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Implementation of an Informatics-Based QMS Dashboard in the Campus Environment

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Dashboard; QMS; campus; information system; quality management.

Abstract
The implementation of a Quality Management System (QMS) in higher education institutions is an essential step to ensure the quality of education, research, community service, and administrative governance. However, QMS processes that are still carried out manually often create barriers such as delays in reporting, scattered data, and limited transparency. This study aims to design and implement an informatics-based QMS Dashboard as a solution for integrating quality data within higher education institutions. The research method used was Research and Development (R&D) with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). Data were collected through observations, interviews, and questionnaires involving 120 respondents from the academic community. The system was designed as a web-based application using the Laravel framework, MySQL database, and Chart.js for interactive data visualization. The findings show that the QMS Dashboard significantly improves the efficiency of quality management. Accreditation report preparation time decreased by up to 40%, user satisfaction reached 87%, and the effectiveness of quality evaluation increased substantially. Respondents stated that the system excels in accessibility, transparency, and data integration. Thus, the implementation of an informatics-based QMS Dashboard has proven effective in strengthening quality culture, enhancing transparency, and expediting decision-making processes in higher education. This system can serve as a reference for other institutions to support digital transformation in educational quality assurance systems.

INTRODUCTION

The quality of higher education is a crucial element in building national competitiveness in the era of globalization. Higher education institutions are not only required to produce competent graduates but also ensure that all academic, research, community service, and administrative activities operate according to established quality standards (Bagdasarian et al., 2019; Okolie et al., 2019; Suleiman, 2023). In this context, a Quality Management System (QMS) functions as a framework to ensure consistency in quality and to support the achievement of both national and international standards (Aithal & Maiya, 2023; Asiyai, 2022; Martin, 2018).

However, the implementation of QMS in many universities in Indonesia still faces several obstacles. Most quality-related processes are still conducted manually using printed reports, spreadsheets, or unintegrated digital files. This situation leads to several issues, such as:

1. **Delayed evaluations** – slow data collection hampers timely quality analysis.
2. **Scattered data** – quality indicators are fragmented across units without integration.

3. **Lack of transparency** – quality-related information is limited to certain stakeholders.
4. **Accreditation difficulties** – preparing self-evaluation and accreditation reports takes significant time.

On the other hand, advancements in information technology offer great opportunities to increase the efficiency of quality management (de Carvalho et al., 2020; Pérez-Aróstegui et al., 2015). One potential innovation is the dashboard—a data visualization tool that enables real-time monitoring of quality performance. Through dashboards, quality indicators can be presented interactively, making it easier for university leaders, lecturers, students, and staff to access and understand academic quality information.

Globally, many leading universities utilize quality dashboards to facilitate evidence-based decision-making (Bergamaschi et al., 2025; Hysong et al., 2023). For example, Harvard University uses an Institutional Dashboard to monitor academic and research performance, while the National University of Singapore has developed an internal quality dashboard to meet international accreditation standards. This phenomenon reflects the importance of integrating QMS with information technology as a strategic step to face global competition in higher education (Dugarova et al., 2016; Lysokon et al., 2024; Yusup, 2025; Živković et al., 2026).

Therefore, this study focuses on the implementation of an informatics-based QMS Dashboard in Indonesian university settings. The objectives are:

1. To design a QMS dashboard tailored to institutional needs.
2. To implement a dashboard system for managing academic, research, community service, and administrative quality data.
3. To evaluate the system's effectiveness in improving efficiency, transparency, and user satisfaction.

Through this research, it is expected that universities in Indonesia can adopt a digital quality assurance system that aligns with the demands of the technological era.

The urgency of implementing a digital quality management system is further underscored by the increasing demands from national accreditation bodies such as BAN-PT (*Badan Akreditasi Nasional Perguruan Tinggi*). Accreditation evaluations now require comprehensive data submissions that are often difficult to compile from fragmented manual records. Institutions that fail to maintain updated and well-organized quality data risk receiving lower accreditation scores, which in turn affects their reputation, student enrolment, and access to government funding. A centralized dashboard system directly addresses these structural weaknesses by consolidating data from various academic units into a single accessible platform.

Furthermore, the concept of a quality dashboard is well-grounded in established theoretical frameworks. The Balanced Scorecard (BSC) approach, originally developed by Kaplan and Norton (1992), introduced the idea of monitoring organizational performance across multiple dimensions simultaneously. Applied to higher education, this framework supports the monitoring of academic outcomes, financial health, internal processes, and stakeholder satisfaction in an integrated manner. The QMS Dashboard developed in this research is conceptually aligned with BSC principles, adapted specifically for the context of Indonesian higher education institutions and their unique regulatory environment.

The purpose of this study is to implement an informatics-based QMS Dashboard in Indonesian university settings. The specific objectives are to: (1) design a QMS dashboard tailored to institutional needs; (2) implement a dashboard system for managing academic, research, community service, and administrative quality data; and (3) evaluate the system's effectiveness in improving efficiency, transparency, and user satisfaction. The contribution of this research is threefold: (1) it provides a practical, evidence-based framework for digital quality management in higher education; (2) it demonstrates the effectiveness of the ADDIE model for developing educational information systems; and (3) it offers empirical data on the

impact of dashboard implementation on quality assurance processes. The benefits of this research include improved efficiency in quality monitoring and accreditation reporting, enhanced transparency in quality data access, greater participation from the academic community in quality assurance efforts, and a strategic solution for addressing digitalization challenges in quality assurance processes. Through this research, it is expected that universities in Indonesia can adopt a digital quality assurance system that aligns with the demands of the technological era.

From a technological standpoint, the shift toward digital quality assurance is consistent with Indonesia's national higher education policy direction. The Ministry of Education, Culture, Research, and Technology has increasingly emphasized the importance of data-driven governance and digital transformation in higher education through various strategic programs. Universities are now encouraged to leverage information systems not only for administrative efficiency but also for continuous quality improvement as mandated under Government Regulation No. 4 of 2014 on the Organization of Higher Education. The QMS Dashboard thus represents a practical and policy-aligned tool for fulfilling these institutional obligations.

RESEARCH METHOD

Research Design

This study used a Research and Development (R&D) approach adopting the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). This model effectively organizes system design steps, implementation processes, and evaluation activities.

Research stages:

1. **Analysis** – identifying user needs and issues in the existing quality system.
2. **Design** – designing system architecture, modules, and dashboard data flow.
3. **Development** – building the web-based system using the Laravel framework.
4. **Implementation** – implementing the dashboard in three faculties as a pilot test.
5. **Evaluation** – measuring system effectiveness through testing and user surveys.

Participants and Research Location

The study was conducted at a public university in Indonesia. A total of **120 respondents** participated:

- 40 lecturers
- 60 students
- 20 administrative staff

Data Collection Techniques

- **Observations**: to identify existing challenges in quality data processing.
- **Interviews**: with heads of quality assurance units, deans, and program coordinators.
- **Questionnaires**: to assess user satisfaction after dashboard implementation.

Research Instruments

A Likert-scale questionnaire (1–5) was used covering indicators: usability, visual design, access speed, data accuracy, and overall satisfaction.

System Development

- **Platform**: Web-based using Laravel
- **Database**: MySQL
- **Security**: Role-based authentication (admin, lecturer, student)

Main Features

1. Monitoring Key Performance Indicators (KPI)
2. Accreditation and self-evaluation reporting
3. Student and lecturer satisfaction data
4. Research and publication database
5. Facilities and administration management

Visualizations
Interactive graphs using Chart.js.
Data Analysis
- **Quantitative data**: descriptive statistics (mean, percentage).
- **Qualitative data**: thematic analysis to identify major response patterns.

The selection of the ADDIE model was deliberate, as it is one of the most widely used instructional and systems design models in educational technology research. Unlike waterfall software development models, ADDIE incorporates iterative feedback mechanisms at each stage, allowing developers to refine the system based on user input before advancing to the next phase. In the context of this research, the Analysis phase involved structured interviews with heads of quality assurance units across three faculties to map existing pain points in quality reporting and data management. The outcomes of these interviews directly informed the design specifications developed in the subsequent phase.

During the Development phase, the Laravel PHP framework was chosen for its robust Model-View-Controller (MVC) architecture, which enables clean separation of data logic and user interface layers. The use of MySQL as the relational database management system was motivated by its compatibility with Laravel's Eloquent ORM and its proven reliability in handling concurrent multi-user environments. Chart.js was integrated for data visualization because it provides a lightweight, browser-native solution for rendering interactive charts without requiring additional server-side rendering processes, thereby optimizing load performance on lower-bandwidth connections common in many Indonesian university campuses.

The pilot implementation was conducted across three faculties: the Faculty of Engineering, the Faculty of Business and Economics, and the Faculty of Information Technology. These faculties were selected because they represent different levels of digital readiness and user demographics, providing a more representative sample for system evaluation. During the Implementation phase, users received a two-day onboarding training covering system navigation, data input procedures, and report generation. The Evaluation phase then gathered user feedback through structured questionnaires administered two weeks after the system was put into regular use, ensuring that initial novelty bias had dissipated and responses reflected genuine usability assessments.

RESULTS AND DISCUSSION

Research Findings

Needs Analysis

Initial observations revealed:
- 78% of units still use manual reports
- 65% find it difficult to access cross-unit quality data
- 70% state that accreditation report preparation is time-consuming

Dashboard Design

The QMS Dashboard includes five main modules:
1. **Academic** – teaching evaluations, student satisfaction, lecturer performance
2. **Research & Community Service** – publications, grants, service activities
3. **Accreditation** – self-evaluation, accreditation documents
4. **Administration** – service satisfaction, staffing, facilities
5. **Quality Reports** – real-time quality performance indicators

System Testing

Table 1 User Satisfaction Table

Indicator	Satisfaction
Usability	87%
Visual design	82%
Access speed	85%
Data accuracy	84%
Overall satisfaction	87%

Average User Satisfaction: 85%

Implementation Impact

1. Accreditation report time reduced from **3 months to 1.8 months**
2. Real-time data access increased to **90% of units**
3. Transparency improved students and lecturers can see evaluation results directly

The implementation of an informatics-based QMS Dashboard has shown a significant positive impact on quality management processes in higher education. First, it reduces manual workload and enhances the efficiency of quality assurance processes. Second, transparency improves because all units can access quality information according to their access rights.

This aligns with Total Quality Management (TQM) principles emphasizing the involvement of all organizational components in continuous quality improvement. With the dashboard, participation becomes more active as users can monitor institutional performance independently.

Compared to previous research (Susanto, 2018; Tjiptono & Diana, 2020), this study strengthens the argument that information systems increase data accuracy and operational efficiency. However, the novelty of this research lies in the use of real-time visual analytics that support evidence-based decision-making.

Despite its benefits, challenges remain in terms of digital literacy and the need for robust internet infrastructure. Regular training and proper technical support are essential to optimize system usage.

Future dashboard development may include predictive analytics for performance forecasting and integration with Learning Management Systems (LMS) to enhance online learning activities.

Additionally, the QMS Dashboard strengthens institutional governance and quality culture. It enables proactive management, real-time detection of performance issues, and data-driven policy design. The system also enhances accreditation processes by automating document preparation, reducing input errors, and accelerating validation (Anderson & Krathwohl, 2001; Bell, 2010; Susanto, 2018; Tjiptono & Diana, 2020).

Organizationally, the system fosters collaboration between IT units and quality assurance units, building a shared sense of responsibility toward maintaining institutional quality standards.

A closer examination of the user satisfaction data reveals meaningful patterns across different user groups. Lecturers reported the highest levels of satisfaction with the data accuracy indicator (88%), citing improved confidence in using dashboard-generated reports as supporting evidence in academic reviews. Students, on the other hand, showed greater appreciation for the visual design and accessibility features, noting that the intuitive interface allowed them to track their own evaluation scores and academic standing without requiring technical expertise. Administrative staff gave the highest ratings to access speed (89%), reflecting the practical efficiency gains experienced in day-to-day reporting workflows. These group-specific insights suggest that the system's multi-role architecture was well-calibrated to the distinct information needs of each stakeholder category.

The reduction in accreditation report preparation time from three months to 1.8 months is one of the most concrete and measurable outcomes of this implementation. This improvement is attributable to two key system features: the automated aggregation of quality indicator data from all faculties into a centralized repository, and the availability of pre-configured report templates aligned with BAN-PT accreditation criteria. Previously, the collection and verification of data from multiple units required extensive inter-departmental coordination, manual data entry, and repeated review cycles. The dashboard streamlines this process by enabling real-time data updates by faculty administrators, with validation alerts that flag missing or inconsistent entries before reports are finalized. This reduces the administrative burden on the Quality Assurance Unit and allows more time to be devoted to substantive quality analysis rather than data gathering.

Qualitative feedback gathered during follow-up interviews further enriched the quantitative findings. Several faculty deans highlighted that the dashboard enabled them to identify underperforming departments earlier in the academic semester, allowing corrective interventions to be made before annual reviews. Program coordinators noted that the research and publication tracking module had increased awareness of faculty publication targets and motivated lecturers to contribute more actively to indexed journals. These behavioural changes suggest that the dashboard functions not only as a passive reporting tool but also as an active driver of quality culture within the institution. This aligns with the concept of management by visibility, wherein making performance data openly accessible creates social accountability and encourages self-regulation among academic staff.

It is also worth noting that the system encountered several implementation challenges that merit acknowledgment. A subset of users, particularly among older administrative staff, reported initial difficulties in navigating the dashboard interface despite training. This highlights the continued importance of digital literacy programs as a prerequisite for successful technology adoption in educational institutions. Additionally, some faculty reported intermittent performance issues during peak usage periods, pointing to the need for server infrastructure upgrades before institution-wide scaling. These challenges, while manageable, underscore that the success of a digital quality system depends not only on software design but also on organizational readiness, infrastructure support, and sustained capacity-building efforts.

CONCLUSION

The implementation of an informatics-based QMS Dashboard in higher education institutions has proven effective in improving efficiency in quality monitoring and accreditation reporting. It also enhances transparency and supports greater participation from the academic community in quality assurance efforts. With an 85% average satisfaction rate, the system demonstrates strong acceptance and positive impact. Therefore, the QMS Dashboard can be considered a strategic solution in addressing the challenges of digitalizing quality assurance processes. For future studies, it is recommended to test the system across more institutions and incorporate predictive analytics for more comprehensive quality forecasting. The significance of this research extends beyond the technical achievement of building a functional web-based system. More importantly, it demonstrates that a carefully designed and contextually adapted digital tool can catalyze institutional change in higher education quality governance. The QMS Dashboard has not only reduced administrative workload but has also shifted the organizational mindset toward a more data-oriented culture of quality management. When quality indicators are made visible and accessible to all stakeholders, accountability becomes embedded in daily institutional practices rather than confined to periodic review cycles. This cultural dimension is arguably the most lasting contribution of the system's implementation. From a policy perspective, this research

recommends that higher education institutions in Indonesia treat digital quality management systems not as optional enhancements but as foundational infrastructure for institutional governance. The Ministry of Education and relevant accreditation bodies are encouraged to develop standardized guidelines for QMS dashboard implementation, including minimum data standards, interoperability requirements, and security protocols. Such guidelines would facilitate the development of compatible systems across institutions and eventually enable cross-institutional benchmarking of educational quality indicators, which is currently a significant gap in the Indonesian higher education landscape. In summary, the QMS Dashboard implemented in this study represents a meaningful step forward in the digitalization of quality assurance in Indonesian higher education. The combination of user-cantered design, appropriate technology selection, and systematic evaluation methodology produced a system that is both functionally effective and broadly accepted by its users. The lessons learned from this implementation including the importance of stakeholder involvement, iterative development, and post-deployment training provide valuable guidance for institutions embarking on similar digital transformation initiatives. As higher education continues to evolve in response to global challenges, tools such as the QMS Dashboard will play an increasingly vital role in ensuring that quality remains at the core of institutional identity and mission.

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