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Design and Construction of a Web-Based Employee Salary Calculation System for the Manokwari Regency Cryptography, Communication and Informatics Service

Yopi Giban[1], Sofyan[2], Joice Pangulimang[3], Yuliana Sangka[4]
Program Studi Ilmu Komputer, Sekolah Tinggi Ilmu Manajemen Informatika Kreatindo Manokwari [1,2,3,4,]
e-mail:* yopigiban1@gmail.com

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ABSTRACT

The development of information technology provides a significant opportunity for government agencies to improve the efficiency and effectiveness of administrative services, including in the management of employee salaries. The Manokwari Regency Code, Communication and Informatics Office still uses a manual system in the process of calculating and recording employee salaries, which is prone to errors, delays, and a lack of transparency. Therefore, this study aims to design and build a web-based employee salary calculation system that can help the salary data processing process to be more accurate, fast, and easily accessible. The method used in designing this system is the waterfall software development method, which includes the stages of needs analysis, system design, implementation, testing, and maintenance. This system is designed using a web-based programming language with an integrated database to store employee data, salary components, and deductions such as bank credit, social gatherings, and other contributions. The result of this study is a salary calculation information system application that can be accessed via a local network or the internet, with automatic calculation features, payslip printing, and employee salary history.

Keywords: *Information System, Employee Salary, Web-Based Application, Communication and Information Service, Manokwari*.

INTRODUCTION

Human resource management is a key pillar in the operational success of any organization, whether private or government. In today's digital era, government agencies are required to innovate to improve the quality of public services and internal efficiency (Ulfa & Frinaldi, 2025). One crucial aspect of internal management is the management of the employee payroll system, which must be carried out accurately, timely, and transparently. Implementing information technology in the payroll process is a necessity to overcome various challenges arising from manual systems, such as miscalculations, delays, and lack of accountability. A modern payroll system serves not only as a tool for distributing wages but also as a strategic instrument for managing employee data holistically. Therefore, designing a web-based payroll system is

an important proactive step in realizing good governance. Digital transformation in payroll management is also in line with the government's agenda to create a bureaucracy that is more adaptive and responsive to change (Nakagawa, 2025).

Manual employee salary management often causes various significant obstacles (Nuryanti & Dzikrayah, 2025). Conventional processes, such as recording data in ledgers or spreadsheets, are highly susceptible to human error. Errors in data entry, calculations, or payroll deductions can lead to employee dissatisfaction and even potential legal issues. Furthermore, manual systems require significant time and effort, hampering administrative staff productivity. Delays in payroll payments due to slow manual processes can disrupt employee financial stability. Therefore, modernizing payroll systems is a top priority. Adopting digital technology is an effective solution to minimize these risks.

The Manokwari Regency Cryptography, Communication, and Informatics Agency is a government agency that plays a vital role in the development and management of information technology. To carry out its duties and functions, this agency employs a number of employees whose payroll must be managed monthly. Based on initial observations, the process of calculating employee salaries in this agency is still carried out manually. The current manual system involves recording salary data and deductions on forms or sheets of paper, which are then processed using a calculator or a simple spreadsheet (Apriliyani & Indriyani, 2025). This situation creates significant risks, including potential errors in calculating base salary, allowances, and various complex deductions. The lack of a centralized system also complicates auditing and real-time monitoring of payroll data.

The main problem faced by the Manokwari Regency Code, Communication, and Informatics Office is an inefficient and inaccurate payroll calculation process. Each month, administrative staff must separately collect attendance, overtime, and deduction data from various sources. These deductions include BPJS contributions, bank loans, social savings accounts (arisan), and other voluntary contributions. Once the data is collected, calculations are performed manually, which is time-consuming and highly risky. Payslips are printed individually and physically distributed to each employee. This situation not only wastes resources but also makes the process slow, opaque, and inefficient. An integrated solution is needed to streamline this process.

Therefore, this research focuses on the design and implementation of a web-based payroll information system for the Manokwari Regency Cryptography, Communication, and Informatics Office. This system is expected to provide a solution to existing problems. With a web-based system, the payroll calculation process can be automated, reducing human error and saving time. Furthermore, this system will also provide important features such as employee data recording, salary component management, and salary

payment history. The presence of this system will facilitate access to salary information for employees and management. Data stored digitally will also be more secure and easier to search.

A web-based system was chosen for its flexibility and ability to be accessed from multiple locations. In the context of the Department of Cryptography, Communication, and Informatics, this system can be accessed by administrative staff in the office as well as by employees on their personal devices to view payroll details. Features such as printed payslips and pay history will increase transparency and give employees greater control over their financial information. With the implementation of this system, it is hoped that the payroll administration process will be faster, more accurate, and more transparent. The system design also adheres to user-friendly design principles to ensure ease of use for users who are not yet familiar with technology (Rachman et al., 2024).

This web-based information system was designed using the systematic and structured waterfall method. This method was chosen because it is suitable for system development projects with clear and well-defined requirements at the outset. The stages include needs analysis, system design, implementation, testing, and maintenance. The needs analysis phase identifies required functionality, such as employee data management, automated payroll calculations, and financial reporting. The system design phase produces architectural, database, and user interface designs. The implementation phase translates these designs into program code. Testing ensures the system functions as expected.

The system will be built using a combination of modern web technologies, namely the PHP programming language and the MySQL database. This combination has proven reliable, efficient, and has broad community support. PHP is used to process business logic on the server side, while MySQL serves as a structured data storage. The server infrastructure will utilize Laragon, a lightweight and easy-to-use web development environment. This technology combination was chosen for its ease of development and high compatibility. Laragon makes it easy for developers to set up a local server integrated with Apache, PHP, and MySQL.

This research aims to produce a system that is not only functional but also provides a concrete solution to the problems faced by the Manokwari Regency Cryptography, Communication, and Informatics Office. It is hoped that this system will improve work efficiency, reduce calculation errors, and enhance accountability in employee payroll management. With this system, payroll data can be digitally archived, simplifying the audit process, and providing accurate reports to management. The successful implementation of this system will serve as a model for other agencies.

This research has significant benefits, both for the Department of Cryptography, Communication, and Informatics and for the development of science. For the agency, this system will facilitate payroll management, save

time and resources, and increase transparency. For science, this research contributes to the design of web-based information systems, particularly in government environments. The results of this study can serve as a reference for other researchers who wish to develop similar systems. Thus, this research not only solves practical problems but also enriches the scientific body.

METHODOLOGY

The research method used in the design and development of this web-based payroll information system is the Waterfall method. This method was chosen because of its systematic and sequential approach, where each stage must be completed thoroughly before proceeding to the next stage. The stages in the waterfall method include software requirements analysis, design, implementation, testing, and maintenance. The first stage, Requirements Analysis, involves collecting data through observation, interviews, and literature review to identify all functional and non-functional requirements of the system to be built. Functional requirements include features such as login, employee data management, salary component management, automatic salary calculation, and payslip printing, while non-functional requirements cover aspects such as system performance, security, and usability. The collected data is analyzed to ensure that the designed system can address existing problems, namely inefficiency and inaccuracy in manual salary calculations. The second stage, System Design, involves creating a system architecture design, database design, and user interface design. At this stage, diagrams are designed, such as Use Case Diagrams to illustrate user interactions with the system, Activity Diagrams to model process workflows, and Entity Relationship Diagrams (ERDs) to visualize database structures. The interface design is designed to ensure the system has an intuitive and user-friendly interface.

The third stage, Implementation, is the stage where program code is written according to the design. This system was developed using PHP as a server-side programming language to process business logic and interact with the database. A MySQL database is used to store all necessary data, including employee data, salary data, deduction data, and benefit data. The development environment used is Laragon, which provides Apache, MySQL, and PHP packages in one easy installation. This stage also involves writing scripts to ensure a stable connection between the web application and the database, as well as writing code to implement complex automatic calculation features, including the calculation of basic salary, allowances, and various deductions. The written program code is also equipped with adequate comments and documentation to facilitate the future maintenance process. The fourth stage, Testing, is carried out to ensure that the system functions according to the specifications established during the analysis and design stages. Testing is carried out comprehensively, starting from unit testing for each module, integration testing to ensure the modules work well together, and testing the system as a whole. This testing is conducted using realistic test scenarios to identify and fix potential bugs or errors. The results of this testing will form the

basis for system improvements before the system is ready for use. The final stage, Maintenance, is an ongoing process involving system improvements, functionality enhancements, and adaptation to changing user or environmental needs. This stage ensures that the system continues to operate optimally in the long term.

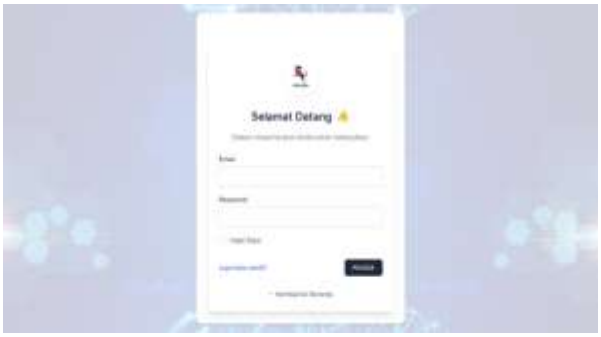
RESULTS AND DISCUSSION

Based on the needs analysis and design, a web-based payroll information system for the Manokwari Regency Cryptography, Communication, and Informatics Office was successfully implemented. This system was designed to address various challenges arising from the manual payroll process, such as inefficiency, inaccuracy, and lack of data transparency. The developed system interface pays close attention to the principle of ease of use so that it can be operated by administrative staff and employees without a deep technical background. This system provides several integrated main modules, namely the employee data management module, the salary calculation module, and the reporting module, all of which are interconnected to ensure smooth and consistent data flow. Each module is designed to fulfill a specific function that has been identified during the needs analysis stage, so that the overall system functionality can run optimally.

Picture1 Welcome Page

Figure 1 displays the system's initial display (welcome page). This page serves as the main entry point for users before logging in. The display is designed in a modern style with a background of digital technology elements to illustrate the transformation from a manual system to a digital one. In the center of the page is the system name, "Employee Salary Calculation System," and the name of the agency as the primary identifier. The "Login" button is prominently displayed to direct users to the login page. In the upper right corner are also "About" and "Contact" links to provide additional information about the system or agency.

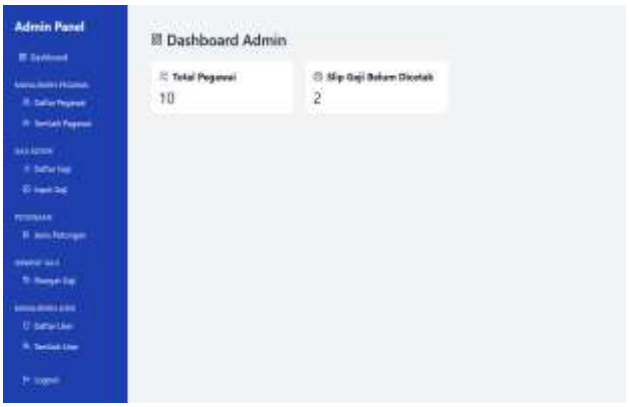
This page is used for user authentication. Users must enter the appropriate username and password to access system features. Login differentiates user access rights (admin, treasurer, manager, employee).



Picture 2Login Page

Figure 2 displays the system login page. This page serves as the main gateway to restrict user access so that only authorized parties, such as administrators, treasurers, managers, and employees, can access the system according to their respective access rights. The login page is designed in a minimalist yet informative manner, with a "Welcome" welcome message and brief instructions for users to enter their account credentials, including email and password. Additional features such as a "Remember Me" checkbox are also available to facilitate future logins, as well as a "Forgot password?" link that facilitates the password reset process if necessary. There is also a "Return to Home" navigation link at the bottom of the page to provide access back to the main page.

After successfully logging in, users are directed to the dashboard. The dashboard serves as the main control center, containing a summary of menus based on each user's access rights. Admins, treasurers, leaders, and employees will see different dashboards.



Picture3Admin Dashboard

Figure 3 shows the dashboard interface for the Admin role after successfully logging into the system. This dashboard page serves as a control and information center for admins to monitor general conditions related to personnel and payroll data. The main section of the page displays two important pieces of information concisely: the total number of employees registered in the system and the number of unprinted payslips, which indicates that the payroll process has not been fully completed. On the left side is a

navigation panel containing various main menus that can only be accessed by admins, including:

Picture 4Treasurer Dashboard

Figure 4 displays the dashboard page specifically for the Treasurer role. This dashboard is designed to support the treasurer's task in verifying and validating the payroll process carried out by the admin before it is approved and printed. In the main section, the dashboard displays brief information such as Total Employees and the number of Unprinted Pay Slips, which serve as early indicators for the treasurer to review data that requires further verification.

Picture 5Leadership Dashboard

Figure 5 shows a dashboard display specifically for users with the Leadership role. This feature is designed to provide comprehensive monitoring access to employee information and payroll processes within the Manokwari Regency Cryptography, Communication, and Informatics Office. In the center of the dashboard, two main pieces of information are displayed: Total Employees and the number of Unprinted Payslips. This information helps managers monitor the progress of payslip distribution and determine the current status of employee data in the system.

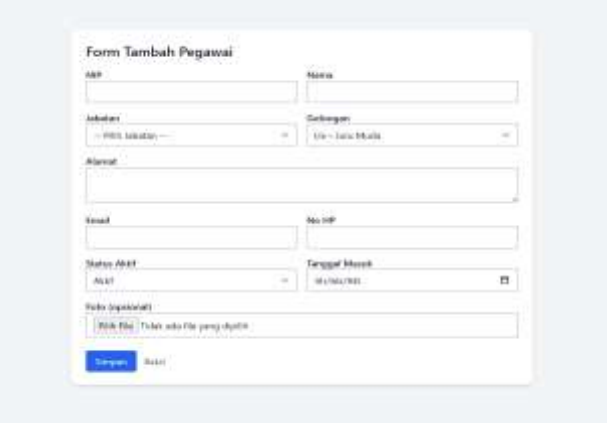
Picture6Employee Dashboard

Figure 6 shows the dashboard page for a user with the Employee role. This page is a simple information center intended for employees to access information related to their personal salary history. In the main section, the system displays a welcome message directing employees to access the Salary History menu to view their salary history, including details of their base salary, allowances, deductions, and net salary. Unlike the admin or treasurer roles, which have more menus, the employee dashboard is kept minimal because it only functions as an information user.

In this menu, admins can manage employee data, such as adding, changing, and deleting employee data. Its function is to ensure employee data is always up-to-date as the basis for salary calculations.

Picture7Employee List

Figure 7 displays the Employee List page within the payroll information system. This page is used by the administrator to view, manage, and update data for all employees registered within the Manokwari Regency Code, Communication, and Informatics Service. At the top right of the page, there is a "+ Add Employee" button used to add new employee data to the system.



Picture8Add employee form

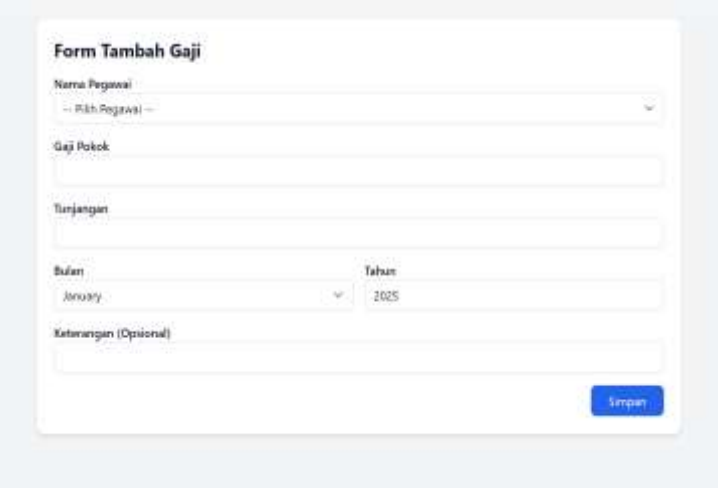
Figure 8 displays the add employee form interface used by the admin to enter new employee data into the system. This form is part of the Employee Management feature, which supports data completeness as a basis for the payroll process.

This form helps ensure that all important information about employees is documented completely and in a structured manner, so that the process of calculating salaries, managing slips, and history can run automatically and accurately.

The admin inputs basic salary and employee allowance data. This menu serves as the basis for calculating net salary.

Picture9Employee Salary List

Figure 9Displays the Employee Payroll page for the current year. This page displays a detailed summary of each employee's payroll data, based on data entered by the administrator and verified by the treasurer. This view serves as a control center to ensure all payroll components have been entered correctly and are ready for verification by the treasurer. It also serves as documentation before pay slips are printed and distributed to employees.



Picture10Salary increase form

Figure 10This page displays the salary addition form interface, which is used by the admin to input employee monthly income data. This form is the start of the payroll process, where basic salary and allowance data are recorded for calculating net pay.

The Save button is used to save data to the database, which will then be processed in the automatic calculation of net salary by subtracting the relevant deduction data. This interface is designed to be simple to facilitate admin input routinely and systematically, while also reducing the potential for manual input errors common in the previous system.

A menu for managing various types of deductions, such as bank credit fees, social gatherings, and TASPEN contributions. The primary function of this menu is to ensure that deductions imposed on employees are accurately recorded.

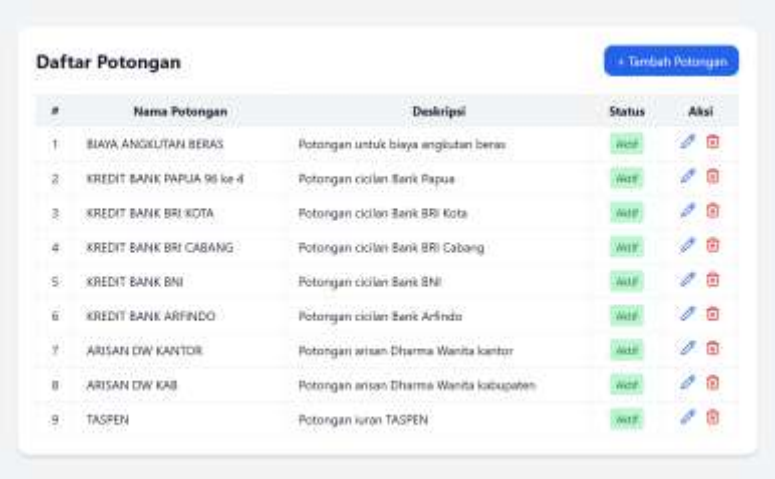


Figure 411List of Deductions

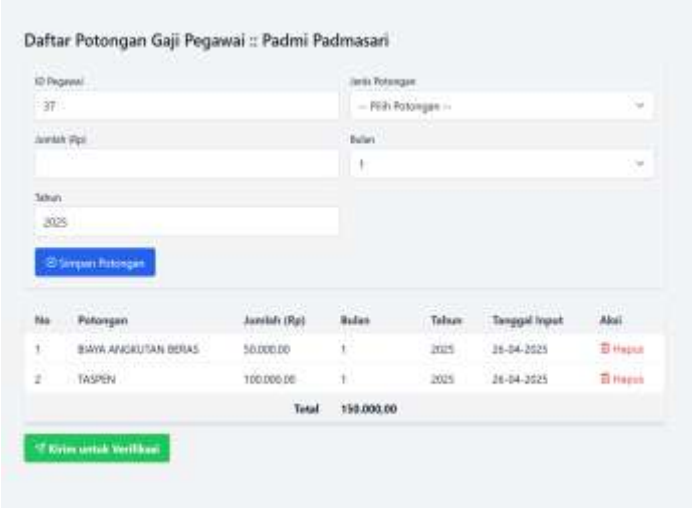
Figure 11 shows the Deductions List page, which is used by the admin to manage various types of deductions applied to employee earnings. These deductions can be in the form of bank installments, contributions, or social

gatherings, which are automatically calculated in the system as a reduction in gross salary to obtain net salary. This feature supports the system's flexibility to accommodate various forms of salary deductions applicable within the Manokwari Regency Code, Communication, and Informatics Office, and supports the automation of the net salary calculation process for accuracy and transparency.

Picture12Add new piece

Figure 12This displays the new deduction add form interface. This form is used by the admin to add deduction types applied to the payroll process, both fixed and temporary.

The Save button at the bottom saves the data to the system and displays it on the Deduction List page. This feature provides agencies with the flexibility to continuously update deduction types according to actual conditions and needs in the field, while ensuring that all salary components are managed in a structured and well-documented manner.



Picture13List and deduction form

Figure 13displays the deduction input form and a list of salary deductions for an employee, in this case Padmi Padmasari. This feature is used by the admin to add and manage deduction data imposed on employees each

month within a specific period. At the very bottom is a "Submit for Verification" button, which functions to submit deduction data for verification by the treasurer before being processed in the net salary calculation. This page ensures that each deduction component is recorded in detail and transparently for each employee, supporting accuracy in the salary calculation process and complete historical documentation.

Picture14Submit for verification

This feature automatically calculates the employee's net salary and submits the calculation results for verification by the treasurer as explained inFigure 13 Verification aims to ensure the validity of the data before the payslip is printed. Figure 14 shows the end of the employee payroll deduction list table, where there is a "Submit for Verification" button available only to the admin. This button has a crucial function in the system workflow, namely as the admin's final step in the deduction input process before the data is sent for verification by the treasurer. After all deductions are entered and listed, the admin presses the "Submit for Verification" button, which is automatically processed.

Thus, this feature supports the implementation of the principles of transparency and accountability in the web-based employee salary management process within the Manokwari Regency Cryptography, Communication and Informatics Service.

Picture15Verification submitted successfully

Figure 15This image shows the system display after the admin presses the "Submit for Verification" button on the employee payroll deduction input page. The system will display a blue notification with the message "Verification Successfully Submitted! This salary is awaiting verification."

This message indicates that: All deduction data entered for the employee in question is locked and cannot be edited or deleted by the admin. The deduction entry status systematically changes to "pending" and enters a verification queue that can only be accessed by the treasurer. This is a transitional stage to the internal verification process to ensure the accuracy and validity of payroll data before the payslip is printed. This notification indicates that the admin has completed their task in the deduction input process, and that the next process is entirely within the treasurer's authority to check, approve, or correct according to internal regulations.

Picture16Details of Employee Salary Deductions by the Treasurer

Figure 16Displays the employee salary deduction details page, which is accessed by the treasurer as part of the payroll data verification process submitted by the admin. In this view, the treasurer can view all salary components and deductions applied to the employee in full.

Picture17Salary and Deductions successfully verified

Figure 17This screen displays the system after the treasurer approves the verification process for employee deduction and payroll data. Green notifications reading "Verification successfully approved" and "Submission Approved! This salary has been verified and approved" indicate that all data has passed the control stage and is valid for the payslip printing process.

Picture 18Print receipt/pay slip

Figure 18 shows the employee's pay slip, or paycheck receipt, printed by the system after the entire payroll and verification process has been completed. This pay slip serves as an official document detailing the employee's earnings and deductions for a specific period. This is the final result of a web-based payroll management system.

Picture19User List

Figure 4.19 This page displays the User List page used by the admin to manage user accounts in the web-based employee payroll system. Each user in the system has a different role, which determines access rights to certain features within the system.

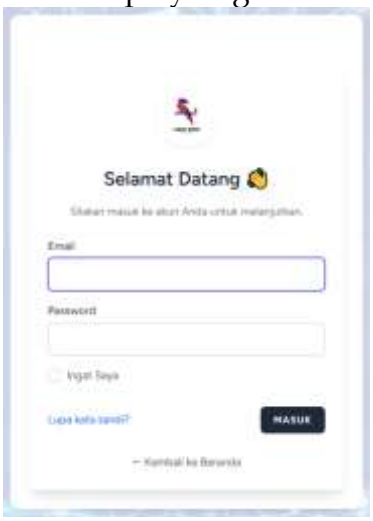
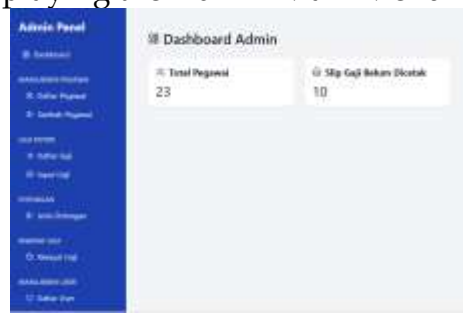
Picture20Add User

Figure 20 displays the add user form, which the admin uses to add new user accounts to the employee payroll information system. Each new user is

granted access based on their selected role, allowing the system to restrict access based on their function.

Black-box testing is performed because it focuses on testing software functionality without requiring knowledge of the program's internal structure or source code. The goal is to ensure that the system performs according to established requirements and specifications. In this method, the tester provides various inputs to the system and observes the resulting output to ensure that the results match expectations. This testing is highly effective in detecting errors such as input validation failures, incorrect calculation results, and inconsistencies between the interface and functionality.

Table 1 Blockbox Testing

Input Data	Which are expected	Conclusion
Login	Can Display Login Form 	[√] accepted [ ] rejected
Select and click Admin Login	Displaying the Admin Main Menu 	[√] accepted [ ] accepted
Select and Click Employee List	Displaying the Employee List Form view	[√] accepted [ ] accepted

Select and Click Add Employee	Displays the Add Employee Form 	[√] accepted [ ] accepted
Select and Click Payroll	Will display the Payroll form 	[√] accepted [ ] accepted
Select and click Add Salary	The Add Salary form will display 	[√] accepted [ ] accepted
Select and click Cut Type	Will display the Cut List 	[√] accepted [ ] accepted

Select and click Register User	Will display User List 	[√] accepted [ ] accepted
Select and click Add User	Will display Add User 	[√] accepted [ ] accepted
Select and click on the leader login	Displaying the Main Menu of the Leader 	[√] accepted [ ] accepted
Select and click Treasurer Login	Displaying the Treasurer Main Menu 	[√] accepted [ ] accepted
Select and click Verify Salary	Will display the verification page	[√] accepted [ ] accepted

Select and click Employee Login	Displaying the Employee Main Menu 	[√] accepted [ ] accepted
Select and click Employee Salary History	Will display the Employee Salary History List page 	[√] accepted [ ] accepted

CONCLUSION

Based on the results and discussion presented, it can be concluded that the design and implementation of a web-based employee payroll information system for the Manokwari Regency Code, Communication, and Informatics Office successfully achieved its objectives. This system successfully overcomes the problems of inefficiency, inaccuracy, and lack of transparency that exist in the manual system. With this system, the payroll calculation process is automated, fast, and accurate, and salary data can be accessed easily and securely. The use of web technology with PHP and MySQL has proven effective in building functional and stable applications. This system not only improves administrative efficiency but also strengthens transparency and accountability in human resource management.

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