Journal of Information System Research (JOSH)
Volume 5, No. 4, Juli 2024, pp 1207−1215
ISSN 2686-228X (media online)
https://ejurnal.seminar-id.com/index.php/josh/
DOI 10.47065/josh.v5i4.5588

# Development of Android Based Halal Tourism Application For Travelers Using Scrum Method

**Mursyidhan Ariefbillah A.M.[1,*], Royana Afwani[1], Ramaditia Dwiyansaputra[1], Akhmad Saufi[2]**

[1] Departement of Informatics Engineering, Faculty of Engineering, University of Mataram, Mataram
Jl. Majapahit No.62, Gomong, Kec. Selaparang, Kota Mataram, Nusa Tenggara Barat
[2] Departement of Management, Faculty of Economy and Business, University of Mataram, Mataram
Jl. Majapahit No.62, Gomong, Kec. Selaparang, Kota Mataram, Nusa Tenggara Barat
Email: [1,*]mursyidhan7@gmail.com, [2]royana@unram.ac.id, [3]rama@unram.ac.id, [4]akhmad.saufi@unram.ac.id
Correspondence Author Email: mursyidhan7@gmail.com
Submitted: **16/07/2024;** Accepted: **29/07/2024;** Published: **30/07/2024**

**Abstract**−Various strategies have been employed to rejuvenate the tourism industry, including enhancing halal tourism services. The halal tourism market segment is highly significant in terms of visitor number and expenditure during travel. This research addresses the technological challenges faced by halal tourism by developing an integrated Android application designed to facilitate hotel reservations, tourist transportation, tour packages, and access to halal-related information. Academics from several fields of University of Mataram play a crucial role in this project, serving as both Product Owners and Scrum Masters, guiding the development team, facilitating discussions, and ensuring the alignment of the application with halal tourism regulations. The application aims to enhance convenience and efficiency for Muslim Travelers by providing easy access to services and information, thus promoting more accessible and effective travel planning. This initiative supports the specific needs of Muslim Travelers and contributes to the economic growth and sustainability of halal tourism in the region. The User Interface (UI) and User Experience (UX) testing using the System Usability Scale (SUS) yielded a score of 82.5 with a grade "A". From the test results, it was concluded that the application, through the exploration of academic insights, is capable of producing an effective solution and meeting the needs of users, thereby improving the quality of services for tourists.

**Keywords**: Android; Halal Tourism Application; Kotlin; Scrum; System Usability Scale

## 1. INTRODUCTION

The tourism industry plays a pivotal role in the economy of West Nusa Tenggara province, especially on the island of Lombok. However, the onset of the Earthquakes in 2018 and the COVID-19 pandemic in 2020 led to a significant downturn in this sector. One of the most notable impacts was a sharp decline in the number of Travelers, which plummeted to 158,000 at its lowest point in April 2020—representing a mere 25% of the total tourist arrivals in 2019 [1]. Various strategies have been employed to rejuvenate the tourism industry, including enhancing halal tourism services. Despite these concerted efforts, the industry has yet to fully rebound to its pre-pandemic levels.

Halal tourism represents an emerging trend within the tourism industry, providing services that comply with Islamic laws. The Global Islamic Economy Report 2020/2021 highlights that Muslim Travelers contribute significantly to the tourism sector, with expenditures reaching $20 trillion [2]. This demographic has significant potential for tourism development on Lombok Island, which is known internationally for halal tourism. Focusing on attracting Muslim travelers is crucial for revitalizing the tourism sector, requiring improved services and accessibility in the halal tourism sector. A key strategy in this context is the digitalization of the industry, which would streamline access to information and services, thereby increasing their effectiveness and efficiency [3], [4]. This approach caters to the specific needs of Muslim Travelers and modernizes the overall tourism infrastructure, making it more adaptable to current trends and demands [5].

The University of Mataram, in collaboration with PT Reganda Persada (Grand Madani Hotel), is developing a digital platform for Muslim travelers to simplify hotel bookings, transportation, tour packages, and access to halal-certified destinations. During a workshop on August 23, 2023, various sectors worked together on this platform. Academics from informatics engineering, sociology, and halal tourism play a crucial role in discussions and ensuring adherence to halal tourism regulations. Their contribution is vital for enhancing facilities and accessibility for Muslim travelers. This initiative resulted in the development of an Android application using Android Studio and Kotlin [6], [7]. The development process will utilize the scrum method, an agile development framework well-suited for large-scale applications, as it emphasizes comprehensive project management with detailed planning and iterative feedback in each phase [8], [9]. Academics will serve as both Product Owners and Scrum Masters. As Product Owners, they will be the primary visionaries, leveraging their in-depth product knowledge. As Scrum Masters, they will guide the Scrum team, ensuring coordinated development and obstacle resolution. Regular feedback from travelers or end users, integral to the Scrum method, ensures each development phase aligns with user needs and stays on target.

Several approaches were considered for this research. The prototyping method involves stages such as needs analysis, prototype construction, evaluation, system coding, testing, and deployment [10]. It emphasizes creating a prototype early for a clear understanding of the system. The waterfall method, with distinct phases—analysis, design, implementation, testing, and maintenance—ensures each phase is completed sequentially, preventing overlap [11], [12], [13]. The third method, Scrum, is a type of agile development. Scrum is more

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flexible than prototyping and waterfall methods, allowing for individual features to be implemented and tested iteratively, enabling continuous feedback and improvements [14].

Agile development includes methods like Extreme Programming (XP), Feature-Driven Development (FDD), Test-Driven Development (TDD), and the Dynamic System Development Method (DSDM). Each method, as discussed in "Agile Software Development: Methodologies and Trends," has unique objectives: XP enhances code quality and adaptability, while FDD, TDD, and DSDM have their own structures and focuses. Unlike these methods, Scrum emphasizes project management with an iterative approach, facilitating teams to adapt more readily to evolving project requirements [15], [16], [17], [18], [19]. Based on the considerations, the author has decided to use the scrum method for application development. The scrum method is highly effective for complex system development and is well-suited for a team size of 10-15 people, allowing the team to manage the development process more efficiently.

In the development process, the author conducted a literature review focusing on roles within Scrum. A 2020 study titled "The Role of Project Managers in Agile Software Teams: A Systematic Literature Review" explores the role of project managers in agile development, highlighting their responsibilities in coordination, communication, problem-solving, and decision-making [20]. Another study, "Implementasi Scrum Agile Development Pada Sistem Informasi E-Mentor Di Kemahasiswaan IIB Darmajaya," examines how Scrum enhances collaboration among roles, mainly through stages such as sprint planning and sprint review [21]. Drawing from these studies, the author emphasizes the importance of roles in Scrum, with academics, including academics and students, as critical actors in the application development process.

This research has the comparison with previous research. The research "Pengembangan Aplikasi Pariwisata Sulawesi Barat Berbasis Android" primarily focuses on developing an Android-based tourism application for West Sulawesi, emphasizing usability and user feedback based on ISO 25010 standards [10]. While it provides a useful resource for general tourism information and received positive feedback from users, it lacks some advanced features and methodologies that are critical for more specialized applications. In contrast, this research demonstrates a more comprehensive and methodical approach to app development, specifically targeting halal tourism. This research excels in several areas like method used which is scrum, collaborative development, and technological integration.

This research endeavors to thoroughly investigate the data and information requirements in the halal tourism industry, focusing on producing integrated Android-based applications as its primary output. The digitization of tourism services and access forms a vital aspect of this research, aiming to significantly enhance the effectiveness and efficiency of the information and services provided to Muslim Travelers. The expectation is that this development will not only meet the specific needs of users more accurately but also improve overall accessibility. Additionally, this initiative is anticipated to contribute to substantial progress in the halal tourism sector in West Nusa Tenggara (NTB). By addressing these needs through advanced technological solutions, the research aspires to create a more seamless and user-friendly experience for Muslim Travelers, fostering a more inclusive and efficient tourism environment. This comprehensive approach highlights the importance of integrating modern technology with cultural and religious considerations to drive the region's growth and sustainability of halal tourism.

## 2. RESEARCH METHODOLOGY

Application development utilizing the Scrum method involves structured stages that enable the systematic progression of system development. The iterative approach central to Scrum facilitates this systematic workflow. Generally, the flow of the Scrum development method is illustrated in Figure 1, depicting the stages of the Scrum Method. The stages are begin with creating user stories, where the data is being gathered to understands the potential users needs, to served in a user stories model. The next stage is product backlog, where the data gathered are being converted into product backlog where the upcoming tasks are being listed. And then the sprint, is split into 6 iteration, where all the product backlog is executed [14].

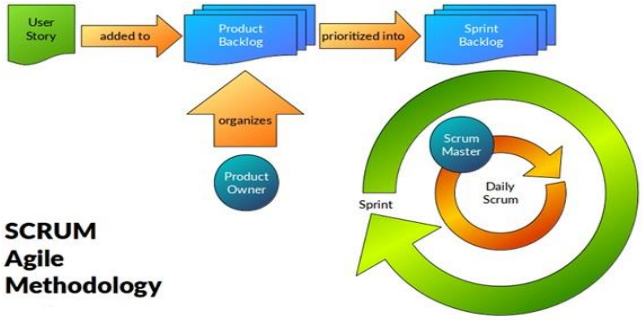


**Figure 1.** The Stages of Scrum Method

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### 2.1 User Stories

The initial phase of our project began with the creation of user stories, a critical step that involved comprehensive data gathering. This data collection process was facilitated through a series of discussions and workshops led by a dedicated academic team from the University of Mataram. These sessions were instrumental in ensuring that the perspectives, needs, and expectations of potential users were thoroughly understood and documented. The academics meticulously gathered data, which would later serve as the foundation for designing applications tailored to meet user requirements.

The gathered data was then meticulously analyzed and translated into detailed user stories. User stories are concise, simple descriptions of a feature told from the perspective of the end user. They play a pivotal role in agile development, as they help to ensure that the development team maintains a clear focus on delivering features that provide real value to users. Each user story captured a specific user need or requirement, providing a structured way to prioritize and manage the development process.

### 2.2 Product Backlog

With a comprehensive set of user stories in place, the next step involved organizing these stories into a product backlog. The product backlog is essentially a prioritized list of everything that might be needed in the product, serving as the single source of truth for the development team. This backlog was not static; it was continuously refined and updated to reflect new insights and changing priorities.

### 2.3 Sprint Backlog

The product backlog was then divided into sprint backlogs, which were further broken down into six sprint iterations. Each sprint represents a time-boxed period, typically lasting two to four weeks, during which specific user stories are selected and developed into working features. Before commencing the first iteration, the academic team organized a sprint planning session.

This session was crucial for outlining the tasks and objectives for the initial sprint. During sprint planning, the team reviewed the highest-priority items from the product backlog and determined what could be accomplished during the upcoming sprint. Once the sprint planning was completed, the team began the sprint execution phase. This phase involved the actual development work, where the tasks identified during sprint planning were carried out.

Throughout this phase, the development team worked collaboratively, leveraging their collective skills and expertise to transform user stories into functional features. At the end of each iteration, a sprint review session was conducted. The sprint review provided an opportunity for the development team to demonstrate the work completed during the sprint to stakeholders, including the academic team. This session was not only a chance to showcase progress but also to gather feedback and identify any issues encountered during the sprint. The insights gained from these reviews were invaluable for refining the product backlog and planning the next sprint.

The cycle of sprint planning, execution, and review was repeated across six iterations. Each iteration built upon the previous ones, gradually adding more features and refining the product. This iterative approach allowed for continuous improvement and adaptation, ensuring that the final product closely aligned with user needs and expectations. The planned sprint backlog for each iteration guided the team’s efforts, providing a clear roadmap for development and helping to maintain a steady pace of progress. Through this structured and collaborative process, the project advanced methodically, with each sprint bringing the team closer to delivering a fully functional and user-centric application [17].

## 3. RESULT AND DISCUSSION

### 3.1 User Stories

In designing the application, gathering data related to user needs necessitates observations and assessments to identify field-specific problems and requirements. To accomplish this, the academic team, comprising academics, engaged in various activities, including discussions and observations involving experts and stakeholders from the tourism industry sector. These efforts aimed to gain comprehensive insights into the challenges and specific needs within the industry, ensuring that the application design effectively addresses these aspects.

The academic team engaged students in observing and gathering data for application design. They conducted workshops and a Focused Group Discussion (FGD) at the Grand Madani Hotel on August 23 and August 30, 2023, respectively. Stakeholders from the tourism industry participated in discussions and Q&A sessions, providing insights crucial for designing applications in halal tourism, focusing on user needs like product management and ordering processes.

The data and information gathered from these observations will be utilized to shape the application's functionality by creating user stories. These user stories will outline the specific features and functionalities to be included in the application, derived directly from the summarized information and insights obtained. This approach ensures that the application's design aligns closely with the identified user needs, enhancing its relevance and

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usability for its intended audience. The detailed results of the creation of user stories can be seen at the Table 1, describing the user stories created in this stage.

**Table 1**. User stories

| No | Persona | Objective | Result |
|---|---|---|---|
| 1 | General Tourist | Looking for information about hotel or transportation products to be booked | Can place product orders easily and as needed |
| 2 | Muslim Tourist | Looking for halal information on hotel or transportation product | Get certainty regarding halal information from a product |

Based on collected data, the system will meet user needs on web and Android platforms. The web app, using design thinking, supports users, client management, and superadmins. The Android app, developed with Scrum, serves tourists and clients like hotels, transportations, and travel agents. Both platforms integrate with a Node.js backend containing APIs. Detailed descriptions of client applications are available in other research papers.

### 3.2 Product Backlog

The preparation of the product backlog is grounded in the analyzed user requirements, aiming to detail the functional domains of the system that need to be addressed. Academics, particularly the academic team, are crucial in initiating discussions to compile these product backlogs. They document the outcomes of these discussions, forming the product backlogs. This process identifies six key domains as the focus areas for application development, as outlined in Table 2. These domains created in the product backlog will focus on halal facilities and amenities, especially client and product information. The product backlog details of domain and its description can be seen in Table 2.

**Table 2.** Product backlog

| Domain | Description | Priority |
|---|---|---|
| Authentication | Allows users to authenticate themselves so that they can use the app. | High |
| Landing Page | Allows users to view a list of product provider clients and recommendations. | High |
| Client Information | Allows users to view details of product provider clients as well as a list of products offered including halal facilites. | High |
| Product Information | Allows users to view detailed information related to the product to be ordered including halal amenities of the product. | High |
| Product Order | Allows users to place product orders up to the payment stage | High |
| Order History | Allows users to view the history of bookings that have been made. | Mid |

### 3.3 Sprint

The previously created Product Backlog will be transformed into a tangible product during the sprint. This stage will encompass six iterations over two months. Each domain from the Product Backlog will be allocated to a specific sprint iteration, with detailed features for each domain outlined in the respective sprint backlogs. Below is a breakdown of the tasks and features planned for each sprint.

#### 3.3.1 Sprint 1

There is the backlog of the first sprint, domains from the product bakclog are detailed into some features, as in the Table 3.

**Table 3.** Sprint backlog 1

| Sprint | Domain | Feature | Priority |
|---|---|---|---|
| 1 | Authentication | Register using username, email, and password | High |
| | | Login using username/ email and password | High |
| | | Users can log out | High |
| | | Users can reset their password. | Mid |

The academic team conducted sprint planning to organize the sprint backlog for the first sprint. During this initial sprint iteration, the focus will be on the authentication domain. This domain will be broken down into several key features: user registration, login, logout, and password reset.

In the sprint review, the academic team and stakeholders concurred that the execution of the first sprint successfully met user needs. All features functioned well, including user registration, login, logout, and password reset. The result of this sprint are creation of register page and login page, as mentioned in the Figure 2 and Figure 3.

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**Figure 2.** Register Page

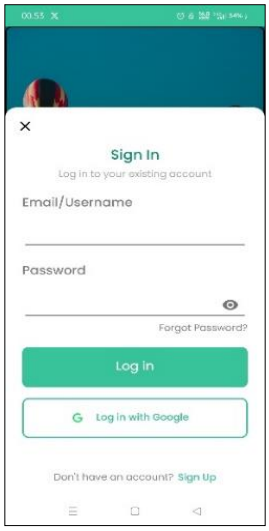


**Figure 3.** Login Page

### 3.3.2 Sprint 2

In the second sprint, the academic team decided to implement two domains from the backlog: the Landing Page and Partner Information. The Landing Page domain includes two features: a list of product provider clients and hotel product recommendations. The Client Information domain contains one feature: product provider client details which will show the halal facilities of the clients. For more detailed information, please refer to Table 4, which explaining the second sprint backlog.

**Table 4.** Sprint backlog 2

| Sprint | Domain | Feature | Priority |
|---|---|---|---|
| 2 | Landing Page | Users can view a list of product provider clients | High |
| | | Users can view recommendation for hotel product provider clients | Mid |
| | Client Information | Users can view product provider partner details | High |

In the sprint review, the product owner approved the Landing Page features. The academics team selected the Google Maps API for partner location details based on their research. They also emphasized including halal information about clients. For the product provider partner information detail feature, observations were made by the product owner and academics. They recommended separate lists for halal and regular facilities and adding policy details to the partner information page. These recommendations were included in sprint two notes by the Scrum Master for the next iteration. The result of this sprint are creation of landing page and client information page, as mentioned in the Figure 4 and Figure 5.


**Figure 4.** Landing Page

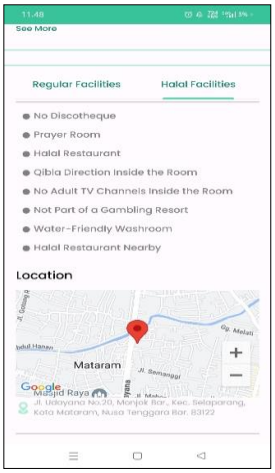


**Figure 5.** Client Information Page

### 3.3.3 Sprint 3

The product owner and Scrum Master completed the mapping for the Product Information domain in the third sprint. During this sprint, the backlog for the Product Information domain was divided into three features: product

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list, product order date, and product details. For a detailed breakdown of the backlog for the third sprint, please refer to Table 5. The Product information includes the halal amenities list in detail feature. The detailed features can be seen in Table 5.

**Table 5.** Sprint backlog 3

| Sprint | Domain | Feature | Priority |
|---|---|---|---|
| 3 | Product Information | Users can view a list of available products | High |
| | | Users can fill in the order date for the product to be selected | High |
| | | Users can view details of the selected product | High |

From the results of the sprint review, two features—the product list and product details—performed well and were accepted by the product owner. The halal amenities are being focused by the academics and development team. However, there were notes to enhance the page appearance, as some text in the product details overlapped. Feedback was provided to improve the date selection interface for the order date feature. As the product owner, the academics suggested implementing a date range selection to accommodate user check-in and check-out dates more effectively. These notes were incorporated into the list of improvements for the next sprint. The result of this sprint are creation of product list page and product detail page, as mentioned in the Figure 6 and Figure 7.


**Figure 6.** Product List Page

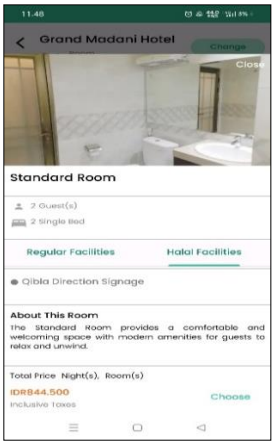


**Figure 7.** Product Detail Page

### 3.3.4 Sprint 4

In sprint 4, the product owner and team continued to work on the ordering domain. The sprint backlog for this domain included two detailed features: the product order summary and the contact form completion. For a more detailed breakdown, please refer to Table 6, which explains the product order domain and the features.

**Table 6.** Sprint backlog 4

| Sprint | Domain | Feature | Priority |
|---|---|---|---|
| 4 | Product Order | Users can view product order summary | High |
| | | Users can fill in contact information such as name, mobile number, and email. | Low |

At the sprint review, the academics, acting as the product owner, accepted the team's work on the completed features. However, a note restricted the contact form to logged-in users only, excluding guests and others. This note was then marked as an improvement to be addressed in the next sprint. The result of this sprint is the creation of booking summary page, as mentioned in the Figure 8.


**Figure 8.** Booking Summary Page

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### 3.3.5 Sprint 5

In Sprint 5, the academic team as product owners focused on enhancing the payment process for users, specifically on product payments and payment status details. They researched and decided to implement the Midtrans API for its user-friendly and integrable payment solutions. For backlog details, see Table 7, which describes the detail of sprint backlog 5.

**Table 7.** Sprint backlog 5

| Sprint | Domain | Feature | Priority |
|---|---|---|---|
| 5 | Product Order | Users can make product payments through midtrans payment gateway | High |
| | | Users can view payment confirmation and booking status | Mid |

In the sprint review, the features developed were functioning well and were accepted by the product owner. The product owner also provided feedback for the order status page, suggesting that it be adjusted to match the status categories used by Midtrans, namely SUCCESS, PENDING, FAILED, CANCELLED, and INVALID. These adjustments were noted and scheduled for completion in the next sprint. The result of this sprint is the integration of the system with midtrans payment gateway, as mentioned in the Figure 9 and Figure 10.

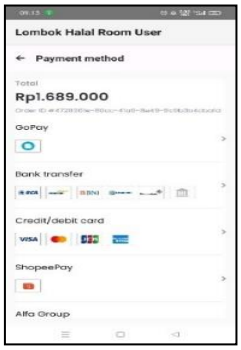


**Figure 9.** Midtrans Payment

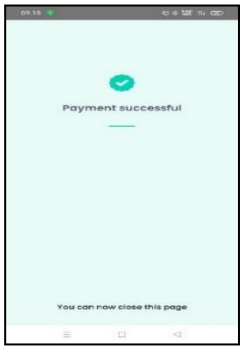


**Figure 10.** Payment Successful

### 3.3.6 Sprint 6

Sprint 6 marks the final iteration, focusing on implementing the order history domain. Following discussions within the academic team, it was determined that users who make reservations require access to their booking history to view details of past reservations. The features included in this domain are the order history list and order history details. The details of sprint 6 and its backlog are being described in Table 8.

**Table 8.** Sprint backlog 6

| Sprint | Domain | Feature | Priority |
|---|---|---|---|
| 6 | Order History | Users can view the history of bookings | High |
| | | Users can view booking history details. | Mid |

Following Sprint 6's review, the academic as product owner expressed satisfaction with the outcomes, noting alignment with user requirements. Valuable suggestions were made, including introducing order status filters to enhance user experience and navigation. These suggestions are noted for future development phases to refine and enhance the application further. The result of this sprint are creation of booking history page, as mentioned in the Figure 11.

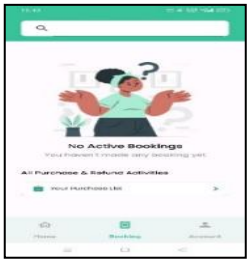


**Figure 11.** Booking History Page

### 3.4 Test

The application's user interface is tested using the SUS method [22], [23]. Feedback is gathered from potential users, and the results are calculated based on their questionnaire responses. The details of SUS score are described in the Table 9.

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**Table 9.** SUS score table

| Respondents | SUS Score | Respondents | SUS Score |
|---|---|---|---|
| 1 | 82,5 | 16 | 62,5 |
| 2 | 87,5 | 17 | 95 |
| 3 | 100 | 18 | 100 |
| 4 | 72,5 | 19 | 80 |
| 5 | 65 | 20 | 85 |
| 6 | 70 | 21 | 77,5 |
| 7 | 100 | 22 | 82,5 |
| 8 | 82,5 | 23 | 85 |
| 9 | 82,5 | 24 | 100 |
| 10 | 70 | 25 | 70 |
| 11 | 77,5 | 26 | 85 |
| 12 | 100 | 27 | 75 |
| 13 | 85 | 28 | 95 |
| 14 | 82,5 | 29 | 70 |
| 15 | 75 | 30 | 72,5 |
| Total: 2.467,5 | | | |
| Average score SUS: 82,25 | | | |

The result of the SUS calculation is a score of 82. This score is perfect in the category "acceptable" with an "A.". With such a score, usability shows that the application is easy to use and is already eligible for publication.

## 4. CONCLUSION

Based on extensive research, it has been conclusively determined that the academic team, particularly the scholars from the University of Mataram, plays a crucial and multifaceted role in the project's various technical and non-technical dimensions. The rigorous exploration, in-depth research, and extensive experience brought to the table by these academics provide invaluable insights and a holistic perspective for the entire research team. Their contributions span a broad spectrum of activities, ensuring that every aspect of the project is thoroughly examined and well-informed. In the context of the scrum development process, the academics from the University of Mataram assume dual roles of great significance: they serve both as product owners and scrum masters. Each sprint iteration's results undergo meticulous discussion and review by the lecturer team. This rigorous review process is vital to ensure that the features developed during each sprint are in alignment with user needs and expectations. The academics' active participation in these reviews is crucial, as their feedback helps refine and enhance the application, ensuring it evolves in a direction that meets user requirements effectively. The active involvement of the academic team from the University of Mataram is instrumental in creating an application that not only meets but exceeds user expectations. Their dual roles within the scrum framework, coupled with their extensive research and experience, provide a robust foundation for the project's success. This collaborative approach ensures that the application is not only technically sound but also user-centric, addressing real-world needs in an effective and meaningful way. The holistic involvement of these academics underscores the importance of bridging theoretical research with practical application, ultimately leading to the development of a highly functional and relevant product.

## ACKNOWLEDGMENT

Thanks to the Ministry of Research and Technology for the innovation and funding for this research. All the support provided was very influential in the success of the research.

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