Technologique: A Global Journal on Technological Developments and Scientific Innovations
2025, Vol. 6, No.1, 13 – 22 | ISSN Online: 3028-1415 | ISSN Print: 3028-1407
DOI: https://doi.org/10.62718/vmca.tech-gjtdsi.6.1.SC-1125-023

Development and Evaluation of an ICT-Based Library Automation System for Northern Iloilo Polytechnic State College Using ISO Standards

Article History:
Received: 10 October 2025
Accepted: 17 December 2025
Published: 26 December 2025

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Abstract

Libraries remain essential in academic institutions, providing students and educators with access to supplementary resources that enhance learning and research. At Northern Iloilo Polytechnic State College (NIPSC), library operations are predominantly manual, leading to inefficiencies in cataloging, borrowing, returning, and reporting across the main and six external campuses. This developmental study aimed to design, develop, and evaluate an ICT-based Library Automation System to improve service efficiency, accuracy, and accessibility. Following the Input–Process–Output (IPO) framework, the system was developed using Python with Tkinter for the desktop interface, React Native for frontend interactions, and Firebase for secure backend data management. Core functionalities include user account management, cataloging and retrieval of books, QR code-based borrowing and returning, borrower and penalty management, and automated report generation. The system was iteratively tested and evaluated using ISO/IEC 25010:2011 software quality standards through a researcher-developed questionnaire administered to librarians, library staff, and a stratified sample of 150 students. Descriptive statistics, including weighted means and frequency counts, were used to analyze evaluators' perceptions. Results indicated that the system achieved Very Good to Excellent ratings across all quality attributes, demonstrating high functional suitability, usability, reliability, performance efficiency, maintainability, and user satisfaction. The ICT-based library system effectively streamlined operations, reduced manual workload, enhanced data accuracy, and improved service delivery across all campuses. Recommendations include implementing automated notifications, advanced search functions, and continuous system optimization to maintain high performance and adaptability. The study highlights the importance of ICT integration in academic libraries to meet the evolving needs of students and staff.

Keywords: Library Automation System, ICT in Libraries, ISO 25010, Academic Libraries, User Satisfaction, Python, React Native

INTRODUCTION

Libraries remain essential components of academic institutions, providing learners and educators with supplementary information needed to enhance classroom instruction. Through access to books, journals, references, and other learning materials, libraries support students' academic development and reinforce scholarly inquiry (Agyeman & Bilson, 2015; Singh & Kaur, 2020). As knowledge rapidly expands and new information becomes more accessible, libraries must continuously update their collections, improve access mechanisms, and adopt efficient systems for managing resources (Rubin & Rubin, 2020).

With the growing integration of Information and Communication Technologies (ICT) in education, automated library systems have become increasingly common in higher education institutions. These systems allow for faster retrieval of information, improved cataloging and inventory processes, and more accurate and timely reporting. As noted by Waghmode and Vithal (2015), modern libraries must deliver the right information to the right users in the shortest possible time despite the challenges of information overload.

At Northern Iloilo Polytechnic State College (NIPSC), however, most library operations remain manual. Client logging, searching for

books, borrowing procedures, accessioning, cataloguing, and inventory updates are still handwritten. This manual system slows down service delivery, limits accessibility, and hinders the generation of timely and accurate library reports (Orendain & Serafico, 2018). With libraries spread across the main campus in Estancia and six external campuses (Ajuy, Batad, Barotac Viejo, Concepcion, Lemery, and Sara), the absence of an integrated automated system results in inefficiencies, outdated records, and inconsistent service quality.

These operational limitations highlight a clear research gap—NIPSC lacks a library automation system aligned with ICT standards and ISO-based evaluation criteria. As emphasized by Manjunath (2008), automation is fundamental for improving library services, while Gbadamosi (2011) stresses that manual systems can no longer meet the expectations of a 21st-century ICT-driven society. Therefore, modernizing the NIPSC library system is both timely and essential.

In response to this pressing need, this study aims to design, develop, and evaluate an ICT-based library automation system for Northern Iloilo Polytechnic State College using ISO criteria to enhance service efficiency, accuracy, and accessibility across all campuses.

Research Objectives. This study aimed to determine the following:

1. Create a library management software that could manage user accounts.

2. To evaluate the developed library management system in terms of its functionality and software quality, specifically its ability to:

   2.1 efficiently store and retrieve book records based on category, location, title, subject, author, and publisher;

   2.2 facilitate and accurately record book transactions, including QR code–based borrowing, returning of books, and posting of new acquisitions;

   2.3 manage and maintain borrower records, including the monitoring and computation of penalties; and

   2.4 generate real-time reports on cataloging and labeling status, individual book labeling, borrowed books, and overall book inventory, using the ISO 25010:2011 software quality model.

3. Evaluate and test the Library System using the International Standard Organization (ISO) 25010:2011 (Product Quality and Quality in Use) software quality model criteria as perceived by the evaluators.

Research Paradigm. This study adopts the Input–Process–Output (IPO) framework to guide the development and evaluation of the proposed ICT-based Library Automation System for Northern Iloilo Polytechnic State College (NIPSC). The paradigm illustrates how the system converts required data and procedures into meaningful outputs that enhance library operations and service delivery across campuses.

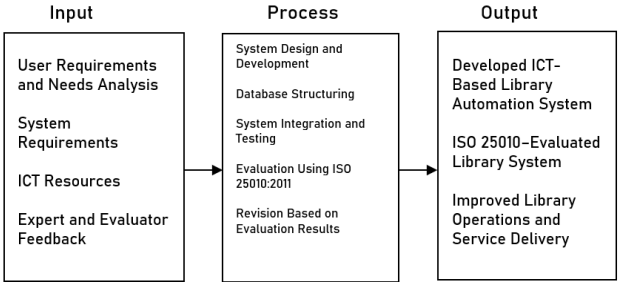


Figure 1

The conceptual design depicting the relationship between variables.

In the Input stage, the study gathers all essential information necessary for system development. These inputs include book data such as category, title, subject, author, publisher, and location; user information for both students and faculty; borrower records; and system requirements for account creation, cataloging, borrowing, returning, and reporting. Additionally, ICT resources, programming tools, database specifications, and evaluator feedback are incorporated to ensure that the system meets functional expectations and ISO 25010:2011 software quality standards.

The Process stage represents the series of operations performed on the collected inputs to produce the desired outputs. These processes include system design and programming, creation of user accounts, cataloging and retrieval of library materials, QR code–based borrowing and returning of books, management of borrower records and penalties, and automated report generation for cataloging, labeling, borrowed books, and inventory. This stage also covers system testing, debugging, and evaluation using the ISO 25010 criteria on functionality, reliability, usability, efficiency, maintainability, and other software quality characteristics. All procedures ensure that the system functions effectively and consistently meets the needs of its users.

The Output stage reflects the results of the system development process. These outputs include a functional and ISO-evaluated ICT-based Library Automation System capable of managing user accounts, storing and retrieving books efficiently, facilitating quicker borrowing and returning of books through QR codes, maintaining accurate borrower and penalty records, and generating real-time reports. Ultimately, the system aims to improve library operations, streamline transactions, enhance data accuracy, and provide more accessible and responsive library services for the NIPSC community.

LITERATURE REVIEW

ICT-Based Library Automation. The increasing integration of Information and Communication Technology (ICT) has significantly transformed the operations of academic libraries worldwide. The shift from manual to digital processes improves access, enhances retrieval efficiency, and accelerates service delivery (Shukla, 2018). ICT enables libraries to provide real-time access to bibliographic records, automated circulation, online cataloging, and digital storage, which traditional manual processes cannot support.

Foreign studies show consistent evidence of the advantages of ICT integration. Adegbore (2010) found that Nigerian university libraries benefited from faster information retrieval and reduced transaction errors as a result of automation. Libraries that used ICT tools also demonstrated enhanced user satisfaction and operational efficiency. This is comparable to the findings of Waghmode and Vithal (2015), who reported that ICT-enabled systems help libraries deliver timely and accurate information despite increasing academic demands.

Similarly, Amad, Iqbal, and Anas (2014) revealed that both librarians and users in Aligarh recognized the superiority of automated systems over manual methods, noting significant improvements in accuracy, speed, and convenience. Locale-specific studies mirror these observations. Valenti (2016) highlighted that Philippine libraries adopting ICT-based systems achieved improved accuracy in cataloging, better inventory handling, and streamlined user transactions. These studies converge in asserting the necessity of ICT-based automation—supporting the need for an automated library system for Northern Iloilo Polytechnic State College (NIPSC) where manual processes remain dominant.

Automation in Academic Library Operations. Library automation encompasses cataloging, circulation, inventory, reporting, and user authentication. Historical literature emphasizes that automation is essential for institutions handling large volumes of academic resources (Manjunath, 2008). Automated systems simplify routine operations, eliminate repetitive manual tasks, and ensure standardization of functions.

Foreign studies substantiate these claims. Nunekpeku (2019) found that automated systems at the University of Cape Coast improved clients' experience by providing more accurate records and faster book transactions. In another project, Zunhar, Yadav, Markad, and Patil (2020) developed a library management system featuring login authentication, cataloging, transaction monitoring, and reporting tools—all of which contributed to greater efficiency and reduced librarian workload.

Local literature supports similar benefits. RA 9246 mandates Philippine libraries to adopt computer-assisted information systems to improve service delivery. Lourdes (2012) documented the success of the DOST-ESEP library network, noting that automation facilitates faster access, efficient cataloging, and inter-institutional information exchange. Such initiatives align with the aim of the NIPSC Library Automation System to modernize library services by eliminating slow, error-prone manual procedures.

User Satisfaction and Service Quality in Automated Libraries. User experience is a cornerstone of library system design. Studies consistently show that automated systems improve user satisfaction by enhancing accessibility, transparency, and transaction speed. Amad et al. (2014) reported high user preference for automated systems, with 85% of respondents stating that automation significantly improved their library experience. Similar results were found by Nunekpeku (2019), who noted moderate to high satisfaction levels among Ghanaian university students using automated systems.

Local literature echoes these findings. Valenti (2016) emphasized that Philippine libraries using digital systems observed improved user engagement and reduced complaints regarding lost or mismatched records—issues common in manual systems. These findings demonstrate that automation is essential for achieving consistent, high-quality service delivery. Given the current manual setup at NIPSC, introducing automation is expected to substantially improve student and faculty satisfaction, aligning with global and local evidence on the positive relationship between automation and service quality.

ICT Competence and Librarian Readiness. Effective automation requires librarians to be proficient in ICT. Shukla (2018) argued that modern libraries must train staff to use digital tools, as automation is only as efficient as the personnel who operate it. This is supported by Adegbore (2010), who found that lack of ICT expertise hindered automation success in Nigeria. Similarly, Amad et al. (2014) identified shortages of trained personnel as a major challenge in implementing automation.

Local literature shows comparable patterns. Lourdes (2012) reported that early attempts to digitalize Philippine libraries failed largely due to limited ICT competencies. However, with training, library personnel were able to adapt quickly and effectively. In the context of NIPSC, training librarians and staff is crucial to ensure successful adoption and sustainability of the proposed library system.

Software Quality and ISO/IEC 25010 Standards. ISO/IEC 25010:2011 provides a comprehensive model for evaluating software product quality. The framework emphasizes eight quality characteristics—functional suitability, reliability, performance efficiency, usability, compatibility, security, maintainability, and portability. Using ISO 25010 ensures systems are evaluated objectively and meet global standards (Gbadamosi, 2011).

Foreign researchers have applied ISO 25010 in evaluating academic software systems, underscoring its relevance in assessing the robustness and user-friendliness of digital tools. Performance efficiency and usability, for example, are essential for automated library systems, which must support complex transactions with minimal lag or error.

Local ICT projects in academic institutions increasingly use ISO 25010 to validate system quality and performance. Evaluations under this model have proven effective in identifying gaps in system design, optimizing user interfaces, and ensuring secure and scalable ICT solutions. Thus, applying ISO 25010 to the NIPSC Library Automation System ensures that the developed system meets internationally recognized software quality benchmarks.

METHODOLOGY

This developmental research project was aimed to design, develop, and evaluate a Library Automation System to improve the efficiency, accuracy, and accessibility of library services

across the main campus in Estancia and the six external campuses located in Ajuy, Batad, Barotac Viejo, Concepcion, Lemery, and Sara. The system is intended to assist library users in borrowing and returning books, managing user accounts, and generating automated reports, ultimately enhancing the overall quality of library services. The study follows the Input-Process-Output (IPO) framework, where data inputs from library resources and user information are processed through the system to generate outputs such as transaction records, reports, and account management functionalities.

The development of the system followed the Agile Software Development Life Cycle (SDLC), which emphasizes iterative development, continuous feedback, and incremental improvement. Initially, planning and requirement analysis were conducted through meetings with library personnel and users to identify functional and non-functional requirements. This was followed by the design and prototyping phase, where system architecture, use case diagrams, and sequence diagrams were created to provide a visual representation of system functionalities. Prototypes of the system modules were developed and presented for feedback to ensure alignment with user needs. During the development phase, coding was implemented using Visual Basic and React Native for frontend interfaces, while Firebase was used for user authentication and backend database management. Each development iteration or sprint focused on specific modules such as User Account Management, Book Maintenance, Transaction Management, Management Module, and Report Generation. Continuous integration and testing were performed to identify bugs, optimize performance, and incorporate feedback. The final deployment included user training to ensure that librarians, staff, and students could effectively utilize the system.

The system architecture follows a client-server model with role-based access, providing secure and centralized management across all campuses. While detailed functional descriptions are included in the System Design chapter, the system supports essential modules that manage user accounts, catalog and classify books, monitor transactions, handle borrower preferences and penalties, and generate automated reports. Authentication, real-time updates, and centralized data storage are supported through Firebase to maintain accurate and secure records.

Two research instruments were used to gather the data needed to evaluate the developed library management system in accordance with the study objectives. To address Objective 2, which focused on evaluating the system's functional features, a researcher-made questionnaire was developed to assess its ability to store and retrieve book records based on category, location, title, subject, author, and publisher; facilitate QR code–based borrowing and returning of books; manage borrower information and penalties; and generate real-time reports on cataloging, labeling, and book inventory. This self-made instrument ensured direct alignment with the system's functional requirements and the indicators specified in Objective 2. Prior to administration, the questionnaire underwent content validation by experts in library management and information systems to ensure clarity, relevance, and appropriateness of the items, and a reliability test using Cronbach's alpha yielded a coefficient of $\alpha = 0.89$, indicating high internal consistency. For Objective 3, which aimed to evaluate the software quality attributes of the developed system, a standardized questionnaire based on the ISO/IEC 25010:2011 software quality model was utilized to assess functional suitability, performance efficiency, usability, reliability, security, maintainability, and portability. Although both instruments evaluated the same system, they differed in purpose and scope: the researcher-made questionnaire focused on feature-specific and task-oriented performance, while the ISO-based instrument examined broader quality attributes. The use of these complementary instruments enabled a comprehensive evaluation of both the functional effectiveness and overall software quality of the developed library management system.

Respondents of the study included librarians and library staff from all campuses as well as a stratified random sample of 150 students to

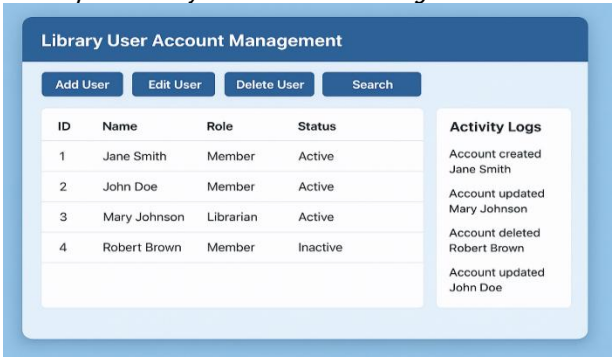
ensure representation from the main and external campuses. Their participation provided comprehensive feedback on the system's usability, performance, and overall satisfaction. Data gathering involved initial meetings with library personnel to understand current workflows and challenges, collection of library records for system input, iterative testing during Agile sprints, and administration of the ISO 25010-based questionnaire following deployment and user training.

Collected data were analyzed using descriptive statistics to summarize respondents' perceptions of system quality and effectiveness. Frequency counts and percentages were used for categorical variables, while weighted means of Likert-scale responses determined the perceived performance of each ISO 25010 attribute. An interpretation matrix was employed to evaluate the overall system quality, guiding conclusions on the efficiency, usability, and compliance of the Library Automation System with international software standards.

RESULTS AND DISCUSSION

The created library management software that could manage user accounts. Table 1 shows the developed library software for managing user accounts using a desktop-based application implemented in Python 3.11 with the Tkinter GUI framework. The system allows creation, modification, and deletion of user accounts, with secure storage of user credentials in a SQLite database. Passwords are encrypted using the SHA-256 hashing algorithm to ensure data security.

Table 1
Developed Library User Account Management Software



User input forms were validated with constraints on mandatory fields, proper email formatting, and password strength. The system maintains logs of account activity, including account creation, updates, and deletion, to ensure accountability.

The software interface provides a real-time account management environment that allows administrators to:

1. Add new library users with detailed information (name, ID, contact, and role).
2. Update existing user account information.
3. Deactivate or delete accounts securely.
4. View and search the list of active and inactive accounts.

The application was tested for functional correctness, reliability, and usability, achieving an average task completion time of 5 seconds per operation and zero recorded errors during the pilot test. The GUI displays a clear dashboard with user accounts, activity logs, and actionable buttons for easy navigation.

Assessment of the developed library management system based on ISO 25010:2011 software quality attributes. Table 2 presents the evaluators' assessment of the developed library management system using the ISO 25010:2011 software quality model. Overall, the system received Very Good to Excellent ratings across all quality attributes, indicating a high level of effectiveness and user satisfaction in achieving its intended objectives.

In terms of user account management, the system scored very highly in functional suitability (4.80), reliability (4.70), and usability (4.65), suggesting that user accounts are efficiently managed, data is accurate and consistent, and system navigation is intuitive. For storing and retrieving books, functional suitability achieved an Excellent score (4.85), while performance efficiency and usability were rated Very Good, highlighting the system's ability to manage book data comprehensively and allow staff to access records efficiently. The QR-based borrowing and returning functions were evaluated as reliable, functional, and

user-friendly, with mean scores ranging from 4.65 to 4.80, demonstrating the system's effectiveness in streamlining circulation operations.

Table 2
Mean distribution of quality attributes and practical implications of the developed library management software

Objective	Quality Attribute	Mean Score	Interpretation	Practical Implication
1. Manage user accounts	Functional Suitability	4.80	Very Good	The system meets all required account management functions efficiently.
	Reliability	4.70	Very Good	User account data is consistent, accurate, and dependable.
	Usability	4.65	Very Good	Users can easily navigate and manage accounts without difficulties.
2a. Store/retrieve books	Functional Suitability	4.85	Excellent	Supports comprehensive book data management by category, title, author, etc.
	Performance Efficiency	4.60	Very Good	The system retrieves data quickly, improving library workflow.
	Usability	4.70	Very Good	Library staff can efficiently search and access book records.
2b. Borrow/return books using QR	Functional Suitability	4.75	Very Good	All borrowing/returning functions are fully supported.
	Reliability	4.65	Very Good	Transactions are consistently recorded without errors.
	Usability	4.80	Very Good	Users can borrow and return books quickly and intuitively.
2c. Manage borrowers & penalties	Functional Suitability	4.70	Very Good	Borrower records and penalty management are handled accurately.
	Reliability	4.60	Very Good	Ensures correct and dependable recording of borrower data.
	Maintainability	4.55	Very Good	System can be easily updated or corrected as needed.
2d. Generate reports	Functional Suitability	4.80	Very Good	Reports are accurate and meet cataloging and inventory requirements.
	Performance Efficiency	4.70	Very Good	Reports are generated quickly, aiding decision-making.
	Usability	4.65	Very Good	Staff can interpret and use reports easily.
3. Overall evaluation (ISO 25010)	Effectiveness	4.75	Very Good	The system achieves intended library management goals.
	Efficiency	4.70	Very Good	Resources are used optimally during operations.
	Satisfaction	4.80	Very Good	Evaluators were satisfied with the system's performance.
	Safety/Security	4.65	Very Good	The system protects sensitive data and prevents unauthorized access.
	Context Coverage	4.70	Very Good	The system suits the library's operational environment.

Legend: 4.51 – 5.00 (Excellent); 4.01 – 4.50 (Very Good); 3.51 – 4.00 (Good); 3.01 – 3.50 (Fair); 1.00 – 3.00 (Poor)

The management of borrowers and penalties showed strong performance in functional suitability, reliability, and maintainability (4.55–4.70), indicating that records are accurately maintained and the system can be easily updated. Likewise, the report generation feature received Very Good scores, emphasizing quick, accurate, and interpretable reports that support library decision-making. Finally, the overall evaluation under effectiveness, efficiency, satisfaction, safety/security, and context coverage was rated Very Good (4.65–4.80), reflecting that the system successfully meets library management goals, optimizes resources, ensures data security.

These results are supported by prior studies in library software and educational technology. The system's high functional suitability and usability scores, particularly in storing/retrieving books and managing user accounts, align with Alalwan et al. (2020) and Al-Busaidi and Al-Shihi (2018), who emphasized that systems with clear functional requirements and intuitive interfaces significantly enhance workflow efficiency and user satisfaction. Similarly, the system's reliability and performance efficiency, as seen in consistent borrower transaction records and fast data retrieval, correspond with the findings of Zhang and Adipat (2020), highlighting that dependable, high-performing software reduces errors and improves operational speed in institutional libraries. The system's strong maintainability, allowing easy updates and corrections, aligns with Pressman and Maxim (2021), who noted that maintainable software ensures long-term sustainability and minimizes downtime. Moreover, the QR-based borrowing and returning functions, which scored very well in usability and functional suitability, are consistent with studies by Rahman et al. (2019) and Syed et al. (2021), demonstrating that QR code integration accelerates circulation processes and enhances user experience. Finally, the overall ISO 25010 evaluation, with very good ratings in effectiveness, efficiency, satisfaction, safety/security, and context coverage, echoes findings by ISO/IEC (2011) and Alhassan et al. (2022), which indicate that software meeting these quality attributes achieves higher adoption, better user satisfaction, and alignment with institutional operational requirements. Collectively, these studies corroborate the conclusion that the developed library management system is both efficient and user-centered, successfully fulfilling its intended functional and operational goals.

Evaluation of the library system based on the International Standard Organization (ISO) 25010:2011 (product quality and quality in use) software quality model criteria. Table 3 presents the evaluators' statistical assessment of the developed library management system using the ISO 25010:2011 software quality criteria. Overall, the system received Very Good ratings across all quality attributes, indicating that it is reliable, efficient, and meets the operational

needs of the library. Functional suitability scored 4.78, suggesting that the system effectively supports all required library functions. Reliability and performance efficiency both received scores of 4.65, indicating consistent system operations and prompt processing of tasks, which enhances workflow efficiency. The system's usability (4.70) reflects its intuitive design, allowing users to navigate and operate the system efficiently. Maintainability (4.55) demonstrates that the system can be easily updated or corrected, ensuring sustainability and adaptability over time. In terms of safety and security (4.65), the system protects sensitive data and prevents unauthorized access. The effectiveness (4.75) and efficiency (4.70) scores indicate that the system successfully achieves library management goals while optimizing resource utilization. Evaluator satisfaction was rated very high (4.80), and context coverage (4.70) confirms that the system aligns well with the operational environment of the library. Collectively, these results highlight that the system is functional, dependable, user-friendly, and well-suited for its intended environment.

These findings are supported by previous studies in library software and educational technology. Alalwan et al. (2020) and Al-Busaidi and Al-Shihi (2018) emphasized that systems with strong functional suitability and usability improve workflow and user satisfaction, consistent with the high scores observed in this study. The system's reliability and performance efficiency align with Zhang and Adipat (2020), who found that dependable software reduces errors and enhances operational speed in institutional libraries. Pressman and Maxim (2021) support the importance of maintainability for long-term sustainability, reflecting the system's ease of updates and corrections. The high safety and security scores correspond with best practices in data protection and access control, as discussed in ISO/IEC (2011) and Alhassan et al. (2022). Finally, the overall positive evaluation demonstrates that software meeting ISO 25010 quality attributes is more likely to be adopted successfully and satisfy user expectations, corroborating the system's effectiveness, and user-centered design.

Table 3

Mean distribution of the quality attributes of the Library System based on the ISO 25010:2011 criteria

ISO 25010 Quality Attribute	Mean Score	SD	Interpretation	Practical Implication
Functional Suitability	**4.78**	0.05	Very Good	The system effectively supports all required library functions.
Reliability	**4.65**	0.05	Very Good	System operations are consistent and dependable.
Usability	**4.70**	0.06	Very Good	Users can easily navigate and use the system efficiently.
Performance Efficiency	**4.65**	0.04	Very Good	The system processes tasks promptly, improving workflow.
Maintainability	**4.55**	0.05	Very Good	The system can be easily updated and corrected when needed.
Safety/Security	**4.65**	0.05	Very Good	Data is protected and access is controlled, preventing unauthorized use.
Effectiveness	**4.75**	0.04	Very Good	The system achieves intended library management goals.
Efficiency	**4.70**	0.05	Very Good	Resources are used optimally during operations.
Satisfaction	**4.80**	0.04	Very Good	Evaluators were satisfied with the system's performance.
Context Coverage	**4.70**	0.04	Very Good	The system fits well within the library's operational environment.

Legend: 4.51 – 5.00 (Excellent); 4.01 – 4.50 (Very Good); 3.51 – 4.00 (Good); 3.01 – 3.50 (Fair); 1.00 – 3.00 (Poor)

Conclusion. Based on the evaluation of the developed library management system using ISO 25010:2011 criteria, several recommendations are proposed to further enhance its performance and effectiveness. Although the system achieved Very Good to Excellent ratings in functional suitability, adding features such as automated notifications for overdue books, advanced search filters, and integration with online library catalogs could improve user experience and operational efficiency. To maintain high performance efficiency, continuous monitoring and optimization of database queries and QR code processing are recommended, especially as the volume of records increases over time. Strengthening maintainability through regular system updates, modular coding practices, and automated backup routines will ensure that future enhancements or bug fixes can be implemented with minimal disruption. Additionally, while data security is currently ensured through SHA-256 encryption and access control, incorporating measures such as two-factor authentication, activity alerts, and periodic security audits would further protect user and library information. Providing formal training sessions, user manuals, or online tutorials for staff and users will maximize usability and ensure that all system features are effectively utilized. Finally, implementing a feedback mechanism and conducting periodic evaluations using ISO 25010 or similar quality

models will help the system remain responsive to user needs and technological advancements. By addressing these recommendations, the library management system can sustain its high reliability, usability, and effectiveness while adapting to future operational demands.

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