

User Experience Analysis and Development of a Web-Based E-Tourism Application Using Agile Scrum for Travel Belitung Begaye

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ABSTRACT

Travel Belitung Begaye, a travel agency operating in Belitung Regency, still relies on manual promotion and reservation through social media and direct communication, which limits market reach and produces inefficient, error-prone manual payment verification. This broadly-defined problem requires both a working software artifact and an empirical, standards-based evaluation of how users actually experience it. This study designs and develops a web-based E-Tourism application for Travel Belitung Begaye that automates the reservation and payment workflow, and subsequently evaluates the usability of the resulting interface. The system was constructed using the Agile Scrum framework together with the Laravel framework and a MySQL database, and it integrates the Midtrans payment gateway so that payment status is updated automatically through a webhook callback rather than manual bank-transfer verification. The Scrum cycle followed the Product Backlog, Sprint Planning, Sprint Backlog, Sprint Execution, Sprint Review, and Sprint Retrospective stages, and produced fourteen functional features covering package management, online reservation, automated payment, e-ticket issuance, customer review, and administrative reporting. Functional correctness was verified using Black-Box Testing, while usability was measured with the System Usability Scale (SUS) administered to 32 respondents who had used the system. The results show a mean SUS score of 78.91 (SD = 12.89), which places the system in grade B with an "Excellent" adjective rating and an "Acceptable" acceptability range; 84.4% of respondents rated the system as acceptable and 71.9% assigned a grade of A or B. Item-level analysis shows that perceived system complexity (item P2) obtained the lowest converted score, 2.75 of 4, indicating that the multi-step reservation-and-payment flow still requires simplification. These findings indicate that combining iterative Agile Scrum development with an automated payment gateway can produce a usable and acceptable E-Tourism platform, while also identifying interface complexity as the primary target for further refinement.



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I. INTRODUCTION

Belitung Regency is one of the regions in Indonesia with substantial tourism potential, ranging from coastal natural attractions to a rich local culture. As information technology advances, the digitalization of tourism services has become a basic requirement for industry actors seeking to widen their

promotional reach and to distribute information more effectively. A web-based tourism information system can accelerate the real-time presentation of destination data to travellers [1]. However, the success of a digital platform is determined not only by the completeness of its data, but also by how users actually interact with the system.

In practice, many travel agencies in Belitung, including Travel Belitung Begaye, still operate using conventional methods. Their dependence on social media and manual communication for promotion and reservation results in a limited market reach and inefficient data management. The problem is compounded by a payment process that is still manual, requiring travelers to submit proof of transfer themselves; this workflow burdens staff with verification work and slows down service delivery. This is consistent with prior findings that feature quality and application response speed are crucial factors that directly influence user perception and satisfaction [2].

For travelers, uncertainty about package availability, pricing, and travel schedules caused by the absence of an integrated system often becomes an obstacle when planning a visit. Although digitalizing reservations and integrating a payment gateway such as Midtrans can serve as a technical solution, ease of use remains the decisive variable for adoption. Prior work confirms that applying appropriate UI/UX principles to a reservation system can significantly improve efficiency and user satisfaction through smooth navigation and an intuitive interface [3]. Without an in-depth analysis of user experience (UX), a newly built application risks being difficult to operate, so that the goal of digitalization is not optimally achieved.

The importance of evaluating user experience has also been emphasized in studies showing that standardized instruments such as the System Usability Scale (SUS) are necessary to ensure that a system is well received by its users [4]. The quality of experience perceived by travelers while using an application largely determines whether the platform will continue to be used or abandoned [5]. Therefore, the development of an E-Tourism application should be carried out using an iterative, user-centered approach in order to minimize the gap between system functionality and traveler expectations.

Based on this problem, the present study designs and develops a web-based E-Tourism application for Travel Belitung Begaye using the Agile Scrum method, which allows the development process to remain flexible toward changing requirements and user feedback at every stage. By leveraging the Laravel framework together with an automated payment-gateway integration, this study expects the resulting application not only to automate Travel Belitung Begaye's business processes, but also to deliver a satisfying digital experience for travelers planning their trip to Belitung.

II. METHODS

A. Object and Development Method

The object of this study is Travel Belitung Begaye, a travel agency that focuses on providing tour packages in Belitung Regency. The software-development method applied is Agile Scrum, an agile framework that divides the

development process into short work cycles called sprints, allowing the team to build parts of the system incrementally while performing routine evaluation [6]. Scrum was selected because it matches the requirement for an application that must adapt its features flexibly to user needs while being assessed in stages.

The Scrum stages implemented in this study are as follows. In the Product Backlog stage, a comprehensive list of required features and functions was compiled from in-depth observation and discussion with the partner; high-priority items such as package management, automated Midtrans payment, and the customer-review feature were placed at the top as the system's core functions [7]. During Sprint Planning, the team determined which backlog items would be completed within a given sprint and established the corresponding Sprint Goal together with an estimated completion time, keeping development progress measurable and focused [8]. The selected features were then translated into the Sprint Backlog as specific technical tasks, including designing the MySQL table structure, building interface prototypes in Figma, and defining the programming logic to be implemented using the MVC architectural pattern [7].

During Sprint Execution, the entire plan was implemented as program code using the Laravel framework, including the Midtrans API integration and the user-authentication logic; independent testing was carried out throughout coding to ensure that every module operated according to its functional specification [8]. At the end of each sprint cycle, a Sprint Review was held to demonstrate the completed features to Travel Belitung Begaye and to obtain direct feedback; any discrepancies or improvement proposals were recorded and returned to the Product Backlog for refinement in the next iteration [8]. Finally, the Sprint Retrospective evaluated the technical and communication obstacles encountered during the sprint, a reflection that is important for improving work effectiveness and ensuring that the next sprint cycle proceeds more smoothly [9].

B. Tools and Materials

The hardware used to support development consisted of a laptop with an AMD Ryzen 7 2700 processor, 8 GB of RAM, 512 GB of SSD storage, and a smartphone used for mobile-friendly browser testing. The software used included the Windows 10 Home Single Language operating system, Visual Studio Code as the primary code editor, XAMPP as the local Apache web server, MySQL managed through phpMyAdmin as the database-management system, the Laravel framework, Google Chrome as the testing browser, Figma for designing wireframes and the user interface, and draw.io for diagramming the system flow and UML models. The supporting materials consisted of Travel Belitung Begaye's operational profile, its tour-package catalog, documentation of the existing conventional reservation procedure, Midtrans sandbox client and server keys, the

standard SUS questionnaire instrument, and academic literature on Agile Scrum, the Laravel framework, and system-evaluation methods.

C. System Architecture and Requirements

The system was built on a client-server architecture based on the Model-View-Controller pattern using the Laravel framework, a MySQL database, and is integrated with the Midtrans payment-gateway API through a sandbox client key and server key. Every user request is processed by the Laravel web server through a query to the database to keep information synchronized, while Midtrans handles the payment-token request and simultaneously sends transaction-status notifications through a webhook mechanism, so that order-status updates and ticket issuance occur in real time without depending on a time-consuming manual payment-verification process.

The functional requirements of the system comprise fourteen core features: authentication (login, logout, registration) for both Traveler and Admin roles; searching, browsing, and reading tour-package and news details; submitting a reservation; processing automated payment through Midtrans; downloading the e-ticket once payment is verified; submitting a rating and review for a completed trip; and, on the administrator side, full CRUD management of tour packages, management of informational content and documentation galleries, real-time monitoring of transaction status, moderation of incoming reviews, and printing of periodic transaction reports in PDF format.

D. Analysis Technique and Usability Instrument

Requirement analysis was conducted using an Object-Oriented Analysis (OOA) approach, modeled visually with the Unified Modeling Language (UML), comprising a Use Case Diagram to define the actor roles of Admin and Traveler and an Activity Diagram to describe the reservation, payment-gateway, and review-submission flows in detail, since structured modeling through the backlog is essential for mapping transaction logic so that the system can minimize data errors [7]. System evaluation combined Black-Box Testing, used to verify that all features—particularly the reservation module and the automated payment mechanism—function correctly without technical disruption, with a usability test administered to prospective travelers and administrators, which is a valid method for obtaining quantitative data on the extent to which an application is accepted by its users [5].

The SUS questionnaire consists of 10 standard statements rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), alternating positive and negative statements in the pattern commonly used in recent usability research [10]. Each respondent's score was calculated by subtracting 1 from the answer value for odd-numbered (positive) items, and subtracting the answer value

from 5 for even-numbered (negative) items; all contribution scores were then summed and multiplied by a factor of 2.5 to produce a final score ranging from 0 (worst) to 100 (best), expressed by the following formula:

$$\text{SUS Score} = [\Sigma (\text{answers to odd-numbered items} - 1) + \Sigma (5 - \text{answers to even-numbered items})] \times 2.5$$

The resulting scores were then interpreted using three classification schemes commonly applied in current usability research: the letter-grade scale (A–F), the adjective rating, and the acceptability range (Not Acceptable, Marginal, Acceptable) [11], [10]. Data collection was carried out online among users who had tried operating the system and successfully obtained 32 respondents.

III. RESULT AND DISCUSSION

A. Implementation Results

The Travel Belitung Begaye E-Tourism system was successfully implemented as a responsive web application using PHP, the Laravel framework, and a MySQL database, so that it can be accessed flexibly by both travelers and administrators through a browser without requiring any additional client-side installation. Structurally, the application adopts a client-server architecture based on the MVC pattern that bridges user requests with data manipulation on entities such as users, packages, reservations, payments, reviews, and news. The system handles promotional-media uploads using the multipart/form-data format and is integrated with the Midtrans payment-gateway API using dedicated client and server keys; this synchronization allows the back end to verify payment status automatically, transitioning from pending to paid through a callback URL. Page-level access is strictly controlled through an authentication middleware based on user role.

On the traveler side, the Login page validates the user's email and password against the users entity in the back end and, when valid, grants access to protected transaction features such as package reservation and (for administrators) the control panel; it also provides a password-visibility toggle, a link back to the home page, and a link to the registration form. The Logout feature terminates the active session through a confirmation pop-up modal to prevent accidental sign-out, available on both the traveler home page and the admin control panel; confirming the action clears the authentication token and returns the user to guest status. The Registration page collects and validates a new traveler's basic identity data—full name, email address, phone number, and password—before creating an account that enables transactions within the system.

The Tour-Package Catalog page functions as a dynamic information showcase, pulling data in real time from the packages entity and presenting it as a card-based browsing layout; a primary search field allows travelers to find a

specific destination by keyword matching, while a dynamic category filter narrows the displayed packages according to preference without a full page reload, and each card links to a detailed product page before the user proceeds to reservation. The Reservation page serves authenticated travelers through a multi-step flow—Fill Data, Review, and Status—in which the first step auto-populates the traveler's identity data from the active login profile, and the second step dynamically calculates the total cost by multiplying the per-pax package price by the number of registered participants before presenting a review summary and routing the user to the Midtrans payment gate; all manifest data is stored in the reservations entity.

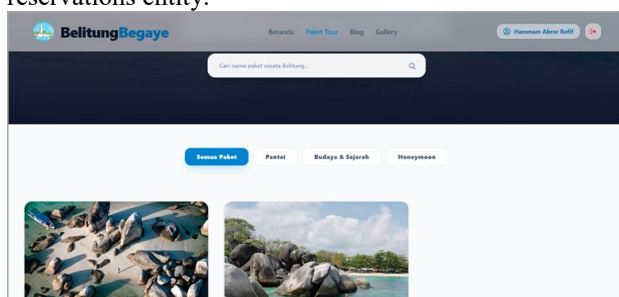


Fig. 1. Tour Package Catalog Page

The Payment feature is directly integrated with the Midtrans gateway and provides a multi-channel payment method through the Snap Midtrans pop-up window, which displays a precise billing amount together with a unique Order ID; travelers may choose GoPay, ShopeePay, credit card (Visa, Mastercard, JCB, Amex), or bank-transfer Virtual Account (BCA, Mandiri, BNI, BRI, Permata). Once a method is selected, the system automatically generates a unique virtual-account number with payment instructions, and an asynchronous callback from the Midtrans API detects payment status in real time; upon successful verification by the bank or e-wallet, Midtrans notifies the back end, which updates the reservation status to “Paid” automatically without requiring manual administrator intervention. The E-Ticket Download feature subsequently generates an official digital manifest containing the order number, package name, traveler's name, number of participants, departure date, pickup time, and total amount paid, which can be saved as a PDF or printed as proof of reservation at the destination.

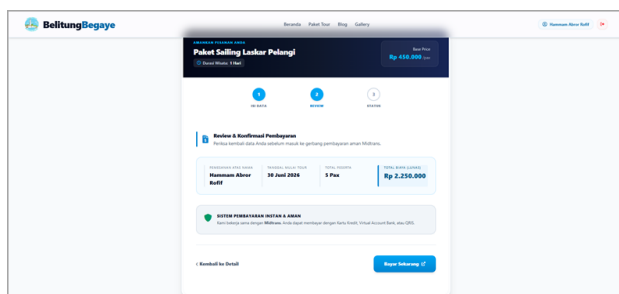


Fig. 2. Reservation and Payment Confirmation Page

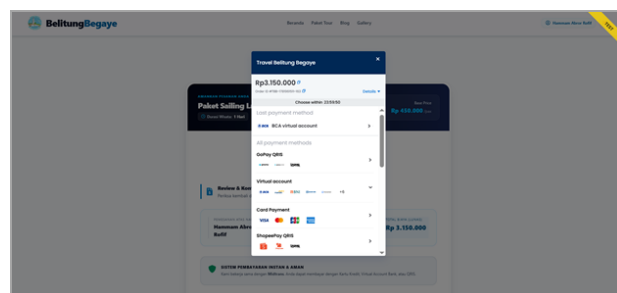


Fig. 3. Midtrans Payment Gateway Interface

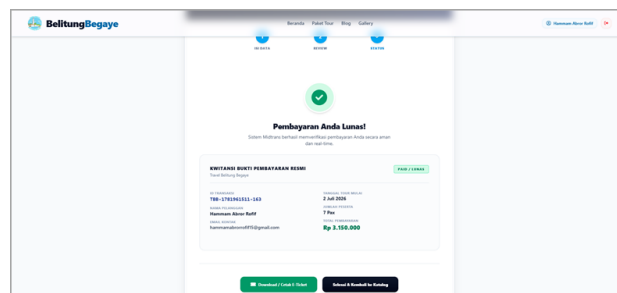


Fig. 4. Payment Success and E-Ticket Download Page

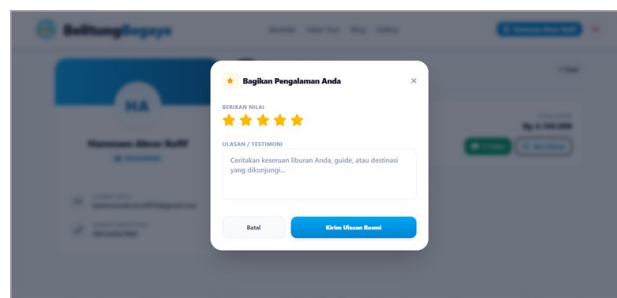


Fig. 5. Tourist Review Modal

The Tour-Package Catalog page functions as a dynamic information showcase, pulling data in real time from the packages entity and presenting it as a card-based browsing layout; a primary search field allows travelers to find a specific destination by keyword matching, while a dynamic category filter narrows the displayed packages according to preference without a full page reload, and each card links to a detailed product page before the user proceeds to reservation. The Reservation page serves authenticated travelers through a multi-step flow Fill Data, Review, and Status in which the first step auto-populates the traveler's identity data from the active login profile, and the second step dynamically calculates the total cost by multiplying the per-pax package price by the number of registered participants before presenting a review summary and routing the user to the Midtrans payment gate; all manifest data is stored in the reservations entity.

Administrator-side features include: tour package CRUD management; news and gallery content management; real-time transaction monitoring; tourist review moderation; and

PDF transaction report generation with date range filtering. The Midtrans webhook callback mechanism automatically updates reservation status from pending to paid without administrator intervention, triggering immediate e-ticket issuance.

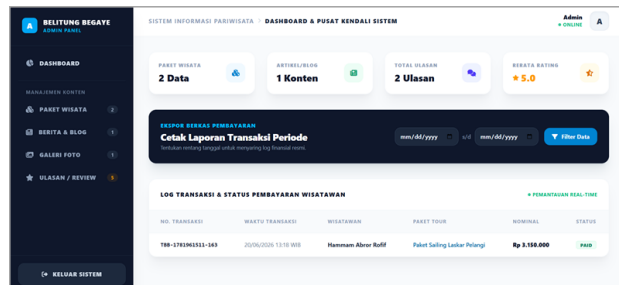


Fig. 6. Admin Tour Package Management Page

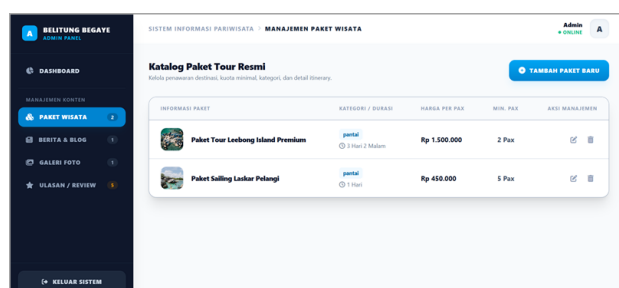


Fig. 7. Admin Dashboard and Transaction Log

B. SUS Usability Testing Results

Usability testing was performed on 32 respondents who had tried operating the system. Each respondent's SUS score was calculated using the formula presented in Section III-D; as an illustration, the first respondent provided a total contribution score of 30, yielding an SUS score of $30 \times 2.5 = 75.0$. Descriptive statistics for all 32 respondent scores are presented in Table I.

TABLE I
DESCRIPTIVE STATISTICS OF SUS SCORES

Statistic	Value
Number of Respondents (n)	32
Mean SUS Score	78.91
Median	80.00
Standard Deviation	12.89
Minimum Score	50.00
Maximum Score	100.00

The mean SUS score obtained is 78.91, with a standard deviation of 12.89, a median of 80.00, a minimum of 50.00, and a maximum of 100.00. Compared to the commonly cited SUS benchmark mean of 68, which is often used as the midpoint of interpretation in recent SUS studies [11], [12], the mean score of the Travel Belitung Begaye information system is above that threshold, indicating a level of usability that is better than average. This finding is also consistent with

similar studies in the digital-tourism domain, such as an SUS evaluation of the NusaTrip mobile application that likewise exceeded the global average benchmark [13], reinforcing the conclusion that travel-service applications tend to achieve high usability when designed with careful attention to user needs.

To explain the meaning of the score obtained, the results were further interpreted using three classification schemes commonly used in current usability research, namely the letter grade, the adjective rating, and the acceptability range [11], [10]. The distribution of respondent grades and acceptability categories is presented in Table II.

TABLE II

GRADE AND ACCEPTABILITY DISTRIBUTION

Category	Respondents	Percentage
Grade A	15	46.9%
Grade B	8	25.0%
Grade C	4	12.5%
Grade D	4	12.5%
Grade F	1	3.1%
Acceptable	27	84.4%
Marginal	5	15.6%
Not Acceptable	0	0.0%

Table II shows that 71.9% of respondents gave the system a grade of A or B, indicating that the majority of users found the system easy to use. Furthermore, 84.4% of respondents (27 of 32) placed the system in the “Acceptable” category, while 15.6% (5 respondents) categorized it as “Marginal,” and no respondent rated the system as “Not Acceptable.” This result reinforces the conclusion that the Travel Belitung Begaye information system is generally perceived as feasible and acceptable to the majority of users, although a small portion of respondents still experienced some difficulty in operating it.

Further analysis was conducted on the mean converted score of each statement item in order to identify the system's usability strengths and weaknesses, as shown in Table III.

TABLE III
MEAN CONVERTED SCORE PER ITEM (0-4 SCALE)

Item	Score
P9 – User confidence	3.47
P3 – Ease of operation	3.38
P1 – Willingness to use again	3.31
P5 – Function/feature integration	3.31
P7 – Ease of learning	3.22
P6 – Consistency of layout/flow	3.19
P8 – Degree of confusion	3.00
P4 – Need for technical assistance	2.97
P2 – System complexity	2.75

The statement with the highest converted score is user confidence (P9) at 3.47, indicating that users felt assured and unhesitant while using the system's features. Conversely, the statement with the lowest converted score is system complexity (P2) at 2.75; although this value still lies above the midpoint of the scale (2.0), it shows that complexity is the relatively most frequent complaint compared to other usability aspects, particularly within the multi-step reservation and payment flow. Taken together, the usability test conducted on 32 respondents shows that the system achieved a mean SUS score of 78.91, placing it in grade B with an "Excellent" adjective rating and an "Acceptable" acceptability range. It can therefore be concluded that the system generally satisfies good usability criteria in terms of effectiveness, efficiency, and user satisfaction, although the complexity of the multi-step reservation-and-payment flow still warrants simplification in future iterations, for example through the addition of interactive onboarding or contextual tooltips for travelers who are less familiar with digital platforms.

C. Discussion

The implementation results and the usability test results together answer the three research questions posed at the outset of this study. First, the iterative Agile Scrum cycle proved effective for accommodating fourteen functional requirements that evolved through observation, sprint review, and sprint retrospective, confirming that an adaptive development approach is well suited to a partner whose operational needs continue to be refined during development [14], [9], [9]. Second, the Midtrans payment-gateway integration successfully replaced the manual proof-of-transfer verification process with a real-time webhook callback, a result consistent with prior findings that payment-gateway automation substantially improves the operational efficiency of a travel agency [15]. Third, the SUS evaluation places the resulting system above the commonly used benchmark of 68 [11], [12], confirming that the combination of an iterative development method with structured usability validation can produce a digital tourism platform that is not only functionally complete but also pleasant and acceptable to use, in line with the broader literature emphasizing the role of user-experience evaluation in determining a digital tourism platform's long-term adoption [4], [5]. At the same time, the item-level finding that system complexity (P2) received the lowest score suggests that future development should prioritize simplifying the multi-step reservation flow, adding automated notifications for travelers, and, eventually, evaluating server security and load resilience as the system moves toward production deployment.

D. Summary of Results

Overall, the Travel Belitung Begaye E-Tourism system achieved a mean SUS score of 78.91, placing it in Grade B

with an Excellent adjective rating and within the Acceptable acceptability range. These results confirm that combining the Agile Scrum iterative development approach, Midtrans payment gateway automation, and SUS-based UX evaluation successfully produces a platform that is both functionally sound and delivers a satisfying user experience.

IV. CONCLUSION

Based on the design, implementation, and testing of the web-based E-Tourism application for Travel Belitung Begaye, it can be concluded that the Agile Scrum approach successfully accommodated the staged, iterative construction of fourteen core functional features, ranging from tour-package management and the digital reservation flow to content management and transaction reporting by the administrator. The integration of the Midtrans payment gateway successfully automated payment verification through a webhook callback, so that transaction status is updated in real time and the e-ticket can be issued immediately after payment is verified, without administrator intervention. The usability test using the SUS instrument on 32 respondents produced a mean score of 78.91, classified as grade B with an "Excellent" adjective rating and an "Acceptable" range, with 84.4% of respondents rating the system as acceptable and 71.9% assigning a grade of A or B. These results indicate that the resulting application not only fulfills its functional requirements on a technical level, but also provides an experience that is easy to understand for both travelers and the agency's staff, although the complexity of the multi-step reservation-and-payment flow remains the primary area for improvement. Future work is recommended to add automated notifications for travelers, to conduct security and server-load testing prior to production deployment, and to extend the platform with a native mobile application.

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