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Information System for Financial Management Advancing Village Community Empowerment Across Bali Province

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Abstract

Manual financial recording at the Community and Village Empowerment Service of Bali Province undermines traceability, delays reporting, and heightens the risk of data loss. This study designs and implements a web-based financial management information system that centralizes data capture, processing, storage, and reporting with role-based controls (treasurer, secretary, head of finance). Development followed the waterfall model—requirements definition; system and software design; implementation with unit testing; integration and system testing; and operation and maintenance—supported by clear specifications for security, reliability, and usability. The implemented system manages employee records, cash flows, changes in capital, balance sheets, and income statements, and generates printable managerial reports. Functional verification via black-box testing showed successful execution across all tested pages, indicating correctness of critical workflows (authentication, data entry, and reporting). A user acceptance test involving six finance staff yielded an average score of 81.04%, with the system aspect (appearance and operability) at 82.00%, the user aspect (comprehension and task support) at 77.78%, and the interaction aspect (accessibility and link/page reliability) at 83.33%. These quantitative results indicate that the application meets user needs and is suitable for operational deployment. Practically, adoption is expected to improve transparency, strengthen internal control, accelerate period closing, and reduce operational risk in public-sector finance. The structured lifecycle and role-aware design further provide a foundation for future enhancements, including broader usability evaluations, security hardening under higher loads, integration with e-government data sources, and mobile or offline modules to support bandwidth-constrained environments.

Keywords: Financial, Management, System, Website

1. Introduction

Accounting is widely regarded as the universal language of business, and its organizing logic underpins modern capital markets through the development and application of sound principles [1]. Within organizations, however, accounting practices and supporting systems often diverge across contexts, influenced by budgeting choices, the availability and capability of human resources, and the need to meet tax obligations that reflect both legal compliance and civic responsibility [2]. In the Community and Village Empowerment Service of Denpasar City, the Finance Division manages the receipt, administration, and recording of transactions related to office finances, yet these activities have long relied on manual procedures. Funds received from higher levels of government are entered into a general cash book, authorized by the head of the service, and processed by the treasurer for operational needs [3]. Recording occurs only after funds are physically received, leaving gaps in traceability and weakening the ability to monitor commitments in real time [4].

Physical ledgers are vulnerable to damage such as tearing and water exposure, and the loss of books erodes institutional memory as well as evidence of receipt and disbursement. The treasurer's oversight becomes more challenging under such risks, while the organization bears the broader cost of diminished control, slower reconciliation, and exposure to error. Daily transactions are summarized into reports prepared by staff and aggregated into monthly summaries at period end, a workflow that embeds repetition and rekeying, invites inconsistencies, and consumes time that could otherwise be devoted to analysis and service improvement [5].

These vulnerabilities also raise concerns about the security and confidentiality of financial information because unauthorized access to a misplaced ledger could reveal sensitive data and undermine trust.

A rational response to these issues is the design and implementation of a website-based financial management information system that centralizes the capture, processing, storage, and reporting of financial data. An information system can be understood as an organized method for collecting and entering data, transforming it into usable information, preserving its integrity over time, and disseminating it to decision makers in formats that align with organizational goals [6]–[8]. The web platform provides ubiquitous access through standard internet connectivity, enabling authorized users to interact with the system across locations and time windows without sacrificing control or auditability [9].

For a government service, the system's core purpose extends beyond convenience and speed to include transparency, accountability, and the generation of reliable evidence for decision making and public administration. By supporting comprehensive management of incoming and outgoing funds, the proposed system can automate the recording of revenue, payments, official travel expenses, meeting costs, tax obligations, capital adjustments, and other operating charges while enforcing data validation, user permissions, and audit trails [10]–[13]. Automated aggregation and dynamic reporting can replace manual recapitulation, shorten closing cycles, and reduce the burden of repetitive work. The conversion of paper-based workflows into structured digital processes reduces the likelihood of data loss, improves the security posture through access control and backups, and preserves institutional knowledge in a durable repository.

The anticipated impact of such a system includes more accurate and timely financial statements that portray performance over a defined accounting period and can be used to assess the effectiveness of resource deployment [14]. To be useful, financial information must be understandable to intended users, relevant to the decisions they face, free from material misstatement, and comparable across periods. Systematic data capture and standardized chart-of-accounts mappings help meet these qualities by ensuring consistency in classification, completeness in transaction logging, and clarity in report construction. Automated controls can flag anomalies, enforce required fields, and support reconciliations, while configurable dashboards can provide role-specific visibility for treasurers, managers, and auditors. The capability to query costs by office code allows granular analysis of spending patterns and supports budget monitoring at the level of programs, activities, and cost centers. This granularity, combined with timely reporting, can elevate managerial productivity, inform policy choices, and strengthen stewardship of public funds.

Underlying the proposed solution is the perspective that accounting is itself an information system, defined by the identification, collection, storage, measurement, and communication of data that supports decisions. An accounting information system operationalizes this perspective by integrating people, processes, controls, and technology to transform raw transactions into reliable information products [15]. In a governmental setting, where compliance requirements, audit expectations, and public scrutiny are substantial, the benefits of formalizing and digitizing these processes are amplified. Prior implementations of information systems in comparable public institutions demonstrate that when systems are aligned with organizational needs and accompanied by appropriate training and governance, they can deliver sustained improvements in accuracy, efficiency, and service quality. By moving finance operations from vulnerable manual books to a secure, web-accessible platform, the Community and Village Empowerment Service can reduce operational risk, enhance transparency, and create a foundation for continuous improvement in financial governance. The result is not merely a technical upgrade but a structural realignment of financial management toward practices that are consistent, auditable, and responsive to the evolving demands of public administration

2. Research Methods

System development follows the waterfall model, which proceeds sequentially with comprehensive documentation [16]–[18]. The process begins with Requirements Definition, namely the formulation of clear, measurable needs so that the functions expected by users are accurately captured. Elicitation activities include observation of work processes, stakeholder interviews, and review of relevant regulations and policies. The outcomes are consolidated into a specification document that states scope, constraints, acceptance criteria, and nonfunctional requirements such as security, reliability, and usability. These deliverables become the single source of guidance for subsequent phases.

The process advances to System and Software Design, where stabilized requirements are translated into architectural and component designs. The design encompasses data and control flows, a database structure that ensures integrity and auditability, and interface layouts that guide user interaction. Technical decisions on error

handling, activity logging, authentication, and deployment topology are defined to ensure that the solution can be implemented and maintained effectively. This design is then realized in Implementation and Unit Testing, during which developers produce modular, testable code. Each unit is verified against its specifications, including boundary conditions and failure scenarios, so defects are detected at the earliest opportunity. Once units are solid, the system is assembled and examined holistically during Integration and System Testing to verify logical coherence and functional completeness. Black box testing [19], role-based scenarios, and user acceptance testing, confirm that behavior aligns with requirements and is ready for operational use, while nonfunctional evaluations assess performance, security, and reliability.

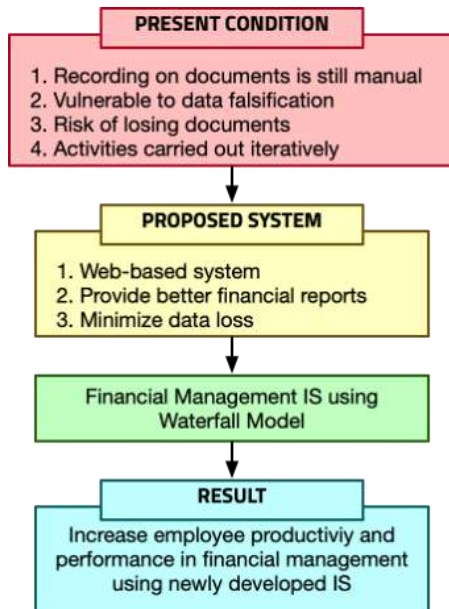


Figure 1. Research Framework

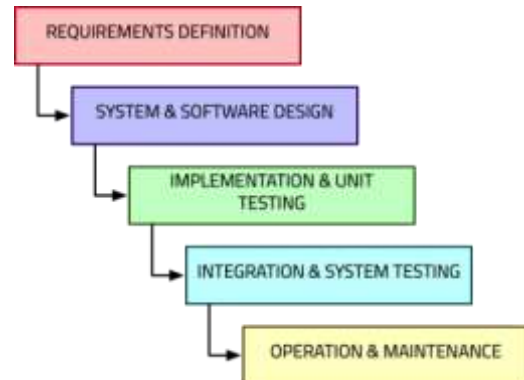


Figure 2. Waterfall Model for Research

The cycle concludes with Operation and Maintenance, when the system is deployed to users and supported with training, documentation, and assistance mechanisms. Maintenance activities include defect correction, adaptations driven by policy changes, usability enhancements, and preventive actions such as dependency updates and security hardening. Through this orderly sequence of phases, decisions remain traceable, risks are reduced, and the final outcome meets the standards of accuracy, accountability, and governance required for dependable information systems.

3. Results and Discussions

3.1. Requirements Definition Result

The general picture obtained from the observation period on the research object shows that the workflow starts from the treasurer entering financial data which will be processed by the financial statement information system. All processes are stored in the database and then issued an output in the form of financial reports that are given to the chairman every month. An overview of the system that is planned to be developed in this research can be seen in Figure 3.

Figure 4 describes the Document Flow Diagram of financial management at the Bali Province Village and Community Empowerment Service. Figure 5 describes the Document Flow Diagram of the financial management of financial statements at the Bali Province Village and Community Empowerment Service.

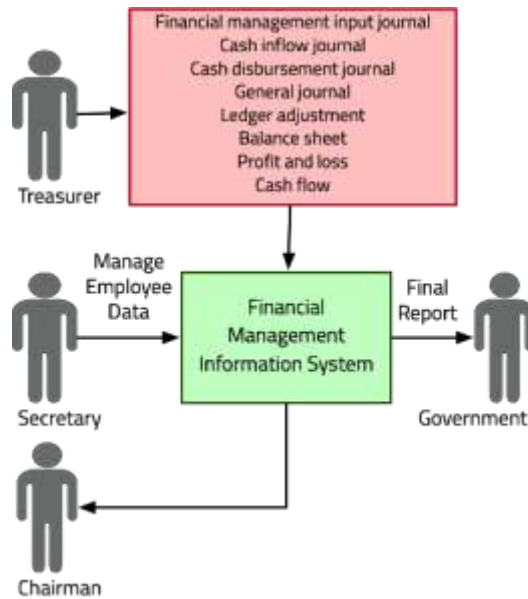


Figure 3. System Overview

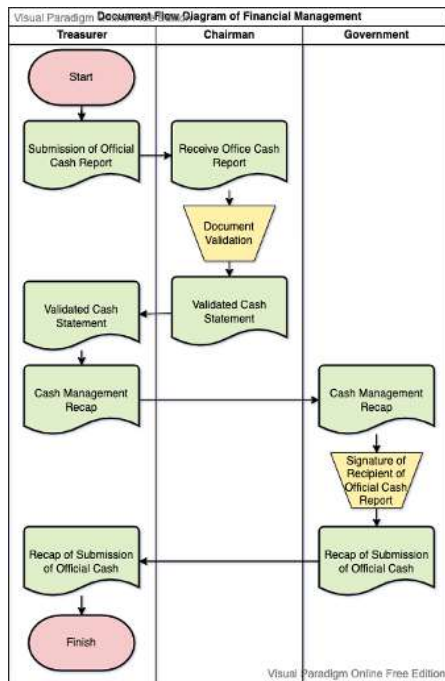


Figure 4. Document Flow Diagram of Financial Management

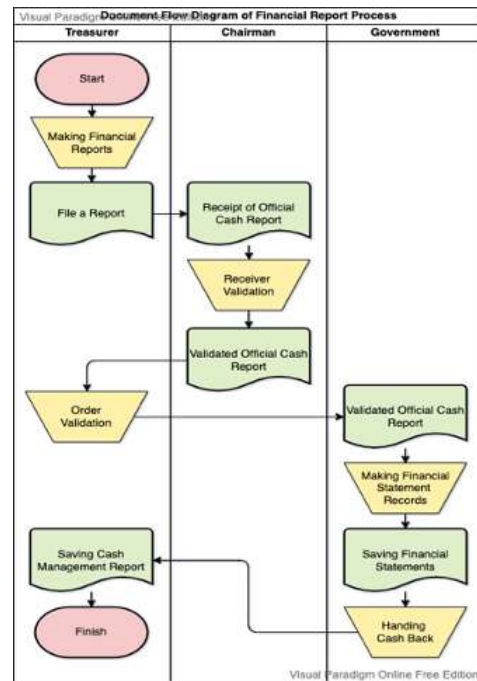


Figure 5. Document Flow Diagram of Financial Report Process

The functional requirements specify a role-based information system for financial statements with three user roles: treasurer, secretary, and head of the finance sub-section. Access control begins with authentication, where users log in using registered credentials; registration precedes first-time access to ensure user identities and privileges are properly established. Once authenticated, the system supports comprehensive employee data management handled by the secretary. This includes creating new employee records, editing existing entries to reflect updated information, searching and displaying records through on-screen forms, and persisting all changes to the underlying database to maintain data integrity and traceability.

Financial data processing is centered on the treasurer's responsibilities. The system enables the treasurer to add, modify, display, and store transactions and summaries related to cash flows, changes in capital, the balance sheet, and the income statement, with entries organized by account and validated against existing database records. These capabilities ensure that day-to-day financial activities are captured accurately and can be reviewed through standardized forms linked to the database. Reporting functions complete the workflow by allowing both the

treasurer and the head of the finance sub-section to view and print formal statements. The system must present up-to-date cash flow reports, statements of changes in capital, balance sheets, and income statements in formats suitable for managerial oversight and compliance. Together, these requirements establish a controlled environment for authentication, operational data entry, financial transaction management, and authoritative reporting aligned with organizational roles and responsibilities.

3.2. System and Software Design Result

The context diagram aims to determine the overall activity of the system, where there are three actors to be able to manage data in the system such as the treasurer, the head of the financial sub-section and the head of the Bali Province Village and Community Empowerment Service. The processes that occur in this system are add, change, and search and can produce financial reports that will be given to the Head of the Bali Province Village and Community Empowerment Service. The context diagram can be seen in Figure 6.

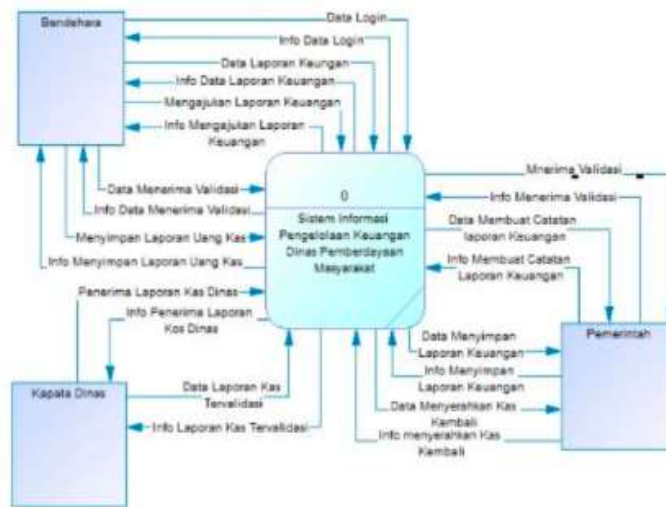


Figure 6. Context Diagram

The Conceptual Data Model (CDM) defines the entities required to record library visitor-related finances and the logical relationships among them. In this context, three core entities are identified: Treasurer, Head/Chairman (Head of Service), and Government. The CDM specifies that a Treasurer supervises or is associated with multiple Employees (one-to-many), ensuring operational linkage between treasury functions and staff records; that each Treasurer is paired with exactly one Head of Service and vice versa (one-to-one), reflecting a unique supervisory relationship; and that a Treasurer may manage financial interactions tied to multiple Government records, such as fund sources or allocations (one-to-many). These cardinalities establish the business rules for how data should be created and maintained across the system.

The Physical Data Model (PDM) instantiates the CDM into implementable database structures by defining tables, primary and foreign keys, data types, and integrity constraints that enforce the above relationships. For example, the Treasurer table would expose a primary key referenced by foreign keys in Employee and Government tables to realize the one-to-many links, while a unique key or shared primary key pairing would implement the one-to-one association with the Head of Service table. Figures 7 about CDM, and 8 about PDM illustrate these structures, showing how the conceptual rules translate into concrete schema elements that preserve referential integrity and support reliable querying and reporting.

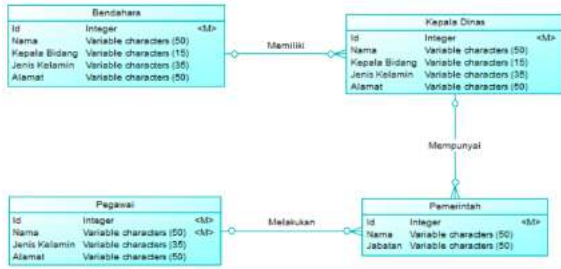


Figure 7. Conceptual Data Model

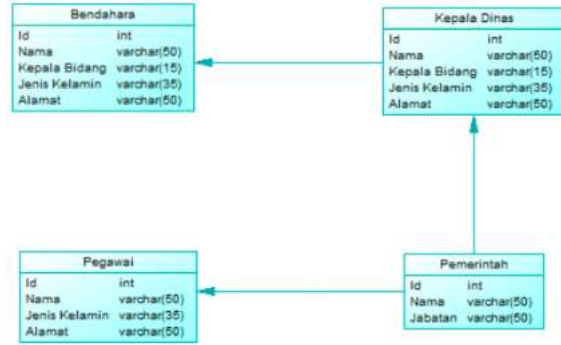


Figure 8. Physical Data Model

The user interface is an intermediate interface that represents the product model to be built or simulates the structure, functionality and operation of the system. This financial management information system can be accessed by the Treasurer. The following is a user interface design of a financial management information system that will be implemented into software.



Figure 9. Home Page User Interface Design



Figure 10. Main Page User Interface Design



Figure 11. Input Page User Interface Design



Figure 12. Report Page User Interface Design

3.3. Implementation and Unit Testing Result

The implementation of the user interface contains a discussion of the interface that has been built in accordance with the user interface design that has been done previously.



Figure 13. Login Page User Interface Implementation



Figure 14. Main Page User Interface Implementation

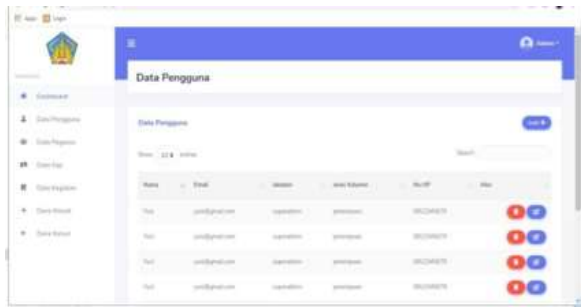


Figure 15. User Page User Interface Implementation

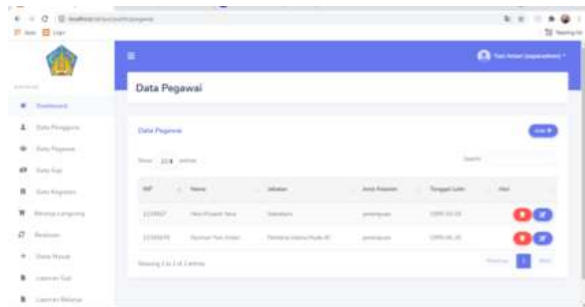


Figure 16. Employee Page User Interface Implementation



Figure 17. Salary Report Page User Interface Implementation

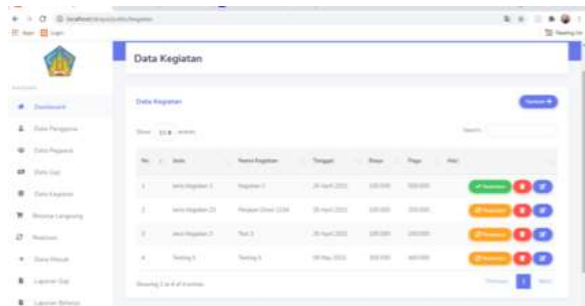


Figure 18. Activities Page User Interface Implementation

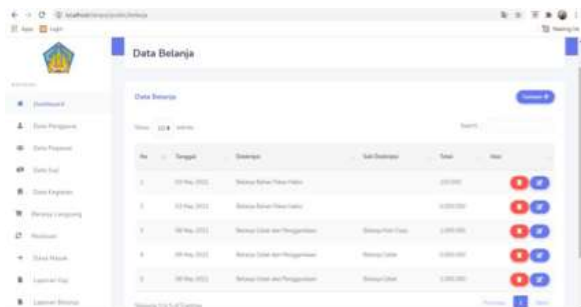


Figure 19. Expense Page User Interface Implementation

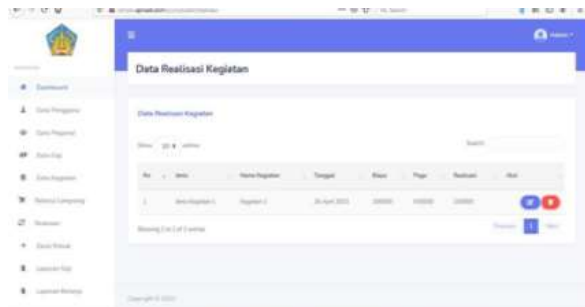


Figure 20. Realization Page User Interface Implementation



Figure 21. Cash-In Report Page User Interface Implementation

3.4. Integration and System Testing

System testing in this study uses black box testing. Black box testing itself is a test by testing the model and then observing the results of the model. So, it is known whether the results of the model are as expected or not. The following is a black box testing on the management of incoming cash report data which is shown in table 1.

Table 1. Black Box Testing Test Results Cash Incoming Report Page

Test Class	Test Scenario	Expected results	Results
Cash In Menu	Press the cash in menu	The system displays the cash in page	Succeed
Add Cash In	Pressing the add cash in button	The system displays the cash entry form data page	Succeed
	Press the save button after the cash comes in	The system stores incoming cash data. Then the display will remain on the form add cash in.	Succeed
	Press the save button before the cash comes in	A notification of saved incoming cash appears	Succeed
	Press the exit button	System returns to cash in page	Succeed
	Pressing the save button after the cash inflow is changed	The system stores incoming cash data. Then the next display will remain on the change cash entry form	Succeed
	Pressing the update menu	The system saves the data after the data is updated	Succeed

Usability testing is based on five components, namely learnability, efficiency, memorability, safe to use and have a level of satisfaction. The questionnaire was made in the form of a 5-point score with a Likert scale model, to measure the level of user agreement with the measurement results statement then processed by descriptive statistical methods and analyzed either on each parameter or on all parameters. From the measurement results of the user acceptance test (UAT) it can be seen that the suitability of the designed system with the system required by the user. It is also known whether the proposed application is in accordance with the conditions when the user uses the system, as well as the level of user satisfaction with the developed system.

Because the users of this application are only limited to the financial section of the Bali Province Village and Community Empowerment Service, so that there are only 6 users. The questions given in this questionnaire can be seen in Table 2. The results of the questionnaire are shown in table 3. The UAT graph can be seen in Figure 22.

Table 2. Questionnaire Questions in User Acceptance Test

Q ID	Question
System Aspects	
S1	Is the display on the financial management information system interesting?
S2	Is the appearance of the colour and interface of the financial management information system good and not boring?
S3	Is the financial management information system easy to operate?
User Aspect	
A1	Are the menus on the financial management information system easy to understand?
A2	Does the material on the financial management information system help in simplify performance?
A3	Can the financial management information system be used independently without the help of experts?
Interaction Aspect	
I1	Can the financial management information system be accessible to the information easily?
I2	Are all pages and links on the financial management information system working well?

Based on Table 3, this application gets an average UAT result of 81.04% which indicates this application can be well received in the community. This has an average value for the System Aspect which is known to be 82.00% agreeing that this system in development already has a good appearance, user interface that is easy to accept and easy to operate. In the User Aspect, it is known that the average is 77.78%, it can be conveyed that for users of this system the menu is easy to understand, helps in simplifying performance and can be easily used without expert

assistance. Furthermore, for the interaction aspect, it is known that 83.33% agree that this system is easy to use where information can be accessed easily and all pages and links work well.

Table 3. Questionnaire Result

Q ID	Questionnaire Result					Conversion Mark					SUM
	A	B	C	D	E	A=5	B=4	C=3	D=2	E=1	
S1	1	2	2	0	0	5	8	6	0	0	19
S2	2	3	1	0	0	10	12	3	0	0	25
S3	3	2	1	0	0	15	8	3	0	0	26
A1	2	2	2	0	0	10	8	6	0	0	24
A2	2	2	2	0	0	10	8	6	0	0	24
A3	1	2	3	0	0	5	8	9	0	0	22
I1	3	2	1	0	0	15	8	3	0	0	26
I2	3	1	1	1	0	15	4	3	2	0	24

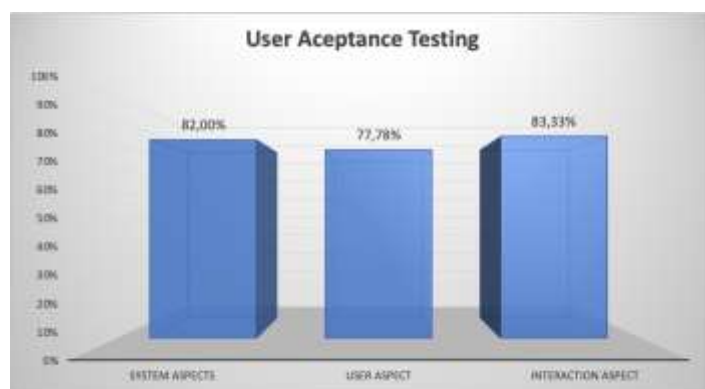


Figure 22. User Acceptance Test Result

3.5. Operation and Maintenance

The final phase stage of the waterfall model is maintenance. When any new system is put in place it will often need ongoing maintenance. This is to make sure the software is operating at optimum levels of performance. This can be concerned with bugs in the software, security issues or to address issues that have only come to light when the new system was implemented. Activities in this phase include obtaining maintenance requests from the end users, transforming these requests into changes, designing the changes and finally implementing said changes.

3.5. Discussion

Financial Management Information System at the Service of Community Empowerment and Village in Bali Province can be implemented very well in web-based software. Assisted by the waterfall model, the system can be developed without any significant obstacles. the implementation of the interface design can be implemented properly. it is hoped that this system can help increase the effectiveness and productivity of the Service of Community Empowerment and Village in Bali Province.

There are 2 tests carried out in this study, namely black box testing and user acceptance tests. The implementation of black box testing is quite good and there are no errors on every page that is tested. The implementation of the test using the user acceptance test did not give satisfactory results because only a few respondents were obtained because there were only 6 people in the Finance section. To follow up on the results of the UAT, confirmation was made to the treasurer to determine the acceptance of the application implementation. The response from the treasurer was quite positive about the system being developed and the results of the UAT were sufficient to represent statements from users that the system was well received for implementation.

The system developed may still be far from perfect and it is felt to be very simple so that for further development, it is expected to provide better improvements to the system. in further research, it can be improved on a better user interface, or can develop similar technology in mobile-based applications. The quality of testing in further research can also be improved from the type and instrument used.

4. Conclusion

This study demonstrates that a web-based financial management information system can replace manual bookkeeping in the Community and Village Empowerment Service of Bali Province and produce timely, accurate, and auditable financial information. Built with a waterfall lifecycle and role-based access for treasurer, secretary, and head of finance, the system supports end-to-end workflows for employee data, cash flows, changes in capital, balance sheets, and income statements, and generates printable managerial reports. Functional verification through black-box testing showed successful execution across tested pages, while user acceptance testing achieved an average score of 81.04%, with system, user, and interaction aspects at 82.00%, 77.78%, and 83.33% respectively, indicating overall readiness for operational use. The system's practical applications include improved transparency, strengthened internal control, faster period closing, and reduced risk of data loss. These results imply measurable gains in productivity and governance quality for public financial administration. Future work should broaden the user sample for more robust usability metrics, harden security and performance under higher loads, integrate with e-government data sources and archival backups, and explore mobile and offline modules to extend accessibility in bandwidth-constrained environments.

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