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Agile Based Development of a Web Ticketing Platform Using Scrum: A Case Study of the A5 Ticket System

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***Abstract*— This study presents an agile based development of a web ticketing platform A5 Ticket using the Scrum framework, examined through a case study approach. The primary motivation is to address the growing need for an efficient, scalable, and user centric online ticket management system in the digital era, capable of serving end users, event organizers, and system administrators within a single integrated platform. The Scrum framework was adopted as the development methodology for its iterative and collaborative nature, which engages stakeholders at every stage of the development cycle. The system was developed through six Scrum stages: Product Backlog, Sprint Planning, Sprint Execution, Daily Stand-Up, Sprint Review, and Sprint Retrospective. Key features of the developed platform include user registration and login, ticket search and ordering, event management for organizers, sales reporting for administrators, and payment gateway integration. The platform is accessible on both desktop and mobile devices, featuring an intuitive, responsive user interface. The research findings highlight the effectiveness of the Scrum methodology in ensuring platform responsiveness, data security, and ease of use. User satisfaction was evaluated using a Likert scale survey distributed to users, organizers, and administrators, while qualitative insights were gathered through semi structured interviews. The results demonstrate that agile driven iterative development through Scrum effectively addressed user requirements at each sprint cycle, leading to a functional, secure, and user friendly event ticketing platform. This case study contributes practical evidence on the application of Scrum in web-based ticketing system development and serves as a reference for future agile software engineering projects in similar domains**.

***Keywords*— agile development; web ticketing platform; Scrum methodology; case study; user experience; iterative development; online ticketing.**

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I. INTRODUCTION

The rapid growth of the digital economy has significantly transformed the way people access entertainment and cultural events. Online ticketing platforms have emerged as critical infrastructure for managing large scale events, replacing traditional manual processes that were often inefficient and error prone [1]. The global online event ticketing market is projected to grow substantially, driven by increasing internet penetration and the proliferation of smart devices [2]. Developing such platforms requires robust, agile oriented engineering approaches that can respond to dynamic user requirements throughout the development lifecycle.

In Indonesia, the demand for digital based event management solutions has grown considerably, particularly following the post pandemic recovery of the live event industry [3]. Event organizers increasingly require integrated platforms that can handle ticket sales, capacity management, and real-time reporting simultaneously. Existing commercial ticketing platforms, while functional, often lack customization and adaptability for local use cases [4].

Web application development for event ticketing requires a methodology that is flexible, iterative, and capable of accommodating evolving user requirements. Agile frameworks, particularly Scrum, have been widely recognized as effective approaches for developing complex, user centric software systems [5]. Scrum enables development teams to deliver working software incrementally while continuously incorporating stakeholder feedback [6].

Scrum has been successfully applied in numerous software development contexts, including enterprise resource planning systems [7], healthcare information systems [8], and e-commerce platforms [9]. Its structured yet adaptable nature makes it particularly suitable for projects where requirements may evolve during the development lifecycle [10].

This study addresses the agile based development of "A5 Ticket," a web ticketing platform built using the Scrum framework, examined through a case study approach. The platform is designed to serve three primary user roles: end-

users who search and purchase tickets, event organizers who manage event details, and administrators who oversee the platform and generate sales reports. By documenting the Scrum implementation process in detail, this research provides practical insights applicable to future agile based web platform development projects.

The objectives of this study are: (1) to design and develop a comprehensive web ticketing platform using the Scrum agile framework through a structured case study; (2) to evaluate the effectiveness of Scrum in managing the iterative development process of the platform; and (3) to assess user satisfaction with the resulting platform through quantitative and qualitative evaluation methods.

II. LITERATURE REVIEW

A. Online Ticketing Systems

Online ticketing systems have evolved significantly over the past two decades. Early systems were primarily web-based extensions of box-office operations, whereas modern systems integrate real-time inventory management, dynamic pricing, and multi-channel distribution [11]. Kim and Yang [12] identified key functional requirements for online ticketing systems, including real-time seat availability, secure payment processing, and automated delivery of confirmation.

The adoption of web based ticketing has been shown to reduce operational costs significantly compared to traditional ticketing methods [13]. Furthermore, digital ticketing enables richer data collection, supporting organizers in making data driven decisions regarding event planning and marketing [14].

B. Scrum Methodology

Scrum is an agile framework originally formalized by Schwaber and Sutherland [15], designed to organize software development into iterative, time-boxed cycles known as sprints, each typically spanning two to four weeks. As illustrated in Fig. A (adapted from Rachmawati et al. [15]), the Scrum framework operates through a continuous cycle beginning with the Product Backlog, proceeding through sprint cycles comprising Sprint Planning, Daily Scrum, and development execution, and concluding with Sprint Review and Sprint Retrospective events before delivering a product increment.

Fig. 1. Scrum Framework Cycle (adapted from Rachmawati et al., Journal RESTI, 2023 [15])

The Scrum framework consists of three core components [16]: (1) Roles is the Product Owner who manages the Product Backlog; the Scrum Master who facilitates the process; and the Development Team who deliver the increment; (2) Events is Sprint Planning, Daily Scrum, Sprint Review, and Sprint Retrospective; and (3) Artifacts is the Product Backlog, Sprint Backlog, and Increment. Hossain et al. [19] demonstrated that consistent application of Scrum practices significantly improves team productivity and product quality, particularly in contexts involving evolving requirements. The iterative structure enables early defect identification, substantially reducing the cost of post-deployment corrections [18].

C. Web Application Development

Modern web applications are typically developed using a client-server architecture, with front-end technologies such as HTML5, CSS3, and JavaScript frameworks handling user interaction, while back-end technologies manage business logic and data persistence [19]. The Model-View-Controller (MVC) architectural pattern is widely adopted in web application development for its clear separation of concerns and maintainability [20].

User interface design plays a critical role in the success of web applications, particularly in e-commerce and ticketing contexts. Responsive design principles ensure that applications function effectively across devices with varying screen sizes [21].

III. RESEARCH METHODOLOGY

A. Research Design

This study employs a mixed-methods research design, combining quantitative and qualitative approaches to evaluate the effectiveness of the developed system. The research was conducted in three phases: (1) system design and development using Scrum methodology, (2) system deployment and user testing, and (3) data collection and analysis.

B. *Quantitative Approach*

The quantitative approach was used to measure the effectiveness of the developed web application. Data were collected through structured surveys administered to users, event organizers, and administrators following their use of the system. Respondents were asked to evaluate multiple aspects of the application, including ease of use, system responsiveness, security, and overall satisfaction, using a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). Survey results were statistically analyzed to evaluate mean satisfaction scores and identify areas for improvement.

C. *Qualitative Approach*

Semi-structured interviews were conducted with a purposively selected subset of respondents, including two end users, one event organizer, and one system administrator. Interviews explored participants' experiences with the application, challenges encountered, and suggestions for further development. Data were analyzed thematically to identify key patterns and insights regarding system usability and functionality.

D. *Development Methodology: Scrum*

The Scrum framework was adopted as the primary development methodology. The development process was organized into the following stages:

Product Backlog: All system requirements were identified through stakeholder consultations and documented in the Product Backlog. Requirements were prioritized based on business value and technical complexity, including ticket search, ordering, payment integration, event management, and sales reporting.

Sprint Planning: Each sprint was planned for 2 weeks. Sprint goals and tasks were selected from the Product Backlog based on team capacity and priority. Sprint Planning meetings ensured alignment between the development team and stakeholders.

Sprint Execution: Development tasks were executed iteratively over multiple sprints. Sprint 1 focused on system architecture and user authentication modules. Sprint 2 addressed event listing and ticket search functionality. Sprint 3 implemented the ordering and payment integration. Sprint 4 developed administrative reporting features and conducted system integration testing.

Daily Stand Up: Brief daily meetings were conducted to monitor progress, identify impediments, and synchronize team activities.

Sprint Review: At the end of each sprint, completed increments were demonstrated to stakeholders for feedback and validation.

Sprint Retrospective: The development team reflected on the sprint process to identify improvement opportunities for subsequent sprints.

E. *System Architecture*

The A5 Ticket application was developed using a three-tier web architecture. The front-end layer was built using HTML5, CSS3, and JavaScript, ensuring a responsive, cross-device-compatible user interface. The back-end layer managed business logic, session management, and API services. The data layer utilized a relational database management system for persistent data storage. The system architecture was designed using the MVC pattern to ensure maintainability and scalability.

IV. RESULTS AND DISCUSSION

A. Platform Features

The development process produced a fully functional web ticketing platform comprising five core feature modules, each delivered across the four sprint cycles.

1) User Registration and Login: The platform provides secure user registration and session-based authentication. Users create accounts using email, a username, and a password. Input validation mechanisms prevent unauthorized access and ensure data integrity.

2) Ticket Search and Ordering: Users can browse and search for available events by location, category, or date. The ordering interface displays event details, ticket categories (Regular, VIP, VVIP), pricing, and availability. Users select ticket type and quantity before proceeding to checkout.

3) Event Management for Organizers: Event organizers access a dedicated management interface to create, update, and delete event listings, define ticket categories and pricing, set capacity limits, and monitor ticket availability in real time.

4) Sales Reporting for Administrators: The administrator dashboard provides comprehensive sales reporting, enabling administrators to monitor revenue streams, analyze ticket sales trends, and generate operational reports to support strategic decision-making.

5) Payment Integration: The platform supports multiple payment methods, including credit/debit cards and digital wallets. Upon successful payment, the system automatically generates an invoice and sends an order confirmation to the user's registered email address.

B. UML System Modeling

The platform was modeled using Unified Modeling Language (UML) diagrams to ensure a structured, well-documented system design. The Use Case Diagram (Fig. 2) illustrates interactions between two primary actors, User and Admin, and system use cases including Search Event, View Event Detail, Order Ticket, Payment, Login, and Register.

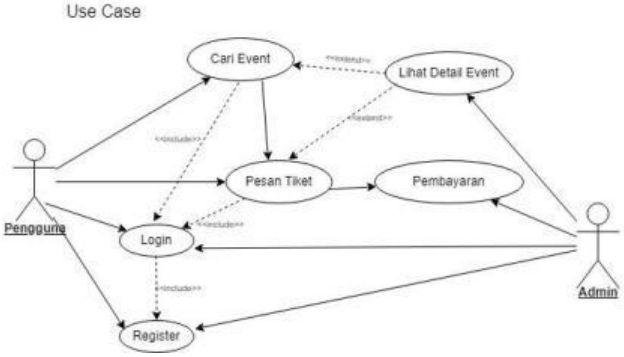

Fig. 2. Use Case Diagram of the A5 Ticket Platform

The Class Diagram (Fig. 3) presents the platform's object-oriented structure, comprising five main classes: User, Order (Pesan), Ticket (Tiket), Payment (Pembayaran), and Event. Associations reflect entity relationships, including composition and dependency.

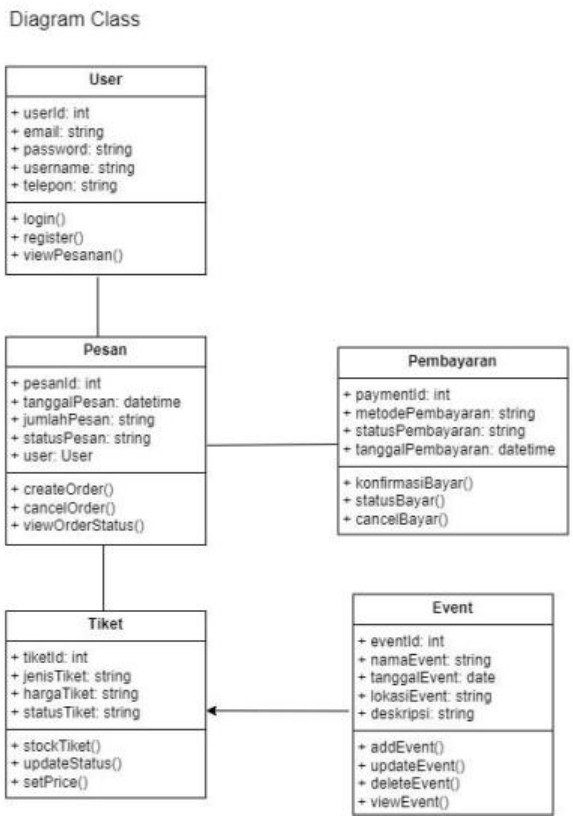

Fig. 3. Class Diagram of the A5 Ticket Platform

The Activity Diagrams (Fig. 4 and Fig. 5) depict the workflows of the Login/Registration process and the Ticket Ordering/Payment process, respectively, illustrating decision points and activity flows within each process.

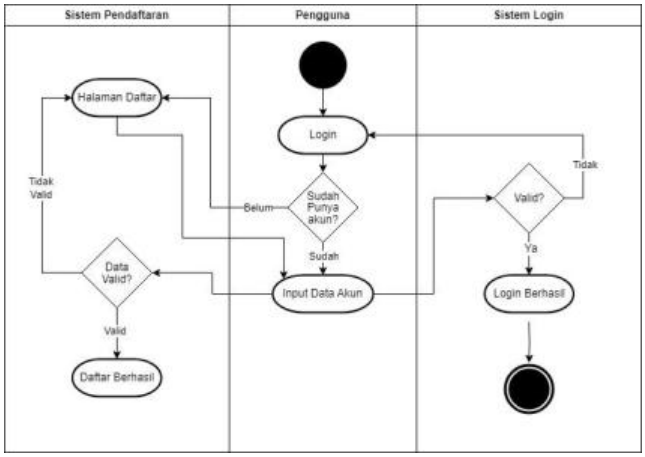

Fig. 4. Activity Diagram: Login and Registration System

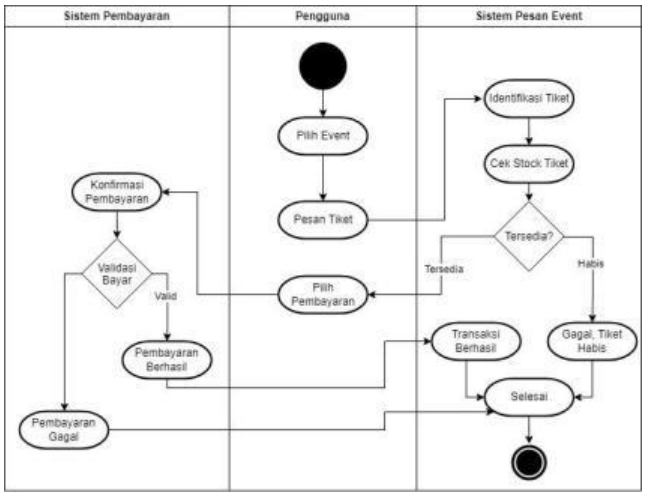

Fig. 5. Activity Diagram: Ordering and Payment System

The Sequence Diagrams (Fig. 6 and Fig. 7) model the interaction sequences between actors and system components for the Login/Registration and Ordering/Payment processes, respectively.

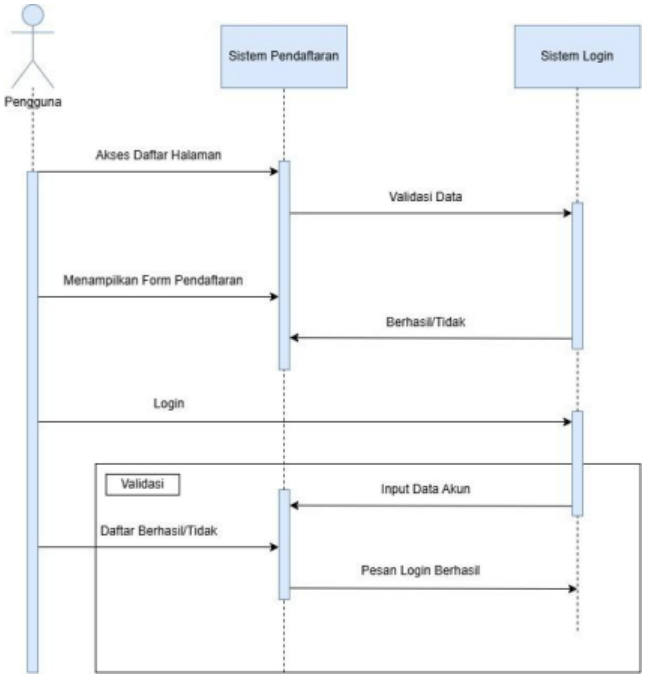

Fig. 6. Sequence Diagram: Login and Registration System

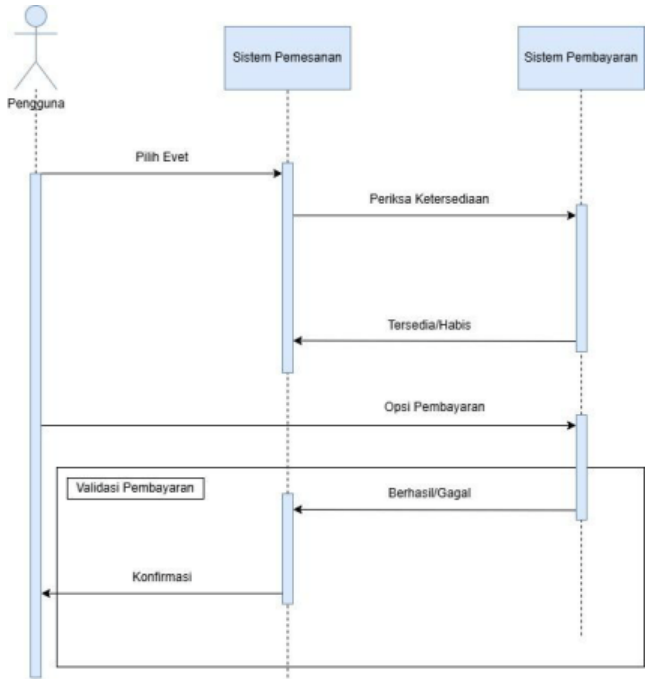

Fig. 7. Sequence Diagram: Ordering and Payment System

C. *User Interface Implementation*

The A5 Ticket application features a modern, dark-themed user interface designed for intuitive navigation. Fig. 7 and Fig. 8 present the Login and Registration pages, respectively. Fig. 9 shows the Event Menu page displaying available events with thumbnail images, event names, dates, and starting ticket prices. Fig. 10 shows the Landing Page, the application's main entry point, featuring a hero banner, event highlights, a step-by-step purchase guide, and a contact form. Fig. 11 and Fig. 12 show the Ticket Detail pages, where users can view event information and select ticket categories. Fig. 13 presents the Ticket Total page, and Fig. 14 shows the Invoice Pop-Up displayed upon successful payment.

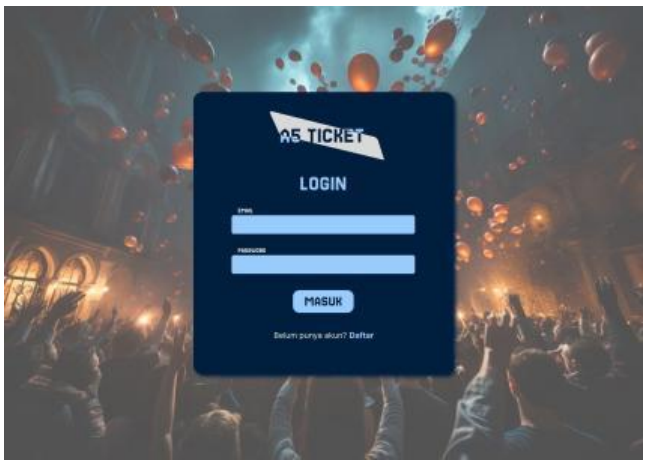

Fig. 8. Login Page

Fig. 9. Registration Page

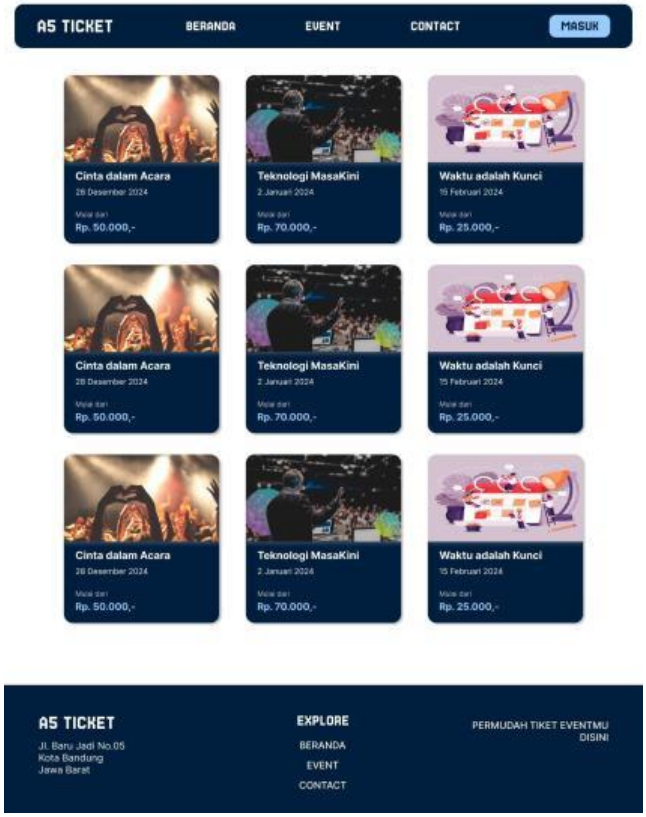

Fig. 10. Event Menu Page

Fig. 11. Landing Page

Fig. 12. Ticket Detail Page 1

Fig. 13. Ticket Detail Page 2

Fig. 14. Ticket Total Page

Fig. 15. Invoice Pop-Up Page

D. Scrum Implementation and Sprint Deriverables

Table I presents a summary analysis of Scrum's effectiveness across key development dimensions observed during the project, demonstrating how the framework contributed to quality, adaptability, and security throughout the lifecycle.

TABLE I.

SCRUM EFFECTIVENESS IN PLATFORM DEVELOPMENT

Aspect	Description
Flexibility	Scrum enabled the team to readily adapt to evolving user requirements throughout the development lifecycle, accommodating changes without disrupting overall project progress.
Iterative Development	Each sprint provided structured opportunities to evaluate and refine system components, ensuring continuous quality improvement before feature release.
Defect Identification	Sprint Review sessions facilitated early detection of deficiencies, enabling corrective actions prior to integration into the production build.
Efficiency & Security	The iterative delivery model ensured that system components were individually tested for responsiveness, security vulnerabilities, and usability compliance before deployment.

Table II details the Sprint Goal and specific deliverables for each sprint, while Table III summarizes the sprint metrics and outcomes.

TABLE II. SPRINT GOAL AND DELIVERABLES A5 TICKET PLATFORM

Sprint	Stories	Hours	Velocity	Sprint Outcome
Sprint 1	6	48 hrs	**6**	Login/Register pages functional; secure session management implemented
Sprint 2	5	40 hrs	**5**	Event browsing and search fully operational; Landing page live
Sprint 3	6	52 hrs	**6**	End-to-end ordering and payment flow complete; Invoice Pop-Up functional
Sprint 4	5	40 hrs	**5**	All modules integrated and tested; platform deployed for user testing
Total	**22**	**180 hrs**	**22**	**Full platform delivered across 4 sprint cycles**

Sprint 1–4, each sprint duration: 2 weeks

TABLE III. SPRINT METRICS AND OUTCOMES A5 TICKET PLATFORM

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Total	**22**	**180 hrs**	**22**	**Full platform delivered across 4 sprint cycles**

Stories = user stories completed; Hours = total dev. hours; Velocity = stories/sprint

As shown in Tables II and III, the development team completed 22 user stories in 180 development hours across four sprints. Sprint 3 recorded the highest effort (52 hours), reflecting the complexity of integrating the payment gateway and automating invoice confirmation. Sprint velocity remained stable at 5–6 stories per sprint, indicating effective Sprint Planning and team capacity management. Each sprint outcome was validated through Sprint Review sessions attended by all stakeholder groups, ensuring continuous alignment between delivered features and user requirements.

E. User Satisfaction Evaluation

User satisfaction was measured using a structured Likert-scale survey (1 = Strongly Disagree, 5 = Strongly Agree) administered to 23 respondents: 15 end users, 5 event organizers, and 3 system administrators. Table IV presents mean scores per statement for each respondent group, along with the overall mean and satisfaction category.

TABLE IV. USER SATISFACTION SURVEY RESULTS (LIKERT SCALE 1–5)

No	Dimension	Statement	Users (n=15)	Org (n=5)	Admins (n=3)	Mean	Cat
1	Ease of Use	The registration and login process is easy to use	4.47	4.60	5.00	**4.57**	Very Good
2	Ease of Use	The ticket search feature is easy to navigate	4.33	4.40	4.67	**4.40**	Very Good
3	Ease of Use	The ticket ordering process is clear and straightforward	4.27	4.20	4.67	**4.31**	Very Good
4	System Responsiveness	Pages load quickly on desktop and mobile devices	4.13	4.00	4.33	**4.13**	Good
5	System Responsiveness	The system responds promptly during peak usage	3.93	4.00	4.33	**4.02**	Good
6	Data Security	I feel my personal data is secure within the system	4.20	4.40	5.00	**4.35**	Very Good
7	Data Security	The payment process feels safe and trustworthy	4.27	4.60	5.00	**4.46**	Very Good

No	Dimension	Statement	Users (n=15)	Org (n=5)	Admins (n=3)	Mean	Cat
8	Feature Completeness	All required features are available and functional	4.07	4.40	4.67	**4.24**	Good
9	Feature Completeness	The invoice and email confirmation feature works well	4.33	4.20	5.00	**4.38**	Very Good
10	Overall Satisfaction	Overall, I am satisfied with the A5 Ticket platform	4.40	4.60	5.00	**4.53**	Very Good
	Overall Average Mean		**4.26**	**4.34**	**4.77**	**4.34**	**Very Good**

Category: Very Good ≥ 4.20; Good: 3.40–4.19; Fair: 2.60–3.39; Poor: 1.80–2.59; Very Poor < 1.80

The overall mean satisfaction score was 4.34, categorized as Very Good, indicating that the A5 Ticket platform successfully met user expectations across all evaluated dimensions. The highest scores were recorded for the registration and login process (M = 4.57) and Overall Satisfaction (M = 4.53). System administrators reported the highest group mean (M = 4.77), reflecting strong satisfaction with the platform's administrative reporting features. The lowest score was observed in System Responsiveness during peak usage (M = 4.02, Good), suggesting that server-side performance optimization should be prioritized in future development cycles.

F. Discussion

The development of the A5 Ticket platform demonstrates that the Scrum methodology is highly effective for developing web-based ticketing platforms. The iterative sprint structure, as documented in Tables II and III, allowed the team to incrementally build, test, and refine platform features, ensuring that each module met defined quality standards before integration. This progressive delivery approach directly contributed to the high overall user satisfaction score of 4.34 reported in Table IV.

The structured Scrum ceremonies, particularly Sprint Reviews and Retrospectives, facilitate continuous stakeholder engagement and enable the team to respond proactively to feedback at each cycle. This aligns with Hossain et al. [19], who demonstrated that Scrum practices significantly contribute to improved product quality and stakeholder satisfaction. The mixed-methods evaluation provided comprehensive insights: quantitative survey results indicated high satisfaction across all five dimensions, while qualitative interviews confirmed positive user experiences with navigation flow and the payment process. These findings are consistent with broader literature on agile-developed digital service systems [24], [25].

The UML modeling process contributed to design clarity and effective team communication across sprint cycles [26]. The MVC architectural pattern ensured the platform remained maintainable and extensible throughout development [22]. The relatively lower System Responsiveness score (M = 4.02) highlights a performance optimization opportunity, consistent with known challenges in agile-developed web applications, where iterative delivery may occasionally prioritize feature completeness over back-end performance tuning [27]. Future development cycles should address this through dedicated performance sprints and load testing protocols.

V. CONCLUSION

This study successfully presented the agile-based development of a web ticketing platform, A5 Ticket, using the Scrum framework through a structured case study. The platform provides an efficient and comprehensive solution for online ticket management, serving the needs of end users, event organizers, and system administrators through a set of well-defined functional modules.

The Scrum methodology proved effective for managing the iterative development process, enabling the team to systematically address user requirements across multiple sprint cycles while maintaining flexibility to respond to evolving needs. The structured application of Scrum artifacts and ceremonies contributed to the timely delivery of a functional, secure, and user-friendly system.

For future development, the following enhancements are recommended: integration of advanced analytics to provide organizers with deeper insights into user behavior and ticket sales trends; implementation of a mobile application version to extend platform accessibility; incorporation of a recommendation engine to suggest relevant events to users based on their preferences and purchase history; and enhancement of the payment module to support additional local payment methods and real-time transaction monitoring.

This research contributes to the body of knowledge on agile-based web platform development for event ticketing systems. The case study documented here provides a practical and replicable reference for developers and researchers engaged in Scrum-based web application development in similar domains.

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