Journal of Information Systems and Informatics
Vol. 6, No. 4, December 2024 e-ISSN: 2656-4882 p-ISSN: 2656-5935
DOI: 10.51519/journalisi.v6i4.956 Published By DRPM-UBD

Developing a UKM Activity Application for Universities in North Jakarta Using Scrum

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Abstract

Student Activity Units (UKM) play a crucial role in supporting the development of student skills beyond academic activities. However, the management of UKM activities often encounters challenges in communication, administration, and membership management. This study aims to develop a UKM Activity Application to enhance the operational efficiency of UKMs at Universities in North Jakarta. The application is equipped with key features such as member registration, activity management, activity payment, and reporting. The development process was carried out using the Scrum methodology, which involves iterative stages, including user needs analysis, product backlog preparation, and feature development across multiple sprints. Daily stand-up meetings were conducted to monitor progress, while sprint reviews provided opportunities for evaluation and adjustments. Testing, including black box testing, ensured the application's functionality and reliability. The implementation of this application resulted in significant improvements in operational efficiency, with reduced administrative delays, enhanced communication among members, and increased participation in UKM activities. Feedback from users highlighted the application's user-friendly interface and its ability to streamline processes, such as managing activities and tracking attendance. Overall, this application serves as a modern digital solution to facilitate UKM management, addressing existing challenges and fostering greater student engagement within the university environment.

Keywords: UKM, Activity, Application, Scrum, University

1. INTRODUCTION

Student Activity Units (UKM) in universities play a vital role in supporting student self-development [1]. UKMs provide a platform for students to build skills, expand social networks, and engage in activities that contribute to both academic and non-academic achievements. At universities in North Jakarta,

various UKMs actively organize a wide range of internal and external activities [2]. However, the increase in UKM membership and diversity of activities has created significant challenges in terms of organized and efficient management [3]. In the context of digital transformation, information technology presents a great opportunity to improve the operational efficiency of UKMs and strengthen student engagement [4]. Despite this potential, UKM management still faces several specific challenges. These include difficulties in effectively delivering activity information, which often leads to uneven dissemination and missed participation opportunities. Manual processes for attendance tracking, activity planning, and financial management are not only time-consuming but also prone to errors, leading to inefficiencies in operations. These issues hinder the smooth execution of UKM activities and risk diminishing member trust in the UKM management team [5], [6].

Previous studies have attempted to develop information systems for student organizations, but most have primarily addressed general administrative aspects without focusing on the specific challenges of activity management. For example, while some studies propose communication platforms for student engagement, they lack features such as integrated activity management, payment processes, and comprehensive reporting [7]. Furthermore, the absence of iterative development approaches often results in systems that do not adequately meet end-user requirements [8].

This study aims to address the challenges of UKM activity management by developing a UKM Activity Application tailored to the needs of a University in North Jakarta. The development process adopts the Scrum methodology, which is structured into three iterative sprints, each focusing on specific features and continuous improvements based on user feedback. In Sprint 1, the focus is on building the application's foundational features, such as the dashboard, login system, and activity information display. These features address the critical need for efficient communication, enabling members to easily access up-to-date activity details. Moving into Sprint 2, the development expands to include advanced functionalities for admin-level activity management. Features such as creating, editing, and managing activities are introduced, alongside tools for handling payment processes, which streamline financial administration and improve transparency. Finally, Sprint 3 prioritizes testing the application's functionality and reliability through black box testing methods. This phase ensures that the system meets user requirements and performs as intended. Further user feedback is gathered and analyzed during this stage to refine the application and make final adjustments. By following this iterative, user-centered approach, the study successfully delivers an application that improves communication, simplifies operational processes, and enhances the efficiency of UKM activity management.

p-ISSN: **2656-5935** http://journal-isi.org/index.php/isi e-ISSN: **2656-4882**

By following this iterative and user-centered approach, this study directly addresses the specific challenges of UKM activity management, including uneven information dissemination, inefficient manual processes, and lack of transparency in financial administration. The resulting application is expected to significantly improve operational efficiency, enhance communication, and strengthen member participation and trust in UKM activities.

2. METHODS

This study uses the Scrum method show in Figure 1, a software development approach that emphasizes team collaboration, flexibility, and iterative development. This method was chosen to ensure that the developed UKM activity application is able to meet the specific needs of UKM administrators and students at the University of North Jakarta. Development is carried out through structured stages, starting from identifying needs to testing and implementing the application [10], [11], [12].

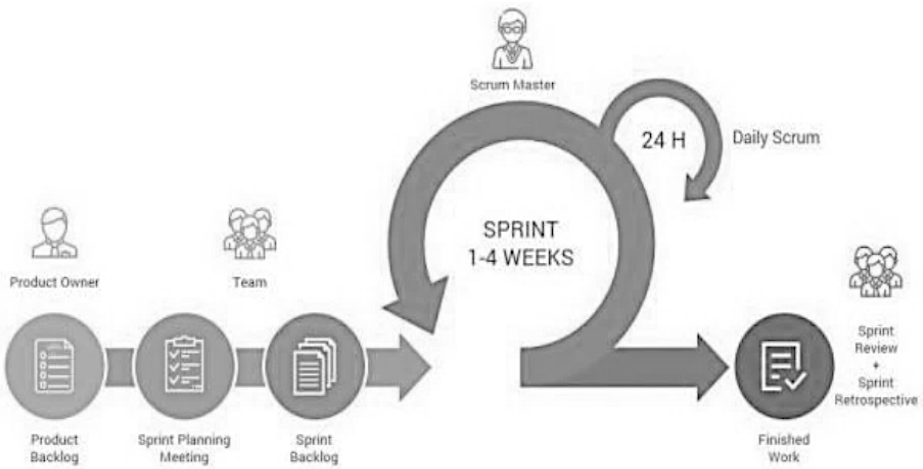

Figure 1. Scrum Method [9]

The initial step is the Product Backlog, where the development team collaborates with UKM administrators and students to identify system needs [13]. In this stage, various features are designed, including activity management, payment management, and report activity. All of these needs are arranged in a backlog to determine development priorities. Furthermore, Sprint Planning is carried out to divide the backlog into several sprints, each of which has a duration of two weeks.

During the development process, Daily Scrum is carried out every day to monitor progress, resolve obstacles, and ensure effective communication among team

members [14]. At the end of each sprint, a Sprint Review is carried out, where the application is tested by UKM administrators and students. Feedback from users is used to refine features in the next sprint [15]. The team also held a Sprint Retrospective to evaluate the work process and find opportunities for improvement in the team's working methods.

Comprehensive testing was conducted at the Final Testing stage, which included testing the functionality, performance, and security of the system [16]. The application was implemented after ensuring that all features worked as expected and could be used in managing UKM activities efficiently. Through this approach, the resulting application is expected to increase the effectiveness and efficiency of UKM activity management and strengthen student participation.

3. RESULTS AND DISCUSSION

3.1. User Stories

Conducted interviews with UKM administrators revealed a strong need for digital solutions to manage activities and record member attendance effectively. Administrators emphasized the challenges of manual processes, which are time-consuming and prone to errors. They expressed the need for features that would allow them to input activity details, such as date, time, location, and description. Additionally, administrators highlighted the importance of generating downloadable digital reports for documentation and evaluation purposes. These requirements shaped the User Stories, forming the foundation for the system's development.

3.2. Product Backlog

Based on the User Stories created, the product backlog is obtained in Table 1.

Table 1. UKM Activity Application Product Backlog

No	*User Stories*	Fitur *Product Backlog*	Estimasi (Jam)	Tingkat	Prioritas
1	Users get an overview of the system design	1.1 Create use case diagram	3	Weak	Low
		1.2 Create activity diagram	5	Medium	High
2	Developers create system	2.1 Create class diagram	8	High	Sedang
		2.2 Create Application Activity UKM	10	High	High
3	Users do testing	3.1 Application Testing	10	High	High

3.3. Sprint Planning

3.3.1. Sprint 1

1) Use Case Diagram

This stage in the development of the UKM Activity Application at a University in North Jakarta focused on creating the main foundation of the system based on the initial needs of users, namely Members (members) and UKM Admins (UKM administrators). Aims to develop core features that enable effective and interactive management of activity information. At this stage, the development team uses a use case diagram as a guide to understand the system requirements and ensure that each main function can be implemented in stages as shown in Figure 2 [17]. The diagram displays the main roles of users, namely members who can view UKM activities, select activities, and make payments if necessary, and admins who can manage activity information and generate financial reports.

The initial stage of development in this sprint includes the creation of a Dashboard, which is the access center for members and admins. To support members, the See Activity feature will be designed, allowing them to view activity information created by the admin. As an initial step for activity management, admins will have access to the Manage Activity feature, which allows them to add or update activity information. In this sprint, the system also begins to be designed to handle financial interactions through Payment Activities, ensuring that the system has a secure transaction management foundation.

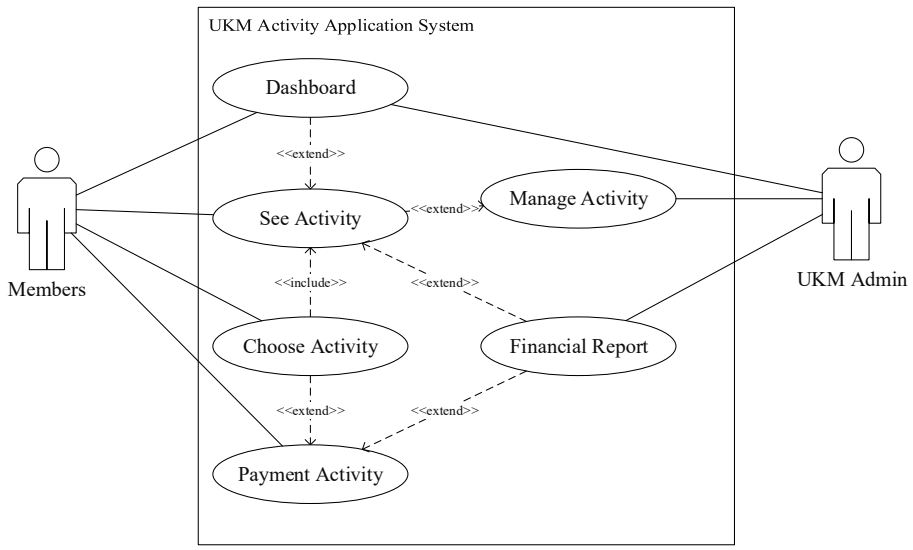

Figure 2. UKM Activity Application Use Case Diagram

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2) Activity Diagram

Sprint 1 in the development of the UKM Activity Application also illustrates the activity diagram, which can be seen in Figure 3. The process begins with members or admins logging into the system. After successful login, users are directed to the dashboard according to their role. For members, they can access the list of activities through the "See Activity List" feature. If members want to participate in a particular activity, they can select the "Join Activity" option. If the selected activity requires payment, members are directed to complete the payment process through the "Payment the Activity" feature. Meanwhile, admins have access to manage activities through the "Manage Activity" feature, which includes creating, updating, or deleting activities. In addition, admins can also view payment reports from members who have registered and made payments, using the "See Payment Report" feature.

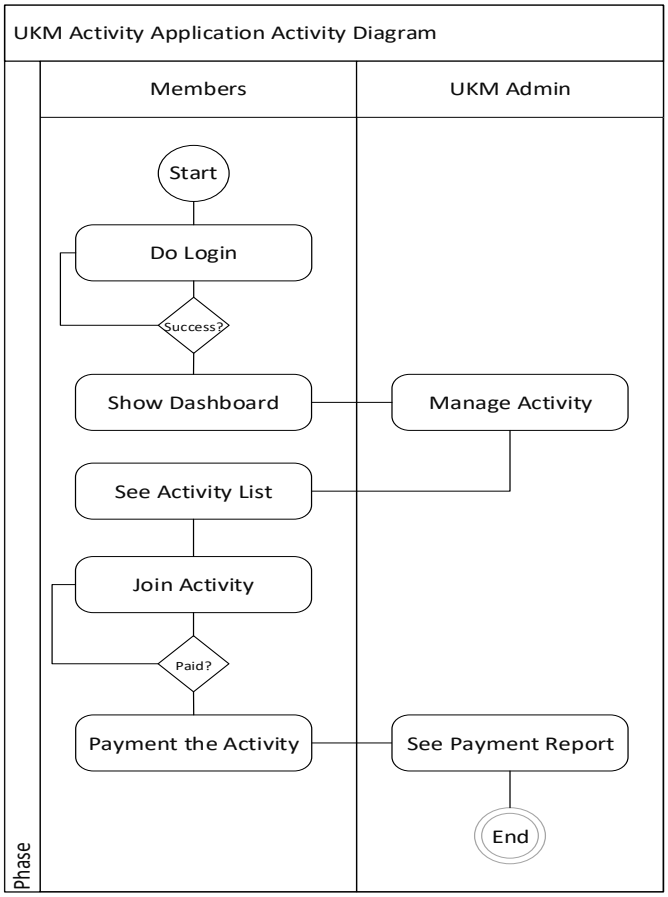

Figure 3. UKM Activity Application Activity Diagram

p-ISSN: **2656-5935** http://journal-isi.org/index.php/isi e-ISSN: **2656-4882**

3.3.2. Sprint 2

1) Class Diagram

The class diagram in Figure 4, used in the development of the UKM Activity Application, illustrates the system structure with relationships between classes that play a role in the main application process. This class diagram consists of several core classes, namely Member, Admin, Member Menu, Dashboard, Report Payment, Payment Activity, and Activity. The Member class is responsible for storing data and information related to members, such as name, ID, and membership status. This class is connected to the Member Menu, which provides features that members can access, such as viewing a list of activities (managed in Activity) and registering for activities. Meanwhile, Admin is a class that functions to store UKM administrator data, including their ability to manage activity information and payment reports.

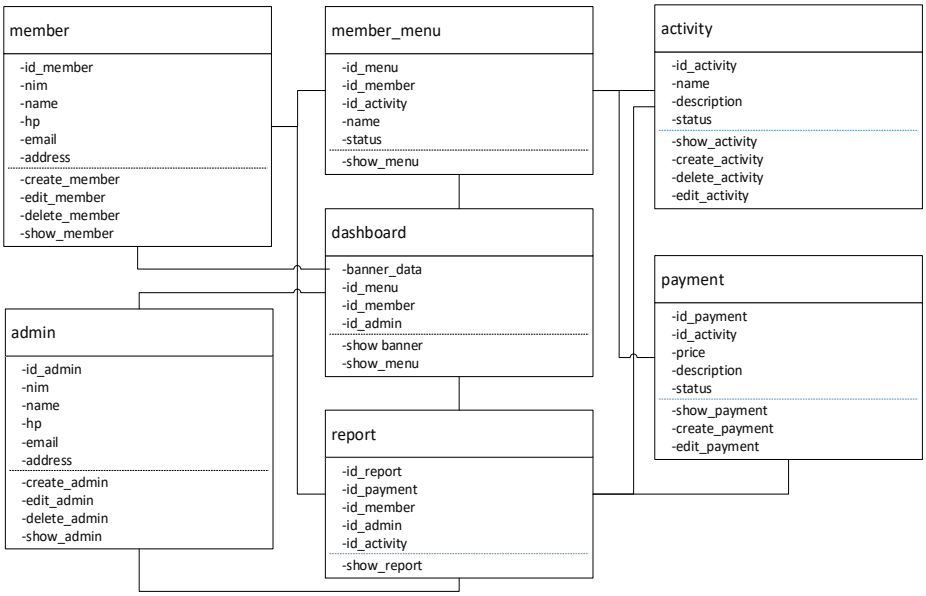

Figure 4. UKM Activity Application Class Diagram

The Dashboard class functions as the main link between members and admins, allowing both to access features according to their respective roles. Members use the Dashboard to view a list of activities, while admins use the Dashboard to manage activity information and monitor payment reports. Activity is a core class that stores activity data, such as activity name, time, description, and activity status. Members can register for this activity through the Payment Activity, which manages the payment process for paid activities. The Report Payment class is

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used to record and provide reports related to the payment status of members who participate in activities. Admins can use this class to view detailed payment data and ensure that every transaction is recorded properly.

2) Mockup

In Sprint 2, application development was also carried out that focused on the implementation of the Upload Activity and Change Activity features for admins. This feature aims to provide convenience for admins in managing SME activity data efficiently through the application interface. The following is an explanation of the two features: The first feature in Figure 5, Upload Activity, is designed as a form to add new activity information to the system. Admins can fill in various important details of the activity, such as the title of the activity, date of implementation, time of implementation, location of the activity, type of activity, field of organizer, name of the speaker or resource person, and participation costs. This form is equipped with input validation to ensure that the data entered is complete and in accordance with the expected format. After all the data is filled in, the admin can press the Save button to save the new activity to the system. With this feature, admins can add various types of activities, from seminars, training, to workshops, easily and quickly.

Figure 5 UKM Activity Application Add Activity

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The second feature in Figure 6, Change Activity, allows admins to make updates or corrections to previously registered activities. This form displays existing activity data, including title, date, time, location, type, field of organizer, speaker, and costs. Admins can select the activity they want to update from the list of available activities. After that, the admin can edit the activity information, such as changing the location, changing the implementation time, or updating the speaker's name. After the changes are complete, the admin can save the updates by pressing the Save Changes button. This feature is also equipped with a Cancel button to cancel the editing process if necessary. Both of these features are designed with an intuitive and simple interface, ensuring that admins can easily manage activities without confusion. With the Upload Activity and Change Activity features, the UKM activity administration process becomes more efficient, ensuring that the information displayed to members is always accurate and up-to-date. This stage is an important foundation for supporting the dynamic operational needs of UKM.

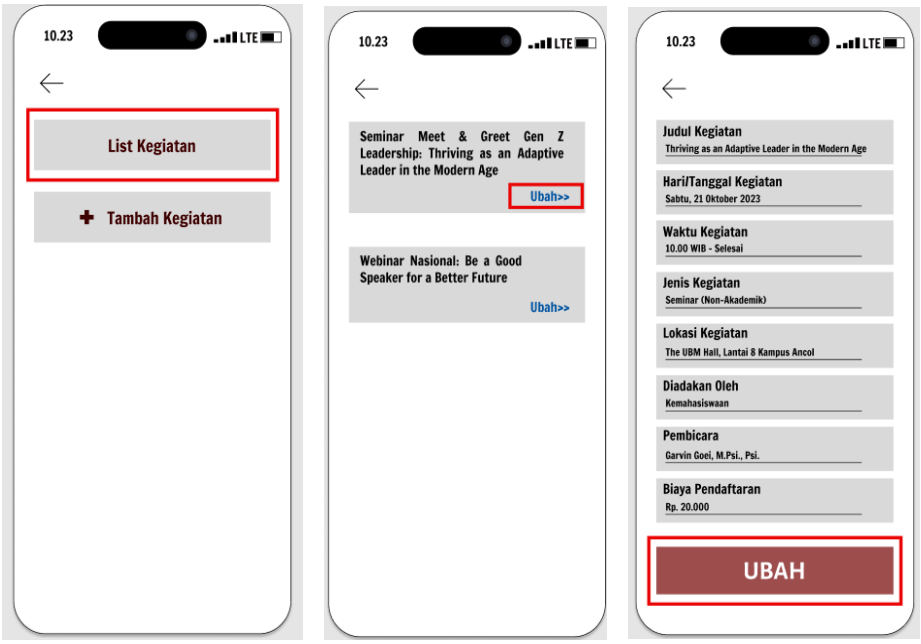

Figure 6. UKM Activity Application Edit Activity

3.3.3. Sprint 3

In Sprint 3, the UKM activity application testing process focuses on black box testing to ensure that all features and functionalities in the system function as expected.

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Table 2. UKM Activity Application Black Box Testing

No	Feature	Test Scenario	Input	Expected Output	Status
1	Login	Login Success	Username & password valid	Access to Dashboard	Pass
2	Login	Login Failed	Username wrong	Error Message Show	Pass
3	Dashboard	Members Access Dashboard	Valid login status	Show List Activity	Pass
4	Activity List	No Activity	Choose See List Menu	Message "No Available Activity"	Pass
5	Join Activity	Payment Activity	Choose Activity	Enter to Payment Process	Pass
6	Payment	Success Payment	Valid Data	Success Message	Pass
7	Manage Activity	Success Add Activity	Valid Data	Success Message "Activity Successfully Save"	Pass

This testing is carried out without looking at the internal implementation of the system, but rather emphasizes user interaction with the application and evaluating whether the system provides the right results according to the input provided. In this stage, some of the features tested include the login process, dashboard display, activity management, activity payments, and payment reports. The main purpose of this black box testing is to verify that the application can handle input correctly and provide appropriate output, and ensure that the user experience is not disrupted by functionality issues. By using various test scenarios that include valid, invalid input, and variations in user scenarios, this testing aims to find potential errors or defects in the application before it is launched further to end users.

3.4. Sprint Review

In the Sprint Review, the development team successfully demonstrated the application to stakeholders, showcasing its core functionalities, including user login, activity management, and payment processing. The feedback from stakeholders was largely positive, with particular praise for the system's ability to improve communication and streamline the planning process. Administrators highlighted significant time savings and a notable reduction in manual errors when managing activities. However, some areas for improvement were identified, such as enhancing the user interface to ensure smoother navigation and incorporating additional features like automated reminders for upcoming activities. These valuable insights will serve as a reference for guiding future development iterations and further enhancing the system's usability and functionality.

3.5. Sprint Retrospective

The Sprint Retrospective highlighted key achievements and challenges encountered during the development process. One of the major successes was the effectiveness of the iterative development approach, which ensured the delivery of functional features aligned with user needs. Additionally, black box testing provided valuable insights into system performance and user interactions, helping to identify and address issues early. However, challenges such as time management and technical issues with data integration required additional effort from the team. To address these, improvement strategies were outlined, including optimizing application performance for faster loading times, enhancing the user experience by refining the navigation flow and adding automated reminders, and strengthening internal team communication to improve coordination in future sprints. This retrospective provided a clear roadmap for addressing stakeholder feedback and further enhancing the application's usability and performance in subsequent development phases.

3.6. Discussion

The development of the UKM Activity Application demonstrates the significant impact of adopting a user-centered and iterative approach using Scrum [18]. By focusing on real user needs through interviews and continuous feedback, the system successfully addressed the manual inefficiencies faced by UKM administrators. The digitalization of activity management significantly reduced administrative workloads [19]. Additionally, attendance tracking became more accurate and accessible, enhancing the reliability of participation data. Usability feedback confirmed that the intuitive interface ensured seamless navigation for both members and administrators, making the system user-friendly and efficient [20]. These improvements reflect the transformative role of digital solutions in supporting operational efficiency and fostering organizational trust. The system not only streamlines activity planning and evaluation but also strengthens member engagement through clear communication and transparency [21]. Moving forward, integrating additional features such as automated reminders and advanced reporting could further enhance the system's value. This study highlights how iterative development and direct user involvement can result in practical solutions that effectively address organizational challenges.

4. CONCLUSION

This study successfully developed an application for managing UKM activities at a University in North Jakarta using the Scrum methodology, which consisted of three process sprints. In Sprint 1, the team developed essential features such as the dashboard, login system, and activity information display. Sprint 2 focused on

enhancing functionality by enabling admins to manage activities and payments, while also improving the application's interface. Sprint 3 was dedicated to testing the application, including black box testing, to ensure its quality and reliability.
The results demonstrate that Scrum is an effective methodology for developing functional applications that meet user needs and adapt to feedback iteratively. The application simplifies access for UKM members to view, participate in activities, and make payments, while enabling admins to efficiently manage activities and reports. For future improvements, it is recommended to integrate additional functionalities, such as a notification system, advanced search features, or activity reminders, to further enhance usability. Additionally, further enhancements to the user interface (UI) and user experience (UX) can be made to ensure the application is more intuitive, responsive, and visually appealing. Continued development and refinement will ensure the application effectively supports UKM activities and delivers greater value to users.

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