

Digitalization of Internal Quality Audit to Enhance Study Program Accreditation in the Society 5.0 Era

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Abstract. The growing demands for accountability and transparency in higher education have positioned internal quality audit as a strategic instrument to ensure continuous improvement and accreditation readiness. However, conventional audit practices often encounter challenges such as inefficiency, limited data accessibility, and weak integration among stakeholders. This research develops a web-based Internal Quality Audit (IQA) digitalization system using the Waterfall software development model to strengthen study program accreditation within the Society 5.0 framework. The system was implemented at the Diploma III Information Technology Study Program at the Off-Campus Study Program (PSDKU) of Politeknik Negeri Pontianak in Sukamara Regency. Black-Box Testing confirmed that all 30 functional test scenarios operated according to specifications. User Acceptance Testing (UAT) conducted with students, lecturers, and study program administrators yielded an overall acceptance score of 87.2%, with the reliability dimension achieving a perfect score (100%). The findings demonstrate that the digitalization of IQA processes significantly improves audit efficiency, document traceability, and accreditation preparedness at the study program level.

Keywords: Internal Quality Audit; Digitalization; Accreditation; Waterfall Model; Society 5.0

INTRODUCTION

Internal Quality Audit (IQA) is a systematic process designed to evaluate the effectiveness of the Internal Quality Assurance System (IQAS) in higher education institutions, particularly at the study program level. IQA is a critical component of the quality assurance cycle, monitoring consistency in quality standard implementation and ensuring compliance in educational, research, and community service activities. Effective IQA implementation directly contributes to accreditation readiness and continuous improvement in higher education governance (Directorate of Vocational Higher Education Academic Affairs, 2024).

In practice, IQA at the study program level is predominantly conducted manually through physical documents and fragmented spreadsheets, resulting in delays in report preparation, data inconsistencies, duplicated work, and difficulties in tracing quality-related information. These challenges are especially pronounced at satellite programs such as the Diploma III Information Technology Study Program at the Off-Campus Study Program (PSDKU) of Politeknik Negeri Pontianak in Sukamara Regency, where integrated information systems are essential for academic governance.

Previous studies have found that more than 60% of study programs in Indonesian public universities have not implemented integrated digital quality management systems, leaving quality-related data including learning outcomes, KPIs, tracer study results, and academic activity reports inaccessible in real time. This highlights the urgent need for digital transformation in IQA (Mozin, Agussalim, & Pakaya, 2025). Without adequate digital

support, audit activities tend to become merely administrative procedures with limited contribution to continuous quality improvement.

This study therefore focuses on developing a web-based digital IQA system capable of managing, monitoring, and reporting quality assurance data in a structured and real-time manner. The novelty lies in a digitalization system specifically tailored to study program-level operational needs, incorporating comprehensive features for audit implementation, corrective action monitoring, and automated IQA report generation, while supporting accreditation preparedness in the digital transformation era.

Literature Review

Internal Quality Audit (IQA) is the primary evaluation mechanism within the IQAS in higher education institutions, serving as a fundamental component for assessing whether activities comply with established quality standards. IQA is recognized as the mandatory internal mechanism for assessing compliance with institutional quality standards (Republic of Indonesia, 2025), and requires accurate, well-documented, and easily accessible quality assurance data. Research by Dinul Haq demonstrated that digitalization of academic processes through web-based information systems significantly improves data management efficiency, information accuracy, and effectiveness of activity monitoring (Dinul Haq & Syukri, 2025), providing strong evidence that digitalization is equally essential for IQA management.

An information system is an integrated set of components—people, computers, information technology, and operational procedures—that interact to process data into meaningful information for achieving organizational objectives (Indah Kusuma Dewi, 2019). Digitalization refers to transforming data and activities previously managed through manual methods into digital formats that can be electronically accessed, processed, and stored (Aspariansyah & Suharsono, 2025). Beyond data conversion, digitalization streamlines operational workflows, enhances information accessibility, and supports more effective organizational management.

METHOD

This study employed a Research and Development (R&D) approach using the Waterfall software development model, selected for its structured, sequential methodology well-suited to information system development with clearly defined requirements (Aspariansyah & Suharsono, 2025; Sudrajat & Suharsono, 2024). The Waterfall model comprises five sequential phases: requirements analysis, system design, implementation, testing, and maintenance (Laelaningrum et al., 2018; Ramelia & Jakfar, 2024), as illustrated in Figure 1.

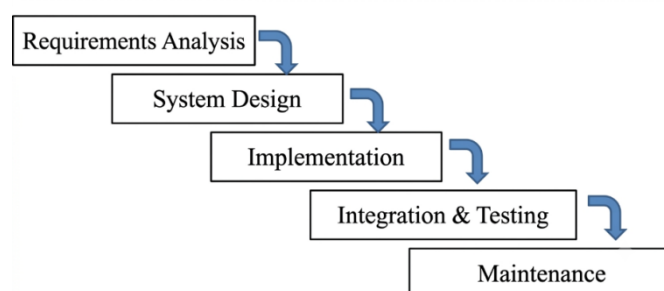


Figure 1. Waterfall Development Stages

The research methodology was implemented through the following stages of the Waterfall software development model:

1. Requirements Analysis

Requirements analysis was conducted through observations and semi-structured interviews with study program administrators, the Internal Quality Assurance Unit, PSDKU staff, and internal auditors to identify quality audit business processes, data requirements, and system features. Document review was also carried out on IQAS standard operating procedures, audit forms, quality indicators, and supporting IQA documents to ensure system alignment with institutional quality assurance requirements.

2. System Design and Implementation

The system design phase involved UI/UX design using Figma and database schema development through Unified Modeling Language (UML) diagrams. The system was implemented using PHP with a MySQL database on a XAMPP web server environment. The system was deployed and tested within the study program's internal network. The developed application integrates nine main modules: Home, Profile, Academic Information, Lecturers and Staff, Students, Research and Community Service, Quality Assurance, Facilities and Infrastructure, and Contact.

3. System Testing

System testing employed two approaches: (1) Black-Box Testing to verify that each functional module operated according to predefined requirements and usage scenarios; and (2) User Acceptance Test (UAT) to assess system feasibility and usability based on end-user perceptions, including study program administrators and lecturers. UAT used a five-point Likert scale questionnaire evaluating four dimensions: usability, reliability, effectiveness, and IQA data management support.

4. Data Analysis

Data analysis employed both qualitative and quantitative approaches. Qualitative analysis was used during requirements gathering to formulate system specifications. Quantitative descriptive analysis was applied to evaluate system performance and user acceptance levels, with findings used to formulate improvement recommendations.

RESULTS AND DISCUSSION

1. System Implementation

The IQA digitalization system was developed as a web-based application comprising nine integrated modules and 31 submenus, as illustrated in Figure 2. The system integrates quality standards management, electronic audit form completion, recording of audit findings and corrective action recommendations, monitoring of corrective action implementation, and automated generation of audit reports. Prior to deployment, user training sessions were conducted to ensure all stakeholders could operate the system effectively..

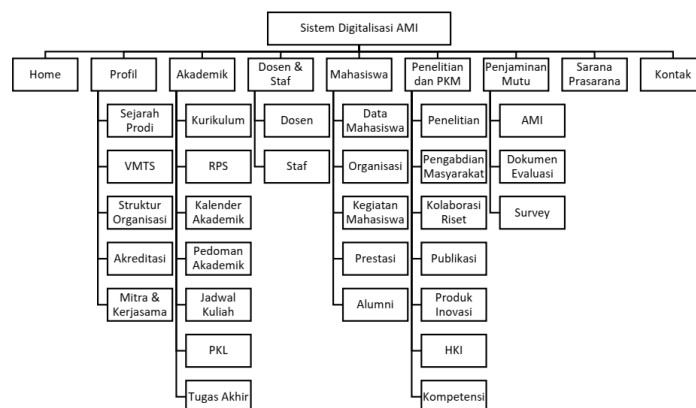


Figure 2. Site Map of the Internal Quality Audit Digitalization System

Figure 2 illustrates the sitemap of the proposed Internal Quality Audit (IQA) digitalization system. The system consists of nine main menus and 31 submenus, providing a comprehensive overview of the application's structure and navigation. The sitemap enables users to understand the overall organization of the system before exploring each module in greater detail.

The system's core modules are described as follows. The Home page serves as the main entry point providing study program information and navigation access. The Profile module contains institutional information including history, vision and mission, organizational structure, accreditation status, and industry partners. The Academic module covers eight submenus supporting teaching and learning, including curriculum, RPS, academic calendar, class schedule, industrial visits, internship, and final project documentation. The Lecturers and Staff module provides personnel directories, while the Students module manages five categories of student data: student records, scholarships, activities and organizations, achievements, and alumni information. The Research and Community Service module serves as a repository for scholarly outputs, community engagement activities, and publications.

The Quality Assurance module constitutes the central component of the system (Figure 3).



Figure 3. Quality Assurance Page View

It integrates three submenus: Internal Quality Audit (IQA), Self-Evaluation, and Stakeholder Satisfaction Survey. This module enables integrated management of audit documentation, self-evaluation records, and stakeholder survey results, supporting evidence-based quality governance.

The Facilities and Infrastructure module provides information on campus buildings, classrooms, laboratories, and library facilities. The Contact module facilitates communication between the study program and its stakeholders through institutional contact information and an embedded Google Maps interface.

Overall, the developed system integrates academic information, quality assurance documentation, stakeholder services, and IQA management into a single platform, contributing to improved quality governance and accreditation preparedness.

2. Black-Box Testing Results

Black-Box Testing was conducted to verify that all system functionalities operated in accordance with the specified functional requirements. Testing focused on validating system behavior from the user's perspective across all modules, including data input, interface navigation, information retrieval, and access to quality assurance documentation. To improve readability, the 30 individual test cases are consolidated into 10 grouped scenarios by main module in Table 1.

Table 1. Black-Box Testing Results (Grouped by Module)

N o	Menu / Submenu	Test Scenario	Expected Result	Status
1	Home	Click Home from navbar	Home page displays study program main information	✓
2	Profile (History, Vision & Mission, Org. Structure, Accreditation, Partners)	Click each Profile submenu	Respective pages display correct institutional information	✓
3	Academic (Curriculum, RPS, Academic Calendar, Guidelines, Schedule, Industrial Visit, Internship, Final Project)	Click each Academic submenu	Corresponding academic pages and documents display correctly	✓
4	Lecturers & Staff (Lecturers, Staff)	Click Lecturers and Staff menus	Lecturer and staff directory information displayed	✓
5	Students (Data, Scholarship, Activities, Achievements, Alumni)	Click each Students submenu	Student-related information pages display correctly	✓
6	Research & PKM (Research, Community Service, Research Collaboration, Publications, Innovation, IPR, Awards)	Click each Research submenu	Research and community service pages display correctly	✓

No	Menu / Submenu	Test Scenario	Expected Result	Status
7	Quality Assurance – Internal Quality Audit (IQA)	Click Quality Assurance → Internal Quality Audit	IQA management module displays with audit documents	✓
8	Quality Assurance – Self-Evaluation & Survey	Click Self-Evaluation and Survey Kepuasan submenus	Self-evaluation and satisfaction survey pages display correctly	✓
9	Facilities & Infrastructure	Click Facilities & Infrastructure menu	Campus building layout and facility information displayed	✓
10	Contact	Click Contact menu	Contact page with map and institutional contact info displayed	✓

As summarized in Table 1, all 30 functional test scenarios (10 grouped by main module) were successfully executed, with each module producing outputs consistent with the predefined expected results. These findings confirm that the proposed IQA digitalization system satisfies its functional requirements and is ready for operational deployment. Several minor interface refinements were implemented following testing to improve readability and navigation; however, these did not affect overall system functionality.

3. User Acceptance Test (UAT) Results

A User Acceptance Test (UAT) was conducted to evaluate user perceptions across four dimensions: usability, reliability, effectiveness, and IQA data management support. Respondents comprised students, lecturers, and study program administrators actively involved in quality assurance activities. Responses were collected using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) and analyzed using descriptive statistics. The complete UAT results are presented in Table 2.

Table 2. User Acceptance Test (UAT) Results

No	UAT Dimension / Item	Mean Score	Category	%
A. Usability				
1	Interface is easy to understand and consistent	4.2	Good	84%
2	Navigation menus are clear and easy to use	4.3	Good	86%
3	Language and terms understandable by non-technical users	4.3	Good	86%
4	Time required to complete common tasks is reasonable	4.2	Good	84%

No .	UAT Dimension / Item	Mean Score	Category	%
5	Upload/contact forms are easy to fill with helpful validation	4.1	Good	82%
B. Reliability				
6	System is stable; pages open without errors/404	5.0	Very Good	100%
7	Document upload/download works without file corruption	5.0	Very Good	100%
8	System saves and displays data accurately	5.0	Very Good	100%
9	Notifications/confirmations are reliably delivered	5.0	Very Good	100%
C. Effectiveness				
10	System facilitates completion of main tasks	4.7	Very Good	94%
11	Search/filter features help locate data quickly	4.3	Good	86%
12	Monitoring dashboard displays useful information	4.3	Good	86%
13	Role-based access ensures users see only relevant functions	4.7	Very Good	94%
D. IQA Data Management Support				
14	System facilitates preparation of IQA documents	4.7	Very Good	94%
15	System provides adequate audit trail	4.3	Good	86%
16	Data availability for accreditation/IQA improved after using the system	4.7	Very Good	94%
17	System facilitates collaboration and communication during IQA	4.3	Good	86%
E. Overall Satisfaction				
18	Overall satisfaction with the system	4.4	Good	88%
	Overall Average	4.36	Good	87.2%

Based on Table 2, the UAT yielded an overall user acceptance score of 87.2% (mean 4.36), demonstrating a very high level of user acceptance. The reliability dimension achieved the highest score (100%), confirming the system's capability to maintain data consistency, execute document operations without errors, and deliver accurate information. The IQA data management support dimension also scored highly (average 90%), indicating

the system effectively meets the core operational needs of audit documentation and accreditation preparation. The graphical representation of UAT results is presented in Figure 4.

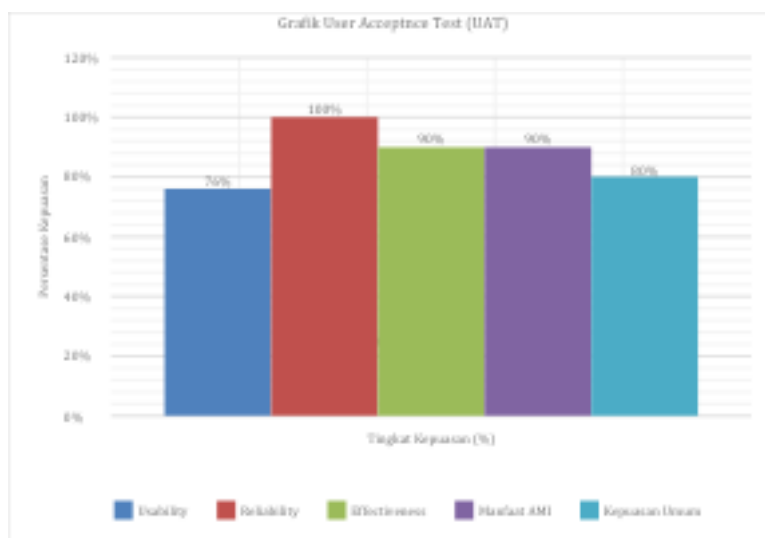


Figure 4. UAT Results by Dimension

The high overall acceptance score indicates that the system effectively meets users' operational needs. The positive evaluations across all dimensions confirm the system's potential to improve IQA process efficiency while facilitating evidence-based quality management. Specifically, the system provides the following benefits: (1) accelerating the preparation of audit reports through centralized document management; (2) facilitating real-time monitoring and tracking of corrective actions; (3) improving traceability of quality assurance documents through a unified digital repository; and (4) reducing dependence on paper-based documentation.

The implementation results demonstrate that digitalization of IQA at the study program level significantly improves the efficiency and transparency of quality assurance governance. This study extends existing knowledge by developing a digital quality assurance system specifically tailored to study program-level operational requirements—rather than at the broader institutional level—thereby addressing a research gap in the digitalization of IQA processes within the smallest academic unit in higher education. These findings are consistent with previous research reporting that audit process digitalization improves efficiency, accuracy, and operational effectiveness (Mozin et al., 2025).

Despite these promising results, the study has limitations. The system was evaluated within a single study program involving a limited number of users; findings may therefore not be directly generalizable to other institutions. Future research should involve multi-institutional implementation, integration with academic information systems, and incorporation of intelligent analytics for predictive quality assurance.

CONCLUSION

This study successfully developed a web-based IQA digitalization system using the Waterfall model, designed to address the limitations of conventional audit processes

relying on physical documents and fragmented data storage. The system integrates quality assurance documents into a unified repository with nine main modules and 31 submenus, enabling more efficient, organized, and accessible quality data management at the study program level.

Black-Box Testing confirmed that all system modules operated according to functional specifications without errors. The UAT yielded an overall acceptance score of 87.2%, with the reliability dimension achieving 100%—demonstrating the system's capability to maintain data consistency and support reliable quality assurance processes. User feedback indicated that improvements to the UI and visual readability would further enhance usability.

Future development should focus on refining the interface design, integrating the system with institutional academic information systems, and incorporating intelligent analytics for predictive quality assurance. Overall, the proposed system provides an effective solution for improving the efficiency, accuracy, transparency, and accountability of quality assurance management at the study program level, contributing to the existing literature on study program-oriented digital quality assurance systems.

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