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Agile-Based Integrated Community Information System With Marketplace Feature: Empirical Evaluation in the Papuan Student Community of Sriwijaya (Kompas)

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Abstract

Papuan students in South Sumatra face challenges related to fragmented communication, limited information accessibility, and low participation in organizational activities. The absence of an integrated digital platform has reduced coordination efficiency within the Papuan Student Community of Sriwijaya (KOMPAS). This study aims to design and empirically evaluate an Agile-based integrated web information system incorporating digital governance and marketplace features to enhance organizational performance and engagement. The system was developed using the Agile methodology through five iterative sprints over a ten-month period involving 15 organizational stakeholders and 75 active members. The platform was implemented using Laravel and MySQL within a three-tier architecture framework. Evaluation procedures included functional testing, performance analysis, and usability assessment using the System Usability Scale (SUS). The results indicated an average page load time of 1.2 seconds (desktop) and 2.8 seconds (mobile), with a PageSpeed score of 94 and 85% unit test coverage. The system achieved a SUS score of 82.5, categorized as excellent usability. After one month of implementation, information accessibility increased from 24% to 76%, participation rose from 38% to 62%, and member engagement improved from 31% to 73%. The marketplace module recorded 23 transactions totaling Rp 8,500,000. These findings demonstrate that integrating digital governance mechanisms with marketplace functionality significantly enhances coordination, engagement, and economic participation in student-based community organizations.

Keywords

Agile Methodology; Community Information System; Digital Governance; Marketplace Integration; System Usability Scale; Student Organization

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Introduction

Digital transformation has significantly influenced organizational governance models, including student-based communities (Vial, 2019). Effective information systems improve coordination, transparency, and engagement (DeLone & McLean, 2003). However, many student organizations still rely on informal communication platforms that lack structured archival mechanisms and governance control.

The Papuan Student Community of Sriwijaya (KOMPAS), established on June 13, 2013, functions as a socio-academic support organization for Papuan students in South Sumatra. Despite having more than 150 active members, organizational coordination remained fragmented. A preliminary survey conducted in October 2025 involving 75 members revealed that 68% experienced difficulty accessing organizational information, 72% were not well-informed about activity schedules, and 81% required a centralized digital platform.

According to the Information Systems Success Model, system quality and information quality directly influence user satisfaction and organizational impact (DeLone & McLean, 2003). Furthermore, technology adoption is strongly influenced by perceived usefulness and perceived ease of use (Venkatesh et al., 2012). Recent studies emphasize the importance of integrating digital governance and agile development approaches to improve organizational adaptability (Lee & Kim, 2022; Hafeez et al., 2025).

Previous research on community information systems primarily focused on communication and documentation features without integrating economic empowerment mechanisms such as marketplace functionality (Zhang & Liu, 2023). Therefore, this study proposes an integrated digital ecosystem combining governance, communication, and marketplace features within a single Agile-developed platform.

Methodology

Research design

This study employed the Agile software development methodology (Beck et al., 2001), which emphasizes iterative refinement, stakeholder collaboration, and adaptive development cycles. Agile approaches are particularly suitable for dynamic organizational environments requiring continuous feedback and system adjustment (Abdillah & Handayani, 2023; Lee & Kim, 2022).

System development was conducted over ten months (January–October 2025).

Development Phases

Development was structured into five sprints:

1. Authentication and dashboard module
2. Content management system implementation
3. Marketplace feature integration
4. Work program and resource management module
5. System integration and optimization

The planning phase included semi-structured interviews with 15 organizational officials and a survey of 75 members, resulting in the identification of 42 user stories prioritized using the MoSCoW method.

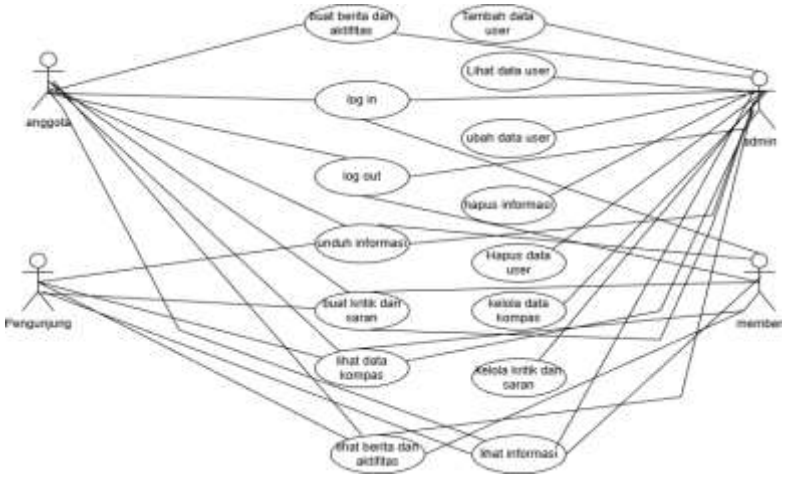

Figure 1. Use Case Diagram Of Kompas Information System

As illustrated in Figure 1, the system involves three primary actors: visitor, member, and administrator, each interacting with specific modules including authentication, content management, and marketplace transactions.

Testing and Evaluation

Testing procedures included:

- Unit testing (85% coverage)
- Integration testing
- Performance testing using PageSpeed metrics
- Usability testing using the System Usability Scale (SUS)

The combination of performance metrics and usability evaluation provides comprehensive system validation (Negara, 2022).

Results

System Architecture

The system adopts a three-tier architecture comprising the presentation layer, business logic layer, and data layer. The Laravel MVC framework ensures maintainability and scalability. The database structure consists of 18 normalized tables (Third Normal Form).

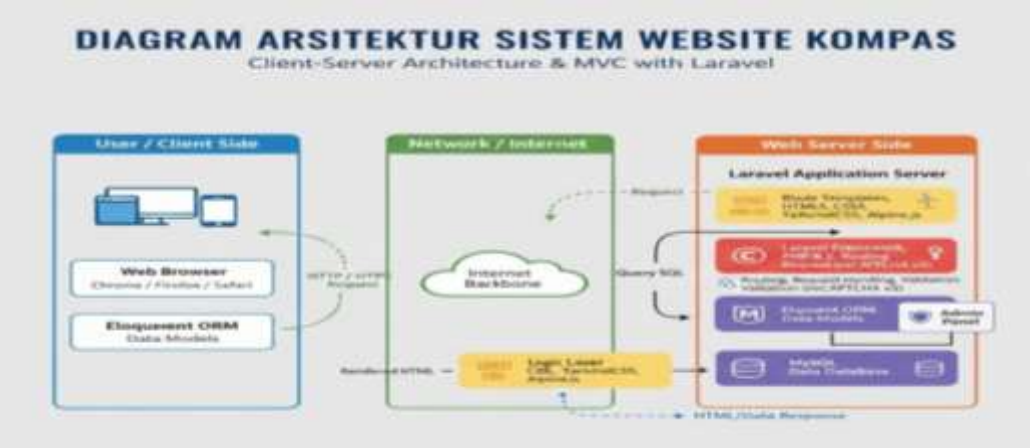

Figure 2. Thee-tier Architecture and MVC Framework Implementation

Figure 2 demonstrates the separation of concerns implemented through the three-tier architecture, consisting of the presentation layer, business logic layer, and data layer integrated within the Laravel MVC framework.

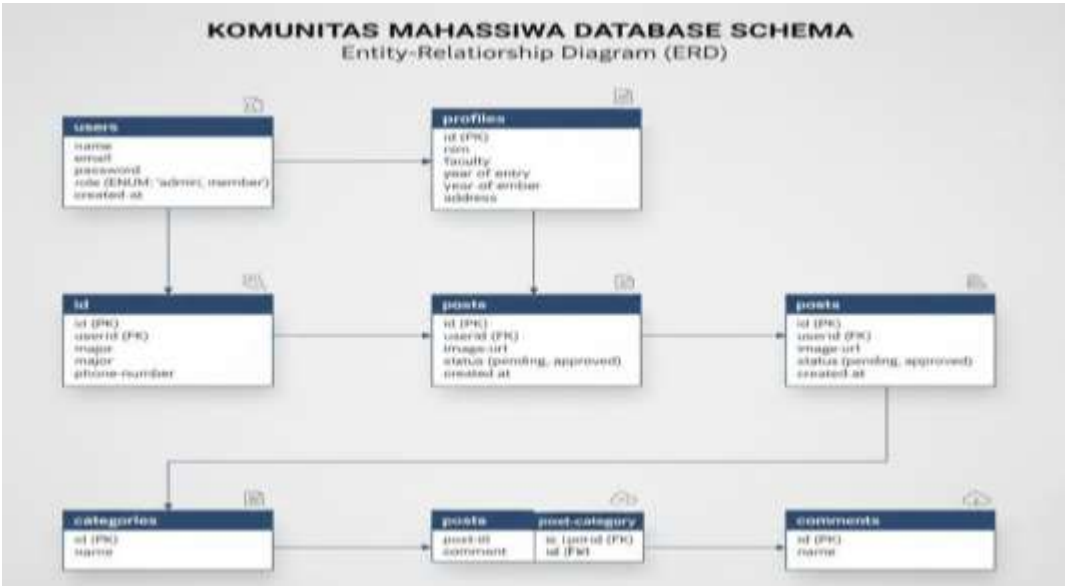

Figure 3. Entity Relationship Diagram (ERD) Of The KOMPAS Database

As shown in Figure 3, the database structure implements referential integrity across user, content, transaction, and moderation entities, normalized up to the third normal form (3NF) to ensure data consistency.

Functional Testing

All modules operated successfully without critical errors. Unit test coverage reached 85%, indicating adequate reliability of core functionalities.

Performance Testing

Metric	Desktop	Mobile
Page Load Time	1.2 s	2.8 s
First Contentful Paint	0.8 s	1.9 s
Time to Interactive	1.5 s	3.2 s
PageSpeed Score	94	87

The performance result indicate compliance with standard web usability benchmarks.

Usability Testing

The System Usability Scale (SUS) produced a score of 82.5, categorized as excellent usability.

- 87% overall satisfaction
- 83% navigation satisfaction
- 90% responsive design satisfaction

One-Mont Impact Evaluation

Indicator	Before	After
Information Accessibility	24%	76%
Participation Rate	38%	62%
Member Engagement	31%	73%
Marketplace Transactions	0	23

The marketplace module generated 23 transactions totaling Rp 8,500,000. The average administrative verification time was 6.3 hours.

Discussion

The observed increase in information accessibility and participation is consistent with the Information Systems Success Model, which emphasizes the influence of system quality and information quality on organizational benefits (DeLone & McLean, 2003). The high SUS score (82.5) indicates strong perceived usability, aligning with technology acceptance theory (Venkatesh et al., 2012).

The implementation of role-based access control and structured moderation reflects digital governance principles applicable to community-based information systems (Negara, 2021). Furthermore, the integration of marketplace functionality facilitated economic participation, supporting findings on digital ecosystem orchestration in community platforms (Nguyen & Irfan, 2025).

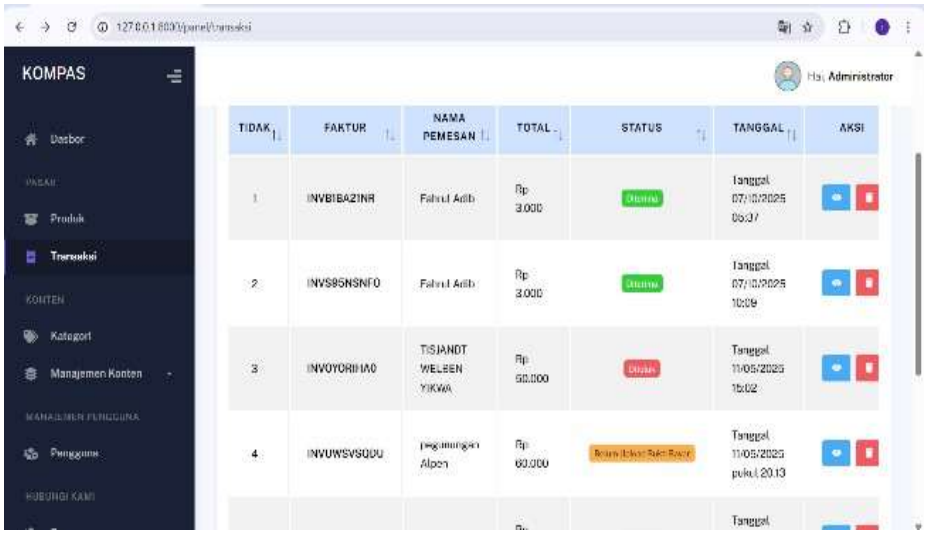

Figure 4. Role-Based Acces Control (RBAC) Flow Diagram

Figure 4 illustrates the role-based access control mechanism defining access boundaries between visitor, member, and administrator roles within the system.

The Agile methodology enabled iterative stakeholder involvement and feature refinement, enhancing system alignment with user requirements and organizational objectives (Lee & Kim, 2022).

Conclusion and Recommendations

This study successfully designed and implemented an Agile-based integrated information system for KOMPAS. The system demonstrated measurable improvements in accessibility, participation, engagement, and economic activity without altering the organizational structure.

Key outcomes include:

- Page load time: 1.2 seconds (desktop)
- PageSpeed score: 94
- SUS score: 82.5 (Excellent)
- Engagement increase: 73%
- Participation increase: 62%
- Accessibility increase: 76%
- Marketplace transactions: 23 (Rp 8.5 million)

The study contributes an integrated digital governance framework that combines information management and marketplace functionality within a student community context.

Disclosure Statement

No potential conflict of interest was reported by the authors.

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Biographical Notes

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