



Further Development of an Integrated Web-Based Information System Supporting Tri Dharma at an Indonesian Aviation Academy

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Abstract. Digital transformation requires higher education institutions to integrate academic, research, and community-service data into systems that are efficient, traceable, and easy to use. This study reports the further development of an integrated web-based information system at Akademi Penerbang Indonesia Banyuwangi to strengthen the management of Tri Dharma activities. The study applied a Research and Development design combining qualitative needs identification with quantitative post-development user evaluation. Initial needs were identified through observation and interviews with five lecturers and five education staff. The improved system integrated activity data, strengthened monitoring and reporting, and added research-budget management functions, including budget-component input, PDF export, financial approval, and revision notes. The developed system was subsequently evaluated by 28 respondents selected from a population of 30 users using a five-point Likert questionnaire consisting of 15 items. The overall mean score was 4.45, which falls within the 'strongly agree' category. The highest mean score was 4.57 for easier access to academic information and support for research management, while data security received the lowest mean of 4.25 but remained in the same category. The findings indicate that the continued development improves usability, data-management efficiency, and institutional coordination while highlighting security as a priority for further enhancement.

Keywords: Digital transformation; Higher education; Integrated information system; Research and development; Tri Dharma.

1. INTRODUCTION

Digital transformation has moved higher education administration toward connected processes for teaching, research, community engagement, monitoring, and decision making. Institutional value is strongest when technology is aligned with organizational processes, user capabilities, and governance rather than implemented as an isolated application (Aditya et al., 2021; Nurhas et al., 2022; Fernandez et al., 2023). At the same time, fragmented data, weak interoperability, infrastructure constraints, and limited user involvement can reduce the benefits of digitalization (Gkrimpizi et al., 2023; Ntorukiri et al., 2022). Integrated information systems are therefore important because they allow data to be entered, traced, and reused across related institutional activities.

In Indonesia, this need is closely related to Tri Dharma Perguruan Tinggi: education, research, and community service. These activities generate connected records such as proposals, budgets, approvals, supporting documents, monitoring data, and reports. When the records are handled through separate files or repeated manual input, institutions face duplication and slower verification. Research information management studies show that integrated systems can improve storage, reporting, and reuse of research data, but their success depends on data quality, usefulness, and ease of use (Azeroual et al., 2020; Stvilia et al., 2021).

Indonesian studies likewise show that web-based systems can simplify monitoring and documentation of research and Tri Dharma performance (Musrifah, 2022; Prahara et al., 2023).

Akademi Penerbang Indonesia Banyuwangi (APIB) had already implemented an integrated website for documenting lecturer Tri Dharma activities. Experience with the existing system, however, showed that data exchange among modules, real-time monitoring, repeated administrative input, and research-budget verification still needed improvement. Because digital transformation is iterative, an implemented platform must continue to evolve as workflows and user needs change (Bygstad et al., 2022; Du et al., 2023). This study therefore develops the existing platform further by strengthening integration, monitoring, research-budget workflow, and information access, then evaluates user responses to the improved functions. The objective is to describe the development, assess user acceptance, and identify priorities for the next development cycle.

2. LITERATURE REVIEW

An integrated information system connects data, processes, and user roles so that information can be entered once and reused across functions. Higher education systems are especially complex because academic, financial, research, and service processes are interdependent and require interoperability (Pereira et al., 2021). For a Tri Dharma platform, integration therefore requires consistent data flows, clear authorization, traceable approval, and outputs for monitoring and reporting. Usability is equally important: a technically complete system can remain underused when navigation is difficult or users perceive limited benefit. Studies of academic information systems associate usefulness, ease of use, trust, and service quality with user satisfaction (Huang et al., 2021; Zaineldeen & Hongbo, 2021; Rahmat et al., 2021). Direct user evaluation can also reveal practical design problems that technical testing alone may miss (Abdulquadir et al., 2023).

3. RESEARCH METHOD

This study used a Research and Development (R&D) design to refine the existing APIB web-based information system. The source study combines qualitative and quantitative procedures; accordingly, the development is presented as a sequence of needs identification, design, implementation, functional testing, and user evaluation. Initial needs were identified through observation and interviews with 10 participants, consisting of five lecturers and five education staff. Development priorities included database integration, research-budget preparation, PDF output, financial verification, revision communication, monitoring, and

information accessibility. The evaluation population comprised 30 potential users. Using the Slovin calculation with a 5% error level, 28 respondents were included. They completed a 15-item questionnaire using a five-point Likert scale. Descriptive analysis summarized response frequencies and means; scores of 4.21-5.00 were interpreted as strongly agree, 3.41-4.20 as agree, 2.61-3.40 as moderately agree, 1.81-2.60 as disagree, and 1.00-1.80 as strongly disagree.

4. RESULTS AND DISCUSSION

System Development Outcomes

The continued development retained the existing integrated website and focused on functions that previously required repeated administrative work. The main addition was a structured Research Budget Plan (RAB) workflow. Users can enter budget components, items, units, volume, prices, and totals, then generate a PDF document. Finance administrators can review submitted budgets, approve compliant submissions, or return them with revision notes. This creates a traceable interaction between researchers and finance staff while reducing dependence on separate files and informal communication. The result extends prior Indonesian web-based research and Tri Dharma systems by connecting proposal administration with budget preparation, verification, revision, and reporting in one workflow (Musrifah, 2022; Prahara et al., 2023).

Table 1. Main Functions Added or Strengthened in the Continued Development.

Function	Operational role	Expected institutional benefit
Structured RAB input	Records components, items, units, volume, prices, and totals	More consistent budget preparation and fewer manual calculation errors
RAB PDF output	Generates a downloadable budget document	Simplifies proposal documentation and reporting
Financial approval	Enables finance administrators to review and approve submissions	Improves accountability and traceability of verification
Revision notes	Returns a submission with specific correction notes	Supports documented communication between users and finance staff
Integrated monitoring	Connects research activity data with supporting administrative records	Faster access to information for monitoring and institutional reporting

User Evaluation

The post-development evaluation involved 28 respondents and 15 items, producing 420 responses. A total of 236 responses (56.19%) were rated 5, 139 (33.10%) were rated 4, 43 (10.24%) were rated 3, two (0.48%) were rated 2, and none were rated 1. The weighted score was 1,869, giving an overall mean of 4.45 in the strongly agree category. Thus, 89.29% of all responses were in the two most positive categories, indicating broad approval of the improved system.

The highest item mean was 4.57 for easier access to academic information and for support to lecturers and staff in research management. These results indicate that the development met its main operational purpose: simplifying information access and research administration. The lowest mean was 4.25 for data security. Although still within the strongly agree category, security should remain a priority because the platform stores academic, research, financial, and administrative information. Digital-transformation research identifies security, infrastructure, and governance as continuing higher education challenges (Gkrimpizi et al., 2023; Ntorukiri et al., 2022). Future iterations should therefore strengthen access control, role-based permissions, backup, audit logs, and vulnerability review.

The results also support iterative user evaluation. Higher education usability studies show that user feedback can reveal design opportunities not captured by functional testing alone (Abdulquadir et al., 2023). Although the present instrument was not a standardized System Usability Scale, its 15 statements covered access, interface clarity, functionality, integration, information retrieval, efficiency, security, and satisfaction. The consistently high scores indicate positive acceptance, while differences among items provide a practical basis for the next development cycle (Nurhas et al., 2022).

Table 2. Summary of User Evaluation Results.

Indicator	Result	Interpretation
Overall mean	4.45	Strongly agree
Highest mean: easier academic-information access	4.57	Strongly agree
Highest mean: support for research management	4.57	Strongly agree
Lowest mean: data security	4.25	Strongly agree; priority for improvement
Responses rated 4 or 5	89.29%	Dominantly positive user response

Implications for Institutional Management

From a management perspective, the main contribution is the conversion of fragmented administrative actions into a traceable workflow. Integrated data entry, budgeting, review, revision, and reporting can reduce duplicated work and improve coordination among lecturers, administrators, and managers. This is consistent with the view that digital platforms become strategically valuable when they connect institutional actors and data rather than operating as isolated applications (Pereira et al., 2021; Du et al., 2023). The findings, however, are based on 28 users from one institution and descriptive Likert analysis. They should therefore be interpreted as user perceptions, not causal evidence of productivity gains. Future evaluation should combine usability metrics, system logs, completion time, error rates, security testing, and multi-institution comparisons.

5. CONCLUSION AND SUGGESTIONS

The further development of the integrated web-based information system at Akademi Penerbang Indonesia Banyuwangi strengthened support for Tri Dharma administration by improving data integration, monitoring, information access, and research-budget workflow. Added functions included structured RAB input, PDF output, financial approval, and documented revision notes. Evaluation by 28 respondents produced an overall mean of 4.45 (strongly agree). The highest mean of 4.57 concerned academic-information access and research management, while security received the lowest mean of 4.25 but remained positively evaluated. The system is therefore useful and well accepted in its institutional context. Further work should prioritize security, interoperability, automated reporting, standardized usability testing, and broader evaluation across institutions.

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