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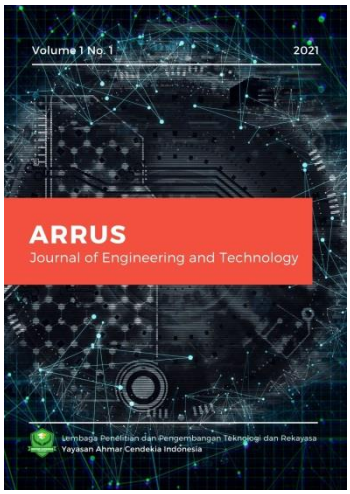

RESEARCH ARTICLE

Application of the Rapid Application Development (RAD) Method for Web-Based Financial Management and Wood Inventory Using CodeIgniter

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Abstract: Financial management system and wood inventory at UD. Anugrah Limbah often faces problems that can affect operational efficiency and accuracy. Problems that arise include the fact that financial recording and wood inventory is still done manually, making it vulnerable to double recording, miscalculations or loss of data as well as other problems. This research discusses the application of the Rapid Application Development (RAD) method in developing financial and wood inventory management applications. The aim of this research is to design and implement an application that can increase efficiency and accuracy in managing finances and wood supplies at UD. Anugrah Limbah. The Rapid Application Development method was chosen because of its advantages in accelerating the application development process through an iterative and collaborative approach, which allows end users to actively participate in every stage of development. The research results show that by using the Rapid Application Development method, applications can be developed in a shorter time with quality maintained. The resulting application has features such as recording financial transactions, monitoring wood supplies, and reporting that is integrated and easy to access.

Keywords: applications, management, transactions, Rapid Application Development

1. Introduction

Financial management and wood inventory is a crucial component in the operations of companies operating in the wood processing industry. Good management of these two aspects is very important to ensure smooth business processes, from production planning to accurate financial reporting. However, many companies still face challenges in managing finances and wood supplies effectively. Therefore, innovative and efficient solutions are needed to overcome this problem. The Rapid Application Development (RAD) method emerged as a potential approach to develop more efficient and accurate financial and wood inventory management applications. This research focuses on the application of the RAD method in developing this application.

Ineffective management of finances and wood supplies can cause various serious problems for companies. Manual recording, which is still widely used, is prone to errors, such as

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double recording or loss of data, which can result in inaccurate financial reports. In addition, the lack of integration between financial systems and inventory management makes stock monitoring and control difficult, resulting in overstock or understock which impacts storage and production costs. Inaccurate and untimely reporting also hinders strategic decision making. Systems that are inflexible and difficult to adapt to evolving business needs add to the complexity of the problem. All of this shows the urgent need for solutions that can increase efficiency and accuracy in managing finances and wood supplies.

To find out the weaknesses of the running system, researchers use the PIECES method by analyzing aspects of performance, information, economy, security, control, efficiency and service so that improvements can be made to build a new system. According to (Warjiyono et al., 2020), PIECES analysis is important to carry out before the system development stage because this can find problems that occur in the old system, so that it will make it easier to determine the requirements needed for the new system.

The Rapid Application Development (RAD) method offers an approach that can speed up the application development process by prioritizing iteration and collaboration, so that the resulting application can be more suited to user needs and dynamic business conditions.

This research aims to apply the Rapid Application Development (RAD) method in developing financial and wood inventory management applications. The specific objectives of this research are:

a. Design an application that can increase efficiency and accuracy in managing finances and wood supplies.
b. Implement applications using the Rapid Application Development method to ensure rapid development and in accordance with user needs.
c. Evaluate the performance and effectiveness of the resulting applications in improving financial management and wood supplies.
d. Identify the benefits and challenges faced during the application of the RAD method in developing this business application.

By achieving these objectives, it is hoped that this research can make a significant contribution to the field of financial and inventory management, as well as offering practical solutions that can be adopted by UD. Anugrah Limbah.

2. Literature Review

The design of this research is a software development study that aims to create a financial and wood inventory management application. Software development method in this research, the software development method used was the Rapid Application Development method. This method is used because there is involvement between analysts and users so that it can help in designing the website needed by the user.

The application of the Rapid Application Development (RAD) method is considered to have good time efficiency. It is proven that the framework consists of 3 stages, including planning, system design and implementation, which can be done in a short time. (Wijaya, 2021).

There are three phases in the Rapid Application Development method according to Kendall and Kendall in (Nurwanti & Meyliana, 2019) involving analysts and users, namely:

a. Requirements Planning

Users and analysts meet to identify the goals of the application or system and to identify the information requirements resulting from those goals. The orientation in this phase is to solve company problems. Although information technology and systems can direct some of the proposed systems, the focus will always remain on achieving company goals.

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b. RAD Design Workshop

The phase for designing and improving can be described as a workshop. Analysts and programmers can work on building and showing visual representations of designs and working patterns to users. This design workshop can be carried out over several days depending on the size of the application to be developed. During the RAD design workshop, users respond to existing prototypes and analysts improve the designed modules based on user responses. If a developer is an experienced developer or user, Kendall considers that this creative effort can encourage development to an accelerated level. In developing this system, teachers are involved as users for processing report cards.

c. Implementation

In this phase, analysts collaborate with users intensively during workshops and design the business and non-technical aspects of the company. After these aspects are agreed upon, the system is then built and refined, tested and then introduced into the organization.

Rapid Application Development (RAD) has the following advantages: (Sagala, 2018)

a. This is very useful when users do not understand what requirements are used in the software development process.
b. Rapid Application Development (RAD) follows the system development stages as in general but has the ability to reuse existing components (reusable objects) so that developers do not need to create from scratch again and the time required for subsequent development is shorter, ranging from 60 days to 90 days. .
c. This method has the ability to maximize the use of existing components and in a shorter time the operational costs required are lower.

Currently, there are various frameworks available that can be used to develop the web. A framework is defined as a structure of libraries, classes and run-time infrastructure that can be used by programmers to develop web applications quickly. The use of the CodeIgniter framework aims to provide efficient, fast and secure solutions in web application development. By providing comprehensive tools and libraries and following the MVC design pattern, CodeIgniter helps developers to produce applications that are structured, organized, and easy to maintain. Large community support and good documentation are also added advantages that make CodeIgniter a popular choice among web developers. One framework is CodeIgniter with the MVC (Models View Controller) concept which separates data and presentation, making it possible to develop a website quickly and simplifying the web management process. CodeIgniter is a framework created using the PHP language, which can be used for fast web development.

Another similar research on the application of the RAD method was carried out by (Irnawati & Listianto, 2018) that the web-based inventory application designed can help distribution, logistics and inventory process activities become more efficient. Meanwhile, other research regarding the CodeIgniter framework carried out by (Choirudin et al., 2023) shows that system development using the CodeIgniter framework produces a system that can be used for the process of managing practical work, starting from the group registration process, submitting a place for implementation, registering for seminars, monitoring attendance and guidance as well as collecting practical work reports. As well as research by (Sholikhatin et al., 2023) which uses the RAD method and CodeIgniter framework in implementing a village financial website to manage village income and expenditure.

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3. Research Method and Materials

3.1. Research methods

3.1.1. Research Design

This research uses a qualitative method with a case study approach to understand the application of the Rapid Application Development (RAD) method in developing financial management and wood inventory applications using CodeIgniter, as well as the application of Black Box testing to ensure application quality.

3.1.2. Research Stages

a. Requirements Analysis by conducting interviews and observing business processes to identify functional and non-functional application requirements. Apart from that, it also collects documentation related to current business processes.
b. System Design for developing application prototypes using CodeIgniter based on needs analysis as well as conducting reviews and feedback to get feedback from application users on the prototype for further improvements.
c. Developed applications in an iterative cycle using CodeIgniter. Each iteration focuses on adding and testing new features based on user feedback and integrating various application components to ensure that each application component works well together.
d. Testing uses the Black Box testing method to test applications based on expected functionality without looking at the source code. The testing carried out includes functional testing to ensure that each application feature functions according to specifications, validation testing to ensure that the input given to the application produces the correct output and meets expectations as well as usability testing by testing the user interface to ensure that the application has been designed easy to use and intuitive.
e. Implementation and Evaluation. After testing, the next step is to provide training to end users regarding application use, collect feedback from users (owners and secretaries) regarding application performance in a real operational environment and make improvements if necessary.

4. Results and Discussion

To meet user needs and be utilized as well as possible, the applications that have been built are also assessed from several aspects, namely:

a. Performance Aspect, to help application users process data when creating purchase and sales reports and increase user speed to obtain information more quickly.
b. Information aspect means that product information can be presented more completely so that application users can see the products they need completely and clearly and present information to management more quickly.
c. Security aspect, storing financial data, stock of goods, purchases, sales and other important data safely in the database so that only authorized parties can access it. Apart from that, this application can control stock discrepancies.
d. Efficiency Aspect. The time required to create important reports required by management is faster and the time to process purchasing transactions can be processed more quickly than if done manually.
e. Economic Aspects. Costs incurred for printing reports as well as costs for purchasing stationery required for recording stock, financial recording and preparing purchase and sales reports can be reduced in such a way as to save expenses.
f. Service Aspects. Service for consumers making transactions becomes faster so that at one time they can handle several consumers and several jobs at almost the same time.

This financial and wood inventory management application has the following limitations:

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a. The financial and wood inventory management information system contains data on raw wood depositors, customer data, expenditure data, raw wood stock, finished wood stock, raw wood purchase data and finished wood sales.
b. Users of this system include factory owners and secretaries.

Table 1. System Requirements Analysis

User	Requirements
Secretary	Login, add, delete and edit raw wood supplier data, expenditure data, raw wood stock, finished wood stock and print raw wood purchase data
Owner	Login, view raw wood supplier data, expenditure data, raw wood stock, finished wood stock, raw wood purchase data and add, edit and delete customer data, print finished wood sales data and create reports

After analyzing it according to user needs, a system is then designed using use case diagrams and a database. This system design can be used as a reference for the use of information systems for financial management and wood supplies at UD. Anugrah Limbah.

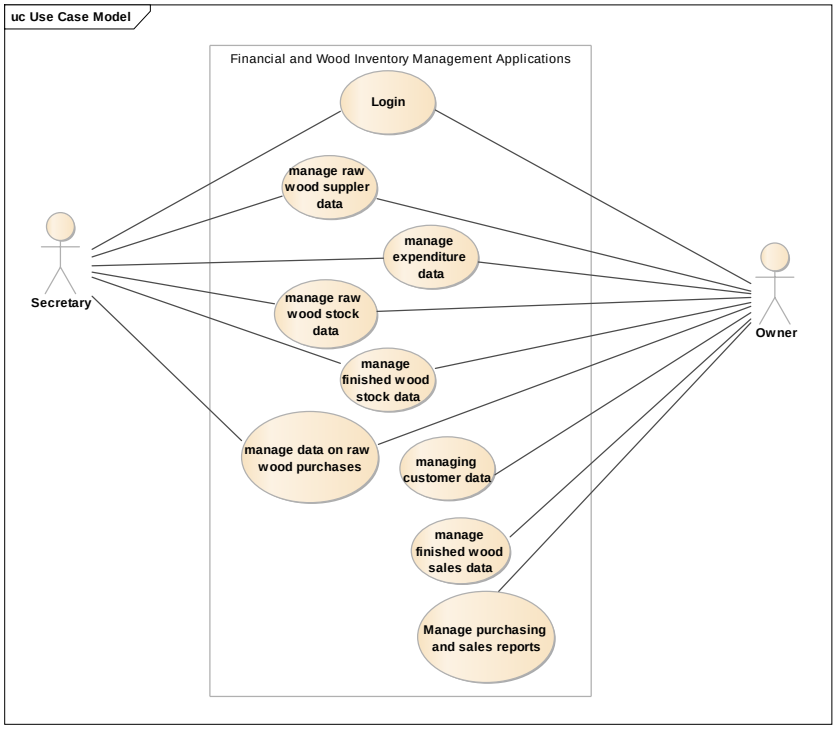

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Figure 1. Use case Diagram

The designed application has several tables as depicted in the Logical Record Structure shown on Figure 2.

From this research, a financial and wood inventory management application was produced for UD. Anugrah Limbah which can be seen in the following interface:

a. Login Page

The login form is the main door to control all database contents so that they can be used properly. To be able to enter the main menu, the user must first enter the correct username and password, but if the username and password are incorrect then they are not allowed to enter the main menu. The figure of login page shown on Figure 3.

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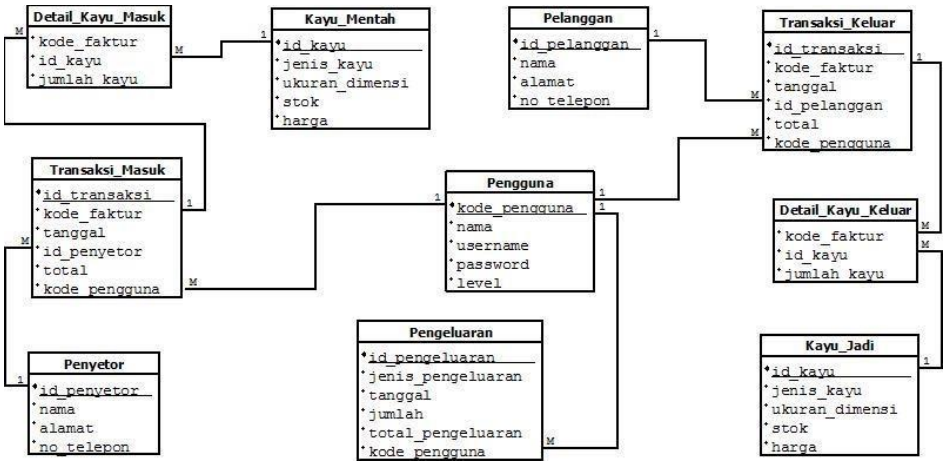

Figure 2. Logical Record Structure

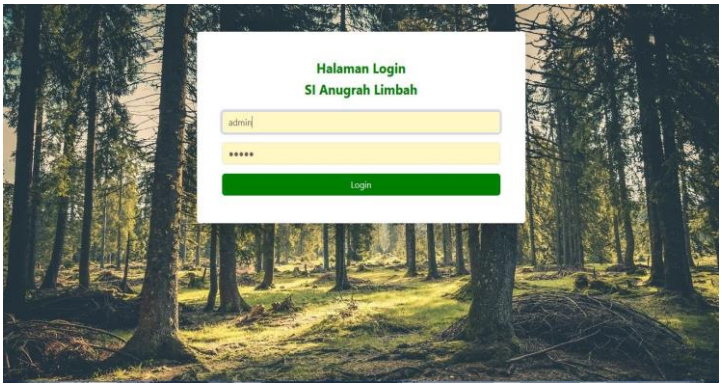

Figure 3. Login Page

b. Owner Home Page

This page is the display on the owner's main page if the login is successful, which contains customer data, supplier data, expenditure data, raw wood stock, finished wood stock, raw wood sales data and sales and purchase reports. The figure of user interface shown on Figure 4.

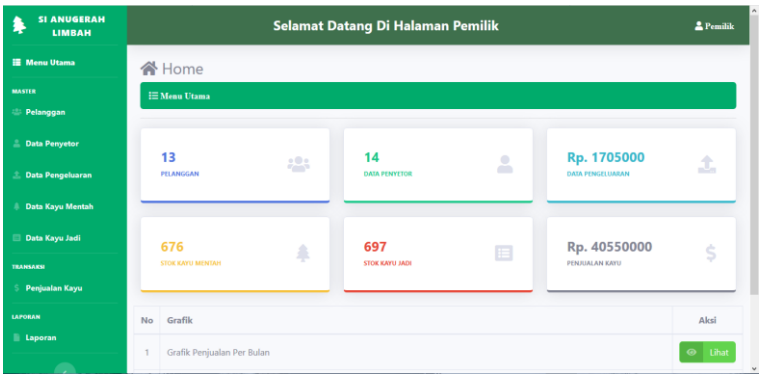

Figure 4. User Interface Display

c. Purchase and sales report menu interface display

This interface is a page that functions to print monthly purchase and sales reports which can be processed by the owner. The figure of purchase and sales report menu interface shown on Figure 5.

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Table 2. Unit Testing Cases

No.	Test Cases	Input	Expected Output	Test Results	Status
Stock Management Module					
1	Adding new stock	Wood Code: K001 Wood Name: Teak Wood Quantity: 50	Stock added successfully. Stock is visible in the inventory list.	Stock added successfully. Stock is visible in the inventory list.	Passed
2	Add stock by the amount of 0	Wood Code: K001 Wood Name: Teak Wood Quantity: 0	Error message "Stock amount cannot be zero". Stock is not added.	An error message appears. Stock is not added.	Passed
Financial Transaction Module					
1	Add transactions	Date: 2024-02-01 Description: Wood Sales Amount: 1000000	The transaction was successfully added to the database.	Transaction added successfully.	Passed
2	Add transactions with negative amounts	Date: 2024-02-01 Description: Wood Sales Amount: -1000000	Error message "Amount cannot be negative". Transactions are not added.	An error message appears. Transactions are not added.	Passed
Stock Report Module					
1	Create monthly stock reports	Period: February 2024	Stock report for February 2024 with accurate initial, addition, subtraction and final stock amounts.	Stock reports are generated correctly.	Passed
2	Create stock reports with wood codes that are not in stock	Wood Code: K999	Error message "Wood code not found", report not created.	An error message appears, the report is not created.	Passed
Financial Report Module					
1	Create monthly financial reports with valid data.	Period: February 2024	Financial reports for February 2024, total income and expenses are accurate.	Financial reports are generated correctly.	Passed
2	Create financial reports without transactions	Period: January 2024	Reports show no transactions	Reports show no transactions	Passed

d. Unit testing uses the Black-Box method.

Black-box testing is suitable for use in the final testing stage when application development is complete. The main purpose of black box testing is to ensure the quality and security of an application before it is released to users. At the testing stage, the author tested several forms in the information system created. (Pradana et al., 2023).

In this financial and wood inventory management application, the testing carried out aims to ensure that each unit or component of the application functions in accordance with the predetermined functional specifications. By conducting systematic testing and documenting the results, any bugs or errors in the early stages of development can be identified and

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fixed, thereby improving the quality and reliability of the application before it is rolled out to end users. The result of unit testing cases shown on Table 2.

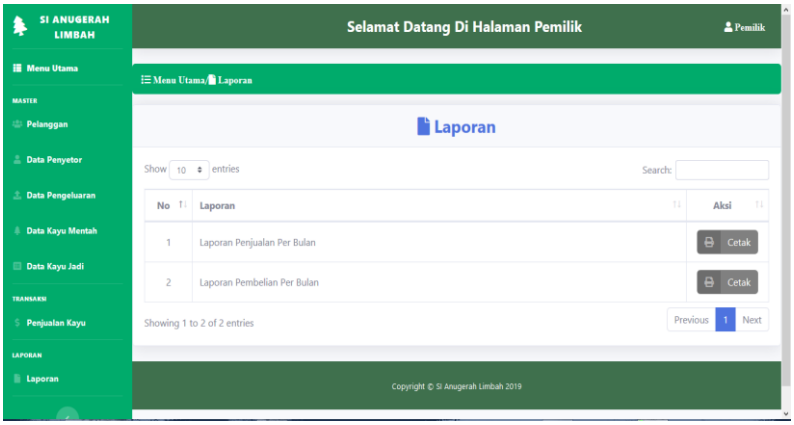

Figure 5. Purchase and Sales Report menu interface display

5. Conclusion

From the results of research on the application of financial management and wood supplies at UD. Anugrah Limbah using the Rapid Application Development method can be concluded that:

a. This application can make it easier and minimize errors for secretaries and owners when managing financial data and wood supplies.
b. Comprehensive research methods and the use of appropriate materials are essential in implementing the Rapid Application Development Method for financial management and wood inventory applications. With a structured approach and focus on user needs, this research is expected to produce effective and efficient applications, as well as improve performance and user satisfaction in financial management and wood inventory.
c. Structured development methods and the use of appropriate testing tools and techniques, such as Black Box Testing, are very important in developing financial management and wood inventory applications using CodeIgniter.
d. With a systematic and iterative approach, it is hoped that the application developed can meet user needs, function well, and make a positive contribution to operational efficiency and business management run by UD. Anugrah Limbah.
e. This application can increase the effectiveness and accuracy of processing transaction data and preparing financial reports.
f. CodeIgniter is a great choice for web application development because of its simplicity, speed, and flexibility. In financial management and wood inventory management application projects, CodeIgniter can be used to build core features such as transaction management, financial reporting, stock management, and user authentication systems, all with less development time and more structured code.

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