 | 100% | 7 | 100% |
| 11 | 4 | 57,1% | 6 | 85,7% |
| 12 | 6 | 85,7% | 7 | 100% |
| 13 | 7 | 100% | 7 | 100% |
| 14 | 6 | 85,7% | 7 | 100% |
| 15 | 5 | 71,4% | 7 | 100% |
| | Average | 83,8% | Average | 97% |

In Table 2 above, there is a variation in effectiveness values for each task. The effectiveness value is calculated using the following formula:

$$\text{Effectiveness} = \frac{\text{Number of successful tasks}}{\text{Total tested tasks}} \times 100\%$$

To assess the effectiveness level of using both applications, the average completion rate of all tasks is calculated. The formula used to calculate the average is as follows:

$$\bar{x} = \frac{\Sigma \text{Effectiveness}}{n}$$

$\bar{x}$ = Average

ΣEffectiveness = Total percentage of effectiveness for each respondent

n = Number of data points

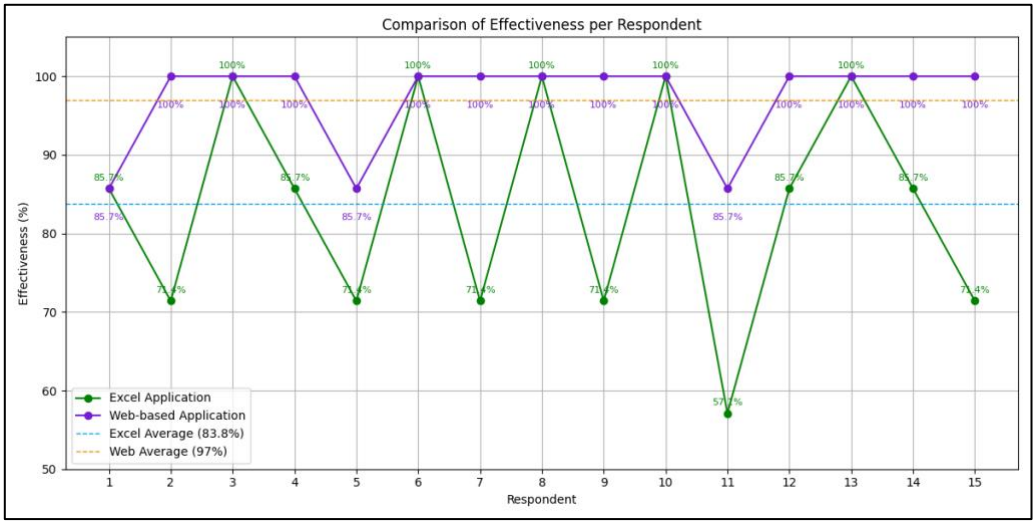


**Fig. 8:** Graph comparing effectiveness per respondent

Based on the effectiveness testing results above, it is shown that the average effectiveness of using the Excel application reached 83.8%, while the web-based application reached 97%.

## 4. Conclusion

This study successfully developed SiTepadNTT, a web-based integrated system for the Regional Revenue and Asset Agency (BPAD) of East Nusa Tenggara Province, using the Waterfall methodology in the system development life cycle (SDLC). By automating asset tracking, implementing role-based access control, and providing real-time reporting, SiTepadNTT significantly enhances the effectiveness of asset management. This improvement is evident from testing conducted with 15 respondents, which compared the effectiveness of asset management using Excel applications versus the web-based application. The results showed that the average effectiveness of using Excel was 83.8%, while the web-based application achieved 97%. Therefore, it can be concluded that the use of the web-based application (SiTepadNTT) is more effective than the Excel application, with an effectiveness increase of 13.2%.

## Acknowledgement

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