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Improving Library Services: A Web-Based Solution for Jember Regency Prosecutor's Office

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Abstract
In the era information technology advancement, adaptation and integration of technology have become essential needs for organizations across various sectors. This research endeavors to design and implement an efficient and modern web-based library system to the specific needs of the Jember Regency Prosecutor's Office. This study employs structured analysis to comprehensively understand existing library management processes, and it adopts the waterfall model for system development. This model entails sequential stages, including requirement analysis, system design, implementation, and testing using black box method, ensuring a systematic approach to system development. Data collection techniques involve interviews with key stakeholders and examination of existing systems and processes. Data analysis encompasses identifying challenges and requirements, which inform system design and development. The findings indicate that the newly developed web-based library system effectively addresses identified challenges, streamlining administrative processes and enhancing user experience. Its successful implementation is expected to significantly improve operational efficiency and resource accessibility at the Jember Regency Prosecutor's Office library, contributing to the modernization of library services in Indonesia and paving the way for future advancements in library technology development.

Keywords: black box testing; web-based library system; structured analysis; waterfall model; jember regency prosecutor's office.

INTRODUCTION

In the swiftly evolving landscape of information technology, the incorporation of technological advancements has become increasingly imperative for organizations spanning diverse sectors. Embracing such advancements not only facilitates the streamlining of processes but also nurtures innovation, thereby empowering institutions to augment the efficiency, accessibility, and overall efficacy of their operations (Aldoseri et al., 2024). The assimilation of technology has engendered a paradigm shift in the operational frameworks of businesses, governmental bodies, and other entities, presenting novel avenues for service enhancement, communication refinement, and productivity amplification (Allioui & Mourdi, 2023; Ud Din et al., 2023). Through the strategic utilization of technology, organizations can sustain their competitiveness, adapt adeptly to evolving landscapes, and effectively address the burgeoning requisites of the contemporary era (Rosid et al., 2023). Integration of technology within its infrastructure stands as a pivotal endeavor for the Jember Regency Prosecutor's Office toward the modernization of its services.

The Prosecutor's Office of the Republic of Indonesia (RI) stands as a pivotal state institution mandated with the responsibility of exercising state power, especially in the realm of prosecution (Sudirdja et al., 2023). Within this structure, the Jember Regency Prosecutor's Office is a critical component equipped with a specialized library under its Administrative Sub-

division. This specialized library primarily serves as an invaluable resource for researchers, prosecutors, and legal staff, offering a collection tailored to the field of law (Kaganovska et al., 2022). Despite its significance, the library services at the Jember Regency Prosecutor's Office present several challenges. These include issues related to administrative data management, such as inconsistent records, inefficient searches, and manual report generation using Microsoft Excel. Furthermore, librarians are tasked with member registration and visitor tracking, responsibilities previously outside their scope. These challenges highlight the current inadequacies in the library service system, necessitating urgent improvement (Kusumojati & Mediawati, 2024).

Although traditional libraries have historically played a crucial role in research and information dissemination, the rapid evolution of technology necessitates a transition to digital platforms (Kato et al., 2021; Kayode et al., 2020). The absence of such digital infrastructure at the Jember Regency Prosecutor's Office exacerbates existing challenges and impedes the core functions of the institution. The integration of technology, particularly through web-based development, has demonstrated its utility in digital environments (Gul & Bano, 2019; Polik & Schmidt, 2022; Ramirez et al., 2024). The implementation of a web-based library system is imperative for augmenting the efficiency, accessibility, and overall effectiveness of the Jember Regency Prosecutor's Office's library services. Automation tools such as the Online Public Access Catalog (OPAC) and Internet of Things (IoT) have yielded substantial enhancements in library management and user experience across various sectors (Asfiyah et al., 2024; Prayoga et al., 2020; Suratman et al., 2024; Utomo, 2019). Nevertheless, despite the demonstrable benefits of library system technology, pervasive inadequacies in the implementation of user interfaces persist (Dhio et al., 2024; Nugraha et al., 2024; Ridwan et al., 2021; Setiyani & Tjandra, 2020; Widiyawati, 2019). In light of these observations, this study endeavors to delve deeper into these issues, striving for advancements and discoveries aimed at achieving heightened levels of effectiveness and efficiency.

The primary objective of this study is to design and implement a robust web-based library system tailored to the specific needs and challenges faced by the Jember Regency Prosecutor's Office. The research aims to enhance the efficiency and effectiveness of library services through the implementation of information technology in library management. This includes streamlining administrative data management processes, such as member registration, visitor tracking, and book management, and improving user experience by providing real-time access to library resources and personalized research capabilities. Given the identified challenges and gaps in the current library services at the Jember Regency Prosecutor's Office, the research question that arises is: How can a well-designed web-based library system be developed to effectively address these issues? This study aims to provide recommendations for a robust design and implementation of a web-based library system, offering valuable insights to enhance the overall library services and support the core functions of the Jember Regency Prosecutor's Office.

METHOD

This type of research is research and development that is used to create products and test the effectiveness of the product results. Research and development is a type of research that is useful for producing software products through methods and to understanding and analyzing the library management processes at the Jember District Attorney's Office and identifying areas in need of improvement. The system design methodology used is structured analysis. To facilitate structured analysis, modeling tools such as Use Case Diagrams, Entity Relationship Diagrams (ERD), and Activity Diagrams are utilized. In system development, this research adopts the waterfall model, which is a sequential and linear software development approach. Each stage must be completed before proceeding to the next stage. Waterfall testing in this

research refers to the waterfall model which outlines several sequential stages: Requirement Analysis, System Design, Implementation, and Testing (Usnaini et al., 2021).

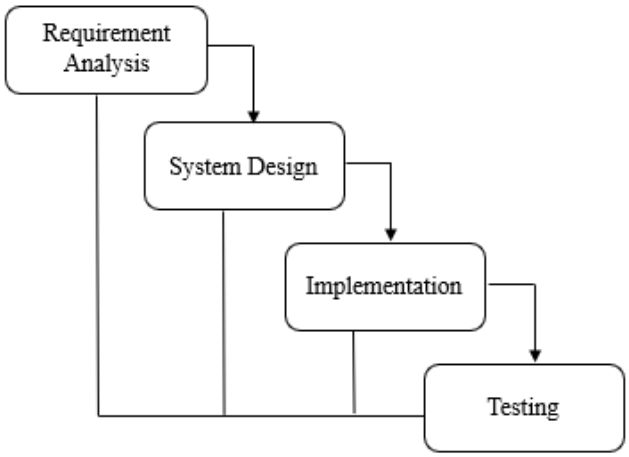

Figure 1. Conceptual model (Usnaini et al., 2021)

The Requirements Analysis phase aims to understand user needs and expectations for the developing system by identifying desired features, functions, and performance criteria. The System Design phase then focuses on crafting the system's architecture and structure based on the analyzed requirements, which involves generating workflow diagrams, designing user interfaces, and specifying technical system requirements. Following this, the Implementation phase involves coding, software development, configuring databases, and integrating components according to the established design. Finally, the Testing phase evaluates the developed system's adherence to predetermined requirements using a black box approach. This includes functional, integration, performance, and user acceptance testing to ensure the system meets user expectations, especially within the Jember Regency Prosecutor's Office context.

RESULT AND DISCUSSIONS

Result

The analysis results indicate that all features tested from phases 1 to 4, such as book search, borrowing, return, member list, borrowing history, adding a new book, editing book details, deleting a book, as well as logging in and logging out of the system, have all succeeded. This suggests that the system functions as expected and is ready for the next stage of development. The analytical steps leading to these results began by acknowledging the existing phenomenon at the Jember Regency Prosecutor's Office, where the current library management system faces challenges in terms of administrative data management, member registration, visitor tracking, as well as efficient book borrowing and returning processes. Considering these findings, the research then proceeded to Phase 2, which involved designing a system to address these challenges and meet the identified needs.

In Phase 2, a pivotal outcome of this research is the creation of a Use Case Diagram for the web-based library system of the Jember Regency Prosecutor's Office. This diagram visually represents the various user interactions with the system, delineating the functionalities and features accessible to different user roles within the organization. It details the specific actions users can undertake, including member registration, book searching, lending, returning, and administrative tasks. By delineating these interactions, the Use Case Diagram offers a clear and comprehensive overview of the system's capabilities and pinpoints potential areas for further refinement and enhancement. It's noteworthy that the Use Case Diagram content is presented in Bahasa Indonesia, the native language utilized at the Jember Regency Prosecutor's Office.

This choice aims to facilitate a better understanding of the diagram's flow, ensuring that the conveyed information is easily comprehensible to all stakeholders. The development and examination of the Use Case Diagram are instrumental in grasping user requirements and guiding the design and functionality of the web-based library system to align with the expectations of the Jember Regency Prosecutor's Office. The Use Case Diagram is illustrated in Figure 2.

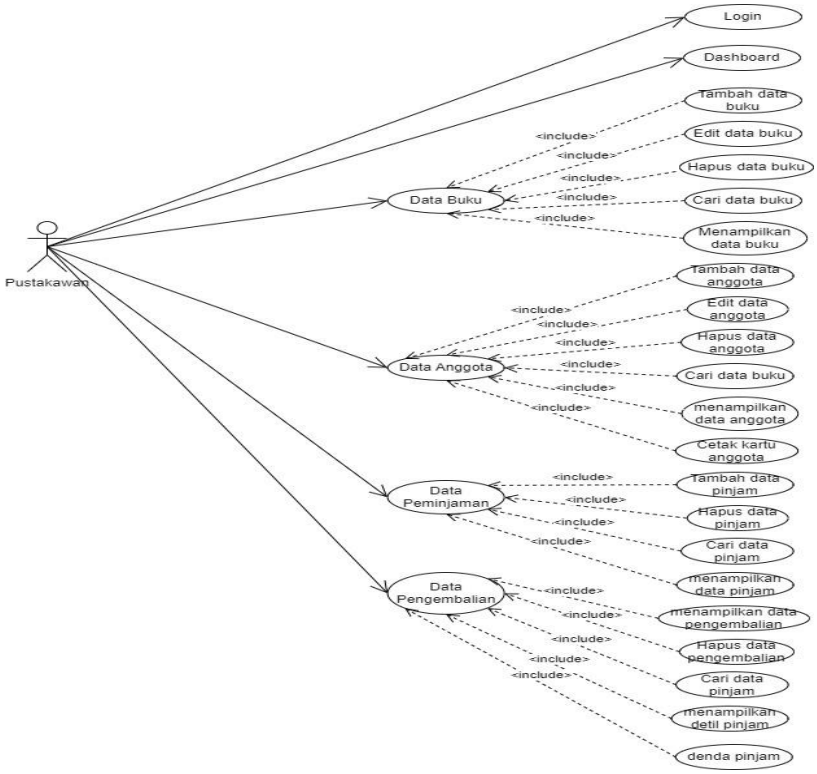

Figure 2. Use case diagram result

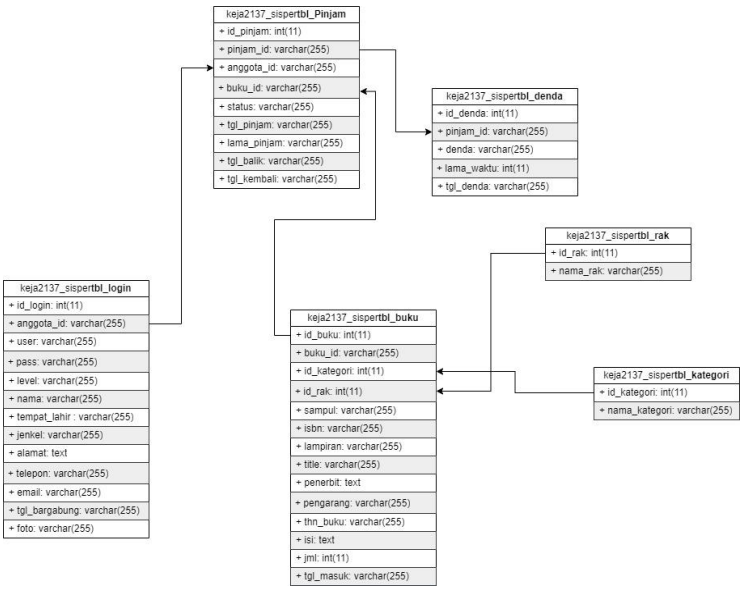

Figure 3. Entity relationship diagram

Based on the Figure 2, the web-based library system for the Jember Regency Prosecutor's Office offers a user-friendly interface. Librarians can log in and access the main dashboard, which is divided into four sections: Book Data, Member Data, Borrowing Data, and Return Data. These sections streamline book management, member details, borrowing transactions,

and returns. After the Use Case Diagram (ERD), the ERD was developed to depict database relationships, ensuring efficient data structure, as shown in Figure 3.

The ERD in Figure 3 delineates the relationships among the data entities within the web-based library system of the Jember Regency Prosecutor's Office. This diagram connects the book collections database with borrowing data and borrower details, incorporating borrowing timestamps and fines. The login data entity manages access to these databases. The design prioritizes simplicity and user-friendliness for librarians, which enhances both system efficiency and user experience. Building upon the Use Case and ERD, activity diagrams have been constructed in three distinct sections: for users, books, and borrowing, as depicted in Figures 4, 5, and 6. These diagrams will be further illustrated directly with the outcomes of Phase 3, which will be showcased through the user interface designs developed using Xampp Apache, MySQL, and Visual Studio Code software. The results can be viewed in Figures 4, 5, and 6.

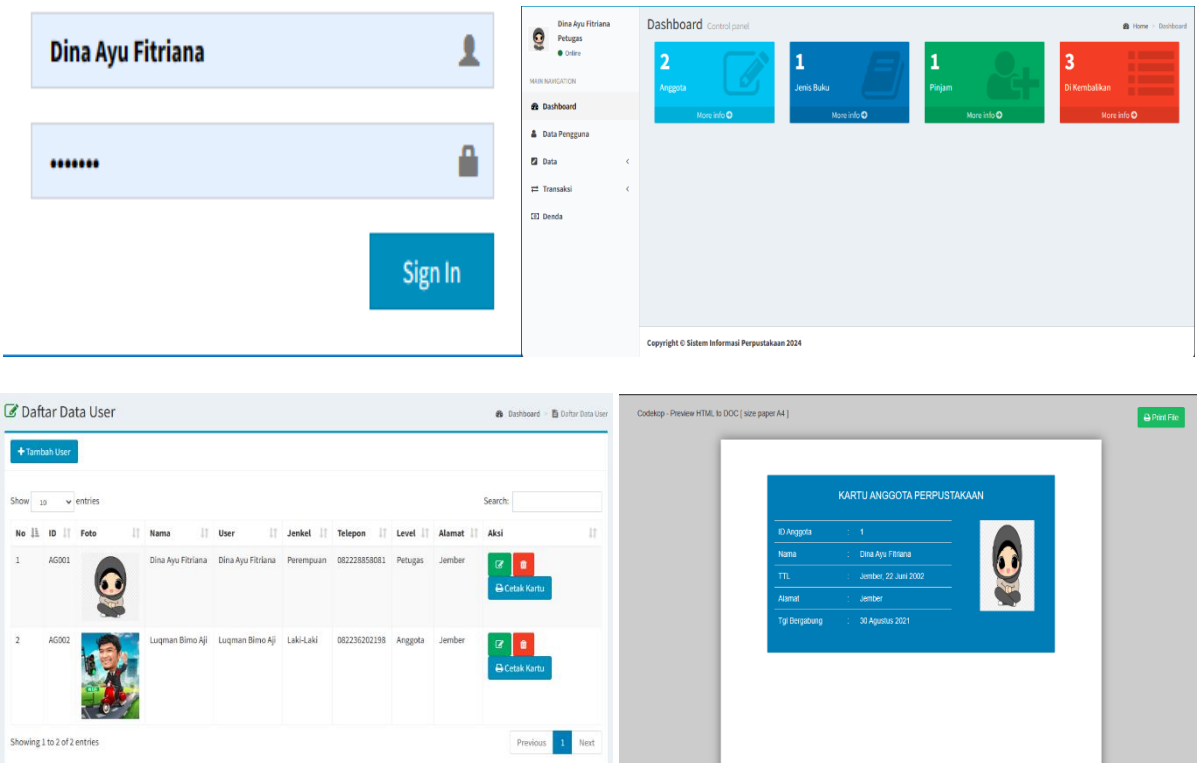

Figure 4. Activity user interface

Figure 4 illustrates the activity for accessing user data within the web-based library system. To initiate the process, librarians are required to input their username and password into the designated fields. Upon successful authentication, librarians gain access to various functionalities related to user management. They have the capability to add new user data, modify existing user information, delete user records, and perform searches to retrieve specific user details. Each of these user data manipulation activities, whether it involves adding, editing, deleting, or searching, triggers corresponding actions in the system. For example, when a librarian edits or updates user information, these modifications are promptly saved and updated in the system's database, ensuring real-time data accuracy and consistency. Furthermore, to provide librarians with a comprehensive view and tangible record of the managed user data, the system is equipped with a 'Print Library Member' feature, denoted as "Cetak Kartu" in Figure 4. This feature enables librarians to generate and directly print out the stored user data from the database. Such printed information serves as a tangible reference and backup,

enhancing the system's utility and ensuring that crucial user data is readily accessible in both digital and physical formats.

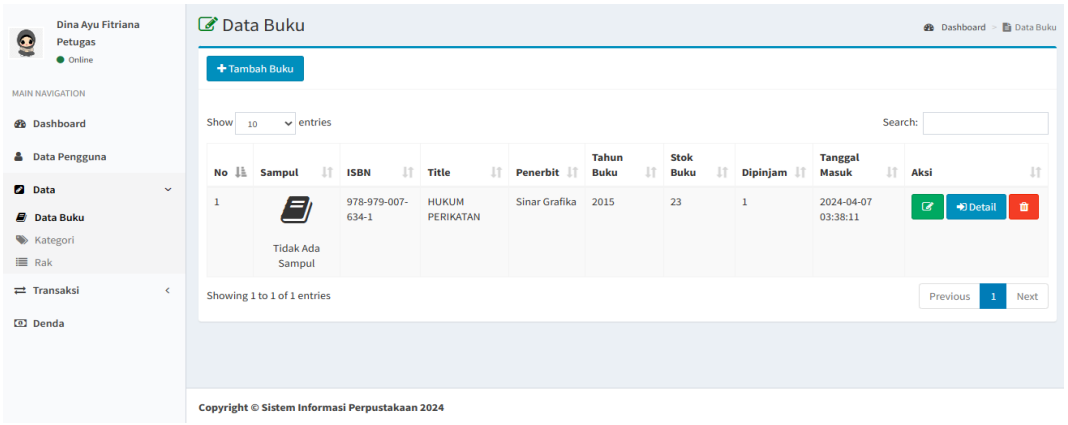

Figure 5. Book activity user interface

Figure 5 depicts the activity flow within the book database of the web-based library system. To initiate the process, librarians must log in to access the dashboard. Once authenticated, they can navigate to the book data section. Within this section, librarians have the capability to edit detailed information about the books stored in the system. All modifications made by the librarians are saved in the system's database. The database is designed to be dynamic and responsive, allowing real-time access to the stored book data. This means that any changes or additions to the book details made by librarians are immediately reflected and can be accessed by other users or librarians without delay. To facilitate easy navigation and information retrieval, the system provides an output display that showcases the search results. This output is specifically denoted as "Search" in Figure 5. In essence, Figure 5 provides a visual representation of the systematic process librarians follow when interacting with the book database. It underscores the system's efficiency in managing book-related data, ensuring accuracy, and facilitating seamless information retrieval for users.

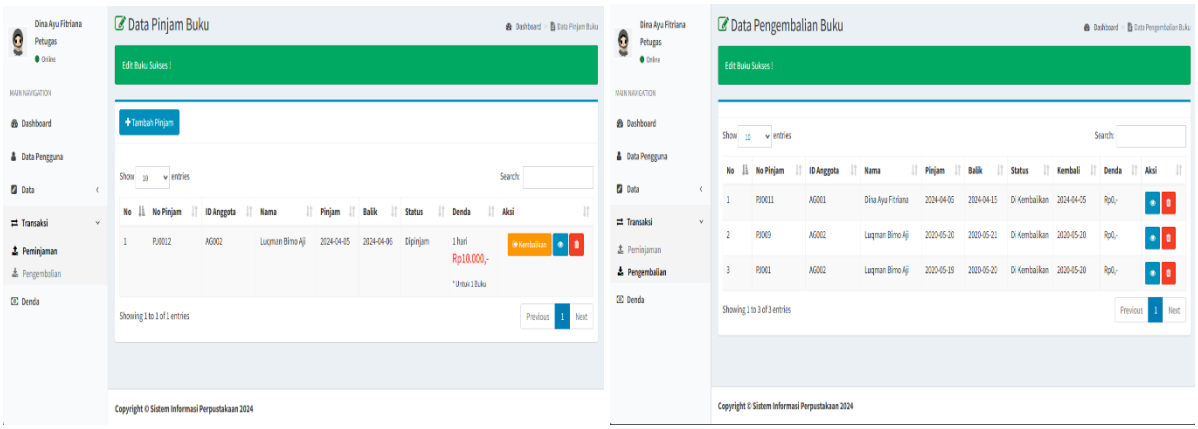

Figure 6. Book borrowing user interface

Figure 6 presents the user interface tailored for book borrowing and returning in the web-based library system for the Jember Regency Prosecutor's Office. Librarians can edit, delete, and view detailed borrowing records, including late return fines, ensuring efficient management of borrowing activities and maintaining system accuracy and integrity. This interface emphasizes user-friendliness and operational efficiency, catering to the specific needs of librarians managing the library's resources. Following the completion of Phases 1, 2, and 3,

the research then proceeded to Phase 4, which involved system testing using the black box testing method. The outcomes of this testing phase can be observed in Table 1.

Table 1. Black box system testing results

No	Features	Test Descriptions	Test Data	Expectation	Actual Results	Status
1	Book Search	Testing the book search feature based on title	"Hukum Perikatan"	Displaying books	Displaying books	Pass
2	Book Borrowing	Testing the book borrowing feature	Book ID: 1	Successful borrowing	Successful borrowing	Pass
3	Book Return	Testing the book return feature	Book ID: 1	Successful return	Successful return	Pass
4	Member List	Testing the library member list feature	"Bimo"	Displaying members Data	Displaying members Data	Pass
5	Borrowing History	Testing the book borrowing history feature	ID: AG002	Displaying history	Displaying history	Pass
6	Add New Book	Testing the new book addition feature	Book Details	Successful book addition	Successful book addition	Pass
7	Edit Book Details	Testing the book detail editing feature	Book ID: 1	Successful detail edit	Successful detail edit	Pass
8	Delete Book	Testing the book deletion feature	Book ID: 1	Book deletion successful	Book deletion successful	Pass
9	System Login	Testing the login feature into the system	Username: Password:	Successful login	Successful login	Pass
10	System Logout	Testing the logout feature from the system"	-	Successfull Logout	Successfull Logout	Pass

The results of the system testing using the black box method in Phase 4 indicate that all tested features, such as book search, borrowing, return, member list, borrowing history, adding a new book, editing book details, deleting a book, as well as logging in and logging out of the system, all passed successfully. This suggests that the system functions as expected and is ready for the next stage of its development.

Discussions

The development and implementation of a web-based library system for the Jember Regency Prosecutor's Office signify a significant advancement in addressing challenges and inefficiencies in their library services. This study employed a structured analysis approach combined with the waterfall model, aimed at addressing specific needs identified within the Jember Regency Prosecutor's Office's library management system.

During the analysis phase, critical areas requiring attention were identified, such as administrative data management, member registration, visitor tracking, and the book lending

and returning processes. These findings align with previous research by (Kaganovska et al., 2022; Kusumojati & Mediawati, 2024). Kaganovska et al., (2022) emphasized the role of efficient design and database management in libraries, a concern that aligns with the challenges faced at the Jember Regency Prosecutor's Office. Furthermore, in the system design phase, various diagrams and models like the Use Case Diagram and Entity Relationship Diagram (ERD) were developed to depict the workflow and relationships between system components. This ensured that the system design met the identified needs and specifications. During the implementation phase, the web-based library system was developed by integrating various required features and functionalities, including book searching, member registration, and tracking of lending and returning transactions. In this process, user-friendly interface design principles were applied, consistent with the findings of (Ramirez et al., 2024).

These findings align with studies emphasizing the transformative potential of technology integration, particularly through automation tools like Online Public Access Catalog (OPAC) and Internet of Things (IoT) (Asfiyah et al., 2024; Prayoga et al., 2020). Asfiyah et al., (2024) highlighted the role of web-based platforms in enhancing accessibility and operational efficiency, reflected in the developed web-based library system for the Jember Regency Prosecutor's Office. Moreover, Ramirez et al., (2024) emphasized user-friendly interface design in enhancing user experience in library management systems, an aspect addressed in the developed system.

The successful implementation of the web-based library system for the Jember Regency Prosecutor's Office validates the significance and relevance of this research. By addressing the identified challenges and implementing innovative solutions tailored to the specific needs of the Prosecutor's Office, this study contributes valuable insights and recommendations to the broader discourse on leveraging technology to modernize library management systems. Furthermore, the implementation of this web-based library system is expected to bring direct positive impacts on library services, such as improved book search capabilities, more efficient member registration processes, and accurate tracking of lending and returning transactions. These enhancements will not only streamline operations but also enhance user satisfaction and accessibility of library resources.

CONCLUSION

The development and successful implementation of the web-based library system for the Jember Regency Prosecutor's Office demonstrate its capability to address and rectify the existing challenges in library management. Through a structured analysis approach and the application of the waterfall model, this research effectively streamlined administrative processes, enhanced member registration, and optimized book lending and returning procedures. The system's robust performance, validated through black box testing, underscores its reliability and adherence to design specifications. By integrating user-friendly interface design principles and automation tools, the system not only meets the specific needs of the Prosecutor's Office but also aligns with broader technological advancements in library management. Consequently, this study offers valuable contributions to modernizing library services, emphasizing the transformative potential of technology in enhancing efficiency, accessibility, and user satisfaction.

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