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Research Article

Travel Website Development Project Management Using The Agile Scrum Method

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Abstract: PT. Lentera Bangsa Benderang, which houses Binar Academy, is an educational institution that contributes to technology development in Indonesia. The company actively supports the development of digital-based technology, including a project to develop an airline ticket purchasing website for a travel client called GarudaNih. However, the company has a history of project delays of 40%. These delays occur due to a lack of backlog management, poorly managed changes in client needs, and ineffective communication between teams. Therefore, research was conducted to address the problem by offering the Agile Scrum method. In this study, effective and iterative stages were formulated in accordance with the methodology to resolve project issues on time. Furthermore, the feasibility of the method was tested as a solution to the disruption experienced by the project using Burndown Charts, Velocity, and Cycle Time. This research resulted in the application of the method to project management as an effort to overcome various problems previously faced by Binar Academy. Furthermore, the results of this study also proved that the method used had been tested for its feasibility and could be an effective solution in overcoming existing obstacles.

Keywords: Agile; Online Ticketing; Project Management; Scrum; Website

1. Introduction

PT Lentera Bangsa Benderang, the institution that oversees Binar Academy, plays a vital role in improving the quality of education and the development of digital technology in Indonesia. With a clear vision of "Enhancing the competitiveness of Indonesia's young generation in the digital era through education and technological innovation," the company is committed to creating an environment that supports the growth of digital skills and innovation among the younger generation (Lalu et al., 2023).

With this vision, the company actively supports the development of digital-based technology, including the development of a website for purchasing airline tickets for clients in the travel sector, called GarudaNih, as a strategic step. In the ever-evolving digital era, information technology plays a crucial role in facilitating public access to travel services, including online airline ticket booking. This allows users to plan trips more efficiently and at competitive prices (Dumadi et al., 2021).

Before this technology, the ticket booking process was done manually, which was often time-consuming and lacked transparency (Himanshu et al., 2023). The demand for more practical and efficient solutions has driven the emergence of web-based platforms that offer not only convenience but also greater transparency in choosing travel options (Dubois & Silvius, 2020). Digital transformation in the travel sector is showing significant growth, with users increasingly seeking fast and flexible services (Meilia Marka & Noor, 2023) (D & P, 2024). Therefore, developing a platform like GarudaNih requires effective project management to ensure all user needs are met.

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Currently, many IT companies, including Binar Academy, use conventional approaches to project management, which often face significant obstacles. A study titled "Challenges During the Movement Control Order (MCO) Against the Success of Software Development Project Management Deliverables" identified that software development projects experienced significant delays and challenges due to sudden changes in the work environment during the pandemic. This study showed that 65% of projects experienced delays (Hussein et al., 2023).

An internal study of projects previously managed by Binar Academy showed that 40% of projects in 2022 experienced delays due to a lack of backlog management, poorly managed changes in client requirements, and ineffective inter-team communication. To overcome these challenges, adaptive and collaborative project management methods are essential. One method proven effective in managing software development projects is Agile Scrum. This method emphasizes flexibility, team collaboration, and an iterative approach to produce products that meet user needs (Rachmawati et al., 2023).

In the context of GarudaNih development, the implementation of Agile Scrum allows the team to adapt to dynamically changing project needs and priorities, identify and resolve issues quickly through intensive communication between team members, and improve product quality through short development cycles (sprints), where user feedback can be immediately implemented. With Agile Scrum, the team can work more efficiently and responsively to change (Pratama & Zunaidi, 2023), ensuring that the GarudaNih platform can continue to grow and optimally meet user needs.

Through this approach, the development of GarudaNih is expected to overcome various existing challenges and provide an innovative, secure, and user-friendly airline ticket booking solution. In this project, project management features such as backlog prioritization, sprint planning, and daily stand-up meetings will be implemented using tools like Trello and Microsoft Excel. To demonstrate the effectiveness of project management, indicators such as backlog completion rate, task consistency, and sprint completion speed will be evaluated.

2. Literature Review

By referring to various previous studies, the author can identify concepts, methodologies, and findings that have been revealed in similar research. Based on Wasesha Research in 2022 (Wasesha, 2023), the Scrum method was chosen because of its ability to accelerate system development and adapt to changing Star Laundry needs, where the team can divide tasks into smaller parts for faster development of new features. The research focused on the application of the Agile Scrum method in Star Laundry's operations, with a primary focus on implementing more efficient work processes. Meanwhile, the GarudaNih study also evaluated the method's feasibility as a solution to address project delays.

There is also research from Kusdiyanto et al. in 2023 that focuses on the development of the Service Computing Framework with Scrum (SCFS) framework that aims to improve efficiency in developing service systems that are in accordance with the needs of the Service Computing Systems Engineering (SCSE) framework. Through an analysis of the strengths and weaknesses of SCSE and the potential of the Scrum methodology, this study uses the PIECES framework to evaluate the need for improvement in SCSE. This research has similarities with the GarudaNih research, namely analyzing the feasibility of the methods used in project development, but this study does not use Agile Scrum.

Agile Scrum

Agile Scrum is a framework applied within the Agile Scrum approach to project management, particularly in software development. This framework emphasizes the importance of iterative and incremental processes, with the primary goal of ensuring intensive collaboration, high flexibility, and the continuous delivery of valuable products (Sassa et al., 2023). In this context, Agile Scrum divides projects into short development cycles called sprints, each typically lasting between one and four weeks. The goal of each sprint is to produce a testable or usable portion of the product, allowing for regular evaluation and necessary adjustments based on feedback (Pratama & Zunaidi, 2023)(Rachmawati et al., 2023). In this context, Agile Scrum divides projects into short development cycles called sprints, each typically lasting between one and four weeks. The goal of each sprint is to produce a testable or usable portion of the product, allowing for regular evaluation and necessary adjustments based on feedback.

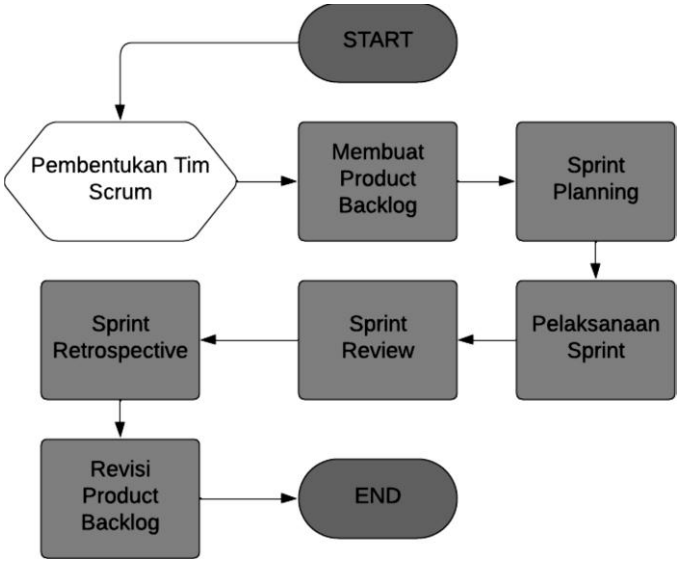

Figure 1. The Stages of Agile Scrum.

Based on Figure 1, the following are detailed steps in implementing Agile Scrum for project development are as follows:

a. Forming a Scrum Team

According to Wahyuningroem's research, the first step in implementing the Agile Scrum method is to form a Scrum team consisting of three main roles (Sassa et al., 2023): Scrum Master, Product Owner, and Development Team.

b. Creating a Product Backlog

Next, a crucial step is to create a Product Backlog, a list of features or project requirements that must be completed. User stories or tasks in this backlog are prioritized based on business value or user needs (Hassani-Alaoui et al., 2020). For the GarudaNih website, the product backlog might include various important features such as ticket search, seat selection, payment integration, and user interface design. This backlog serves as a guide for the team in determining what to work on first.

c. Sprint Planning

Each development cycle begins with Sprint Planning. At this stage, the team defines sprint goals, which are specific features or functions to be completed within a sprint. Furthermore, the team will break down the backlog into smaller tasks that can be completed within a sprint. This planning ensures that all team members have a clear understanding of what needs to be done and how to achieve it.

d. Sprint Execution

During the sprint, the team will carry out work according to the established plan. This process includes a short daily stand-up meeting lasting a maximum of 15 minutes (Kurniawan et al., 2021). This meeting is used to discuss progress, obstacles, and the daily work plan. Furthermore, team collaboration is key here, where all team members work together to complete tasks according to established priorities (Wahyuningroem, 2024).

e. Sprint Review

At the end of the sprint, the team holds a Sprint Review to demonstrate the work results to the Product Owner and other stakeholders. These results typically consist of testable features. The Sprint Review provides an opportunity for the team to receive direct feedback from stakeholders.

f. Sprint Retrospective

Following the Sprint Review, the team holds a Sprint Retrospective to evaluate the work process during the sprint. This meeting aims to identify successes that need to be continued, analyze any obstacles or bottlenecks that have occurred, and determine improvement steps for the next sprint.

g. Product Backlog Revision

After receiving feedback from the Sprint Review, the Product Backlog is updated to reflect new priorities. This revision process ensures that the product continues to evolve according to changing user needs and business objectives (Kamal et al., 2023). By regularly updating the backlog, the team can stay focused on what matters most and ensure that each sprint adds value to the project as a whole.

UML Diagram

UML diagrams are visual tools used to model and represent the structure and behavior of a system, particularly in software engineering (Shcherban et al., 2021). They use a standardized graphical notation to show how different components, classes, objects, and processes interact (Gosala et al., 2021). The two main categories are structural diagrams, which show a system's architecture (like a class diagram), and behavioral diagrams, which illustrate how a system works over time (like a sequence diagram or use case diagram).
Types of UML diagrams :

a. Structural Diagrams: These show the static aspects of a system.Class Diagram: Shows the system's classes, their attributes, methods, and relationships.
b. Component Diagram: Depicts how components are connected.
c. Object Diagram: Shows instances of classes and their relationships at a specific point in time.
d. Deployment Diagram: Illustrate the physical hardware and software deployment of the system.

Story Point

Story points are a unit of measurement used to estimate the effort required to complete a user story in the product backlog (Kusdiyanto et al., 2023) (Pasuksmit et al., 2022). One method for measuring story points is the Bucket System, which groups user stories into bucket categories with Fibonacci numbers (1, 2, 3, 8, 13, 21, etc.) based on their level of difficulty.

Bucket System

The Bucket System is an Agile estimation technique that organizes user stories into predefined categories or "buckets," each representing a specific range of story points. This method simplifies the collective estimation process by allowing teams to assess multiple user stories simultaneously based on their relative complexity and effort. By using predefined buckets containing allocated story points (often based on the Fibonacci sequence), teams can quickly classify stories, facilitate discussion, and reduce time spent on debate (Mallidi & Sharma, 2021).

Burdown Chart

A burndown chart is a visual tool used in the Agile Scrum methodology to track a team's progress in completing work during a sprint. This chart shows the amount of work remaining in the project backlog as time passes. According to Kusdiyanto Research, burndown charts help teams monitor the pace of task completion and provide a clear picture of whether the team is on track to complete the work on time (Kusdiyanto et al., 2023).

Velocity

Velocity is a metric used in Agile methodologies, particularly within the Scrum framework, to measure the amount of work completed by a team in a single iteration or sprint. This metric is typically measured in story points, which is a unit of measure for complexity or the amount of work to be completed.

Cycle Time

Cycle time is the time required to complete a unit of work from start to finish. In the context of Agile Scrum, cycle time refers to the time it takes to complete a user story or feature, from when work begins until the feature is ready for release.

3. Method

The research methodology encompasses a series of structured steps that form the framework for conducting this research. The Agile Scrum methodology, implemented at GarudaNih Project Management, was used. To determine the Product Backlog optimally, research is required that includes observation and interviews as shown in Figure 2.

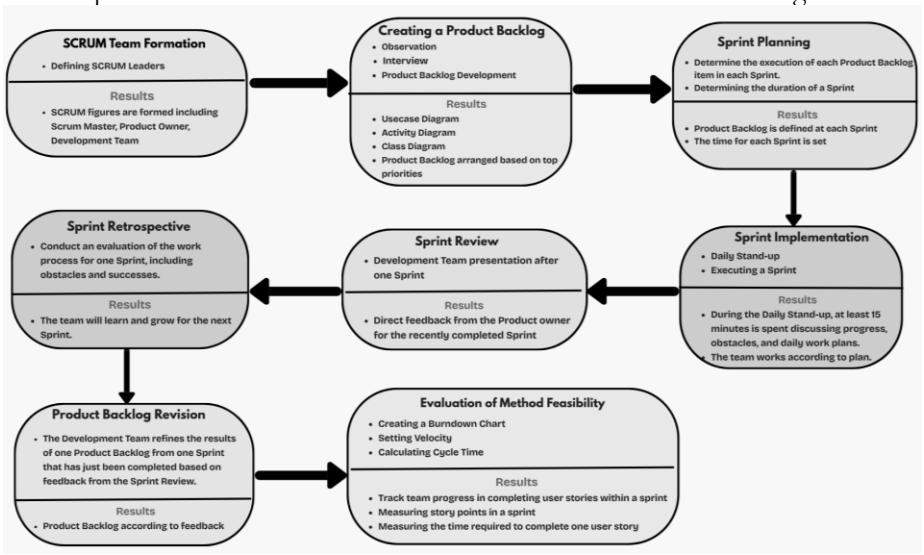

Figure 2. Research Methodology.

Research Approach

This study uses the Agile Scrum approach as a methodology for forming and managing software development teams. Agile Scrum was chosen because of its iterative and flexible nature in managing projects with rapid change. This study also aimed to evaluate the feasibility of the Agile Scrum method in developing the GarudaNih online airline ticket booking platform. The evaluation was conducted using three main metrics: Burndown Chart, Velocity, and Cycle Time, which are used to measure the effectiveness and efficiency of the software development process.

Research Object and Focus

The Product Owner of the GarudaNih application focuses on developing an online airline ticket booking website to meet user needs and compete in the online ticketing market. As a representative of the travel industry, the Product Owner aims to complete this project on time with features that meet expectations. Therefore, this process is necessary to ensure the resulting solution aligns with GarudaNih's goals.

Data Collection Method

The data and information used in this study were obtained through observation and interviews. In the observation stage, the team analyzed various references related to similar case studies, especially through literature studies which played an important role in this research to gather information and deepen understanding of Agile Scrum, especially in its application on online ticket booking websites. For interviews were conducted with Binar Academy clients as project owners to dig deeper into the project's needs. The data collected from these interviews will form the basis for creating use case diagrams, activity diagrams, and class diagrams, which in turn will support decision-making in compiling the Product Backlog.

Scrum Team

The Scrum Team formed for the GarudaNih project consists of several key roles:

a. Scrum Master (1 person) Responsible for ensuring the Scrum process runs smoothly and eliminating team impediments.
b. Product Owner (1 person) Responsible for managing the Product Backlog and prioritizing features based on user needs.
c. Development Team (6 people) dividedinto 2 large groups, namely the Front End Web Development Team with 3 people and the Back End Web Development Team with 3 people, where each team consists of a Team Leader and Team Members.

4. Result and Discussion

This research produced outputs according to the stages of the agile scrum method. Following observation and interviews, the team gathered user requirements and determined the key features that must be included on the website, such as ticket search, flight schedules, seat selection, and payment processing.

Product Backlog Results

By using a structured approach, the team hoped to identify required features and the level of difficulty of each feature. The data collected from these interviews will form the basis for creating use case diagrams, activity diagrams, and class diagrams, which in turn will support decision-making in developing the Product Backlog.

Using use case diagrams facilitates understanding of the features required by each actor. In Figure 3 was found that buyers can register an account, log in and log out, view a list of one-way and round-trip tickets, view a list of airports, select a departure destination, purchase one-way or round-trip tickets, receive payment and ticket schedule notifications, and view their own transaction history. The following is a use case diagram for the Buyer actor.

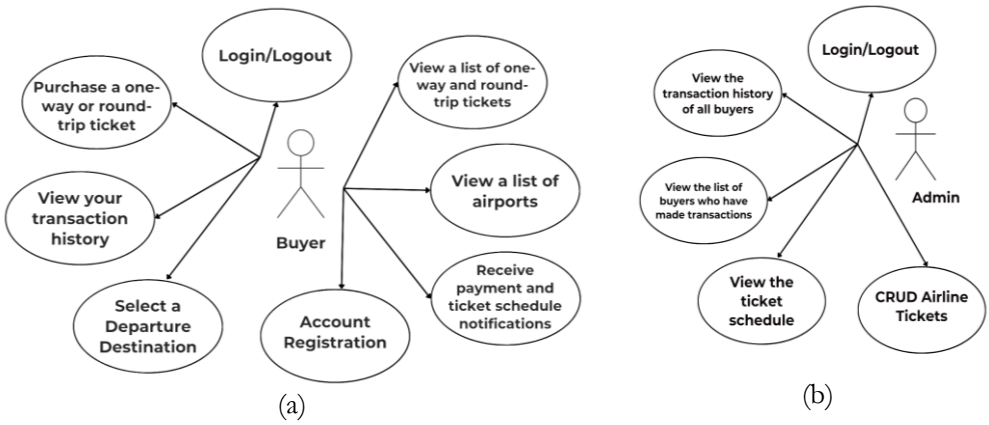

Figure 3. Use Case Diagram GarudaNih. **(a)** Use Case Diagram for Buyer Transaction **(b)** Use Case Diagram for Admin Management.

Based on Figure 4, in the ticket purchase history activity flow, the buyer begins by going to the home page and logging in using their registered account. After successfully logging in, the Buyer selects the transaction history menu to view their ticket purchase history.

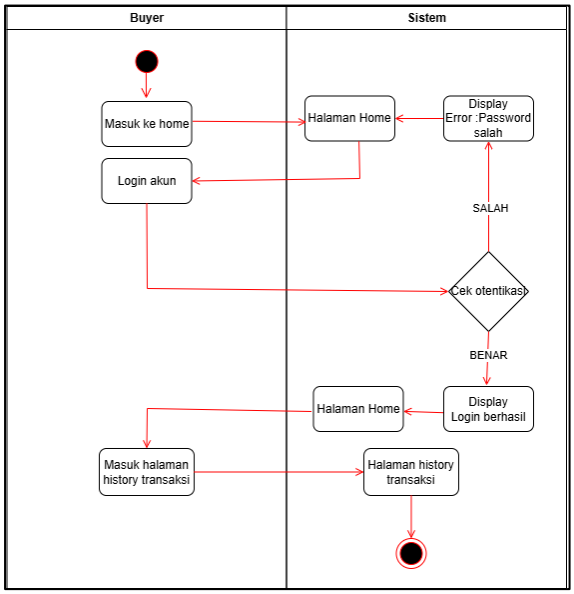

Figure 4. Buyer History Activity Diagram.

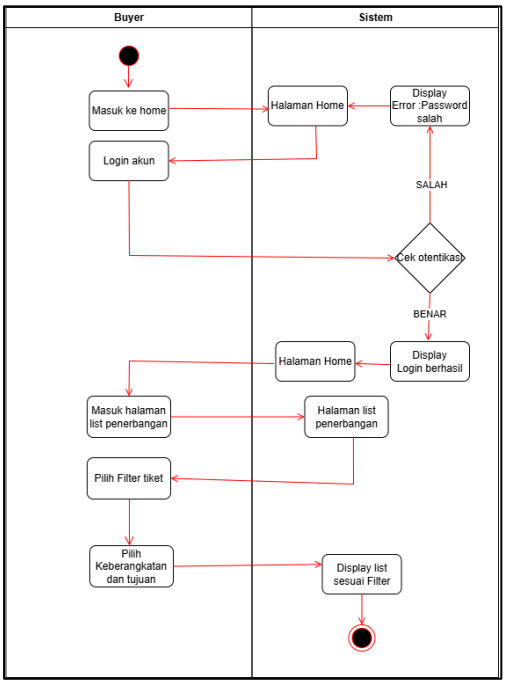

Figure 5. Select buyer departureActivity Diagram.

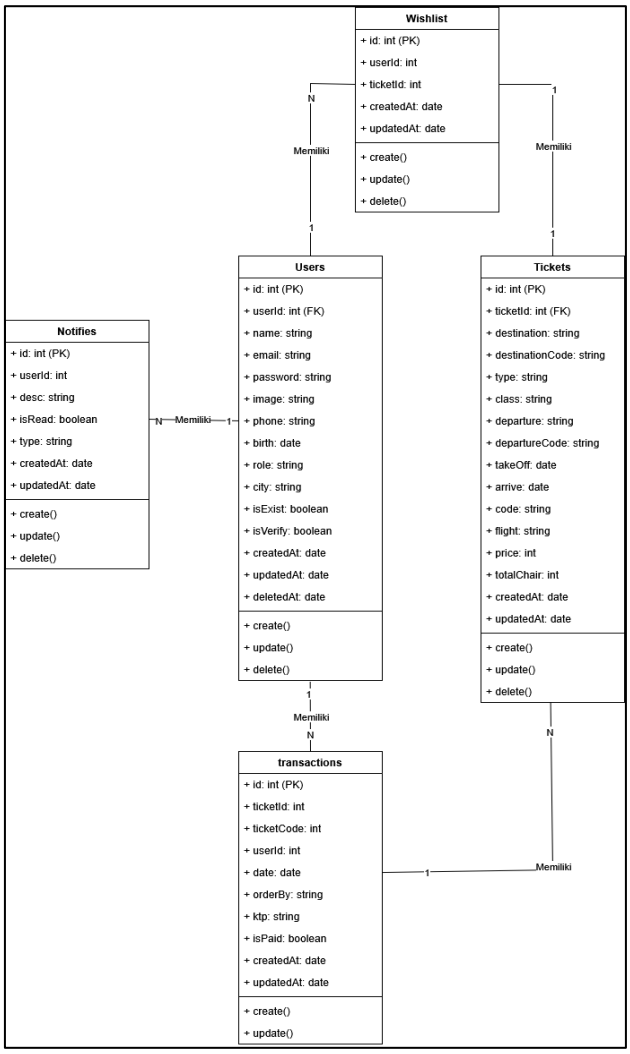

Figure 6. Class Diagram of GarudaNih Apps.

The class diagram as shown at Figure 6 created to understand this is that a single user can have multiple transactions, receive notifications, and wishlist multiple tickets. Conversely, a single transaction can also have multiple tickets ordered. Each wishlist also contains one ticket. After creating the UML diagram, you can then create a Product Backlog by prioritizing key features. Table 1 provides a list for recording the Product Backlog in the Trello application.

Table 1. Product Backlog List

Product Backlog List	Detail List
Product Backlog List	Application flow analysis
	Splash screen page
	Login and registration pages
	Home page and its features
	Settings page and its features (Profile)
	Ticket details
	Wishlist feature
	Flight ticket order history (Transaction history)
	Flight ticket order (Buy ticket)
	Booking status/proof of booking
	Default login (Guest feature)
	Flight ticket CRUD
	Notifications

Sprint

The determination of the time for completing one sprint is adjusted to the work weight determined using Story Points. Table 2 shows the Story Points created using the Bucket System method.

Table 2. Story points weighting

Product Backlog List	Story Point
Ordering Airline Tickets (Buy Tickets)	8
CRUD of Airline Ticket	8
Application Flow Analysis	3
Login and Registration Pages	3
Settings Page and Features (Profile)	3
Airline Ticket Order History (Transaction History)	3
Ticket Details	3
Wishlist Feature	3
Booking Status/Booking Proof	3
Home Page and Features	3
Default Login (Guest Feature)	2
Notifications	2
Splash Screen Page	1

Sprint Planning Results

Once each user story in the product backlog has story points, you can assign a timeframe for each sprint and organize each user story to be completed during the sprint. Table 3 shows the results of the sprint plan for the first sprint. The first sprint divided the product backlog into application flow analysis, splash screen page, login and registration pages, home page and its features, and settings page and its features (Profile). These activities were conducted from November 21 to December 2, 2024.

Table 3. The First Sprint Plan.

Product Backlog List	Story Point
Sprint 1 (November 21 – Desember 2)	Application Flow Analysis
	Splash screen
	Login and registration pages
	Home page and its features
	Settings page and its features (Profile)

Table 4 shows the results of the sprint plan for the second sprint. In the second sprint, the product backlog was divided into three user stories: CRUD for airline tickets, ticket details, and flight ticket order history (transaction history). These activities were conducted from December 5 to December 16, 2024.

Table 4. The Second Sprint Plan.

Product Backlog List	Story Point
Sprint 2 (Desember 5 – Desember 16)	CRUD of Airline Ticket
	Ticket Details
	Airline Ticket Order History (Transaction History)

Table 5 shows the results of the sprint plan for the third sprint. In the third sprint, the team will develop key features focused on the user experience in the ticket booking process. The product backlog for this sprint includes a feature for ordering airline tickets (buying tickets), and a wishlist feature will be added so users can save tickets they are interested in before purchasing. This activity will be carried out from December 19 to December 30, 2024.

Table 5. The Third Sprint Plan.

Product Backlog List	Story Point
Sprint 3 (Desember 19 – Desember 30)	Ordering Airline Tickets (Buy Tickets)
	Wishlist Feature
	Booking Status/Booking Proof
	Default Login (Guest Feature)
	Notifications

Sprint Execution

The next step is the implementation of the Sprint itself, which lasts two weeks each sprint, with daily meetings of at least 15 minutes each to discuss progress, obstacles, and the daily work plan. Daily stand-ups are conducted and recorded in Microsoft Excel from the first, second, and final sprints.

Sprint Review Results

In the first sprint, the development team received feedback regarding the app's design and appearance. Requested changes included updating the splash screen background to make it more modern, adjusting the GarudaNih logo on the login and logout pages, and adding an airplane image as the main page background to strengthen the service's identity.

In the second sprint, feedback focused on improving the user experience by adding icons to the ticket creation and update forms to make them more intuitive. Furthermore, it was suggested that ticket details be divided into two categories, domestic and international, to make it easier for users to select their travel type.

In the final sprint, the team was asked to improve the ticket booking page's appearance with a more interactive seat selection visualization. It was also suggested that the booking confirmation be equipped with informative icons for easier understanding. Furthermore, the default guest login feature, which had been completed, was ultimately removed for data security reasons.

Sprint Retrospective Results

In the first Sprint Retrospective, the team evaluated its strategy for maintaining the smooth progress of the sprint. Discussions covered the effectiveness of the implemented strategy, potential obstacles, and steps to improve productivity. Additionally, the team reviewed communication, collaboration within the backlog, and the efficiency of sprint execution to ensure the project remained on schedule.

In the second Sprint Retrospective, the team discussed delays in the airline ticket CRUD feature development due to blockers experienced by several team members. It was discovered that three team members experienced obstacles due to declining health, causing progress to be delayed. To anticipate similar obstacles, the team developed a strategy to improve communication and coordination to ensure work continued effectively despite the obstacles.

In the third Sprint Retrospective, the team discussed its success in adapting to various issues or obstacles that arose in the previous sprint. This evaluation covered how the team identified obstacles, found effective solutions, and improved coordination and communication among team members.

Product Backlog Revision

During the first sprint, the team completed and revised the product backlog on time, based on feedback from the Product Owner. These included the application flow analysis developed during the Product Backlog development, the Splash Screen, the Login and Register Pages, the Home Page and its features, and the Settings Page and its features.

During the second sprint, the team completed the tasks planned during sprint planning, including CRUD for airline tickets, ticket details, and flight order history. The third sprint, the final activity of the sprint, saw the team complete and revise all tasks planned for the final sprint: airline ticket orders, the Wishlist feature, booking status/proof of booking, default login (guest feature), and notifications.

Feasibility Evaluation

Feasibility evaluation in Agile Scrum is not conducted at the beginning of a project, but rather continuously throughout the development cycle. This ensures the team remains flexible and adaptable to changes. Feasibility evaluation can be assessed from various perspectives, including processes, artifacts, and the team itself.

Burndown Chart Creation

Figure 7 shows the results of the Burndown Chart for Sprint 1. It can be seen that the actual line in red is descending faster than the ideal line in blue, so it is considered that there are no delays in sprint 1.

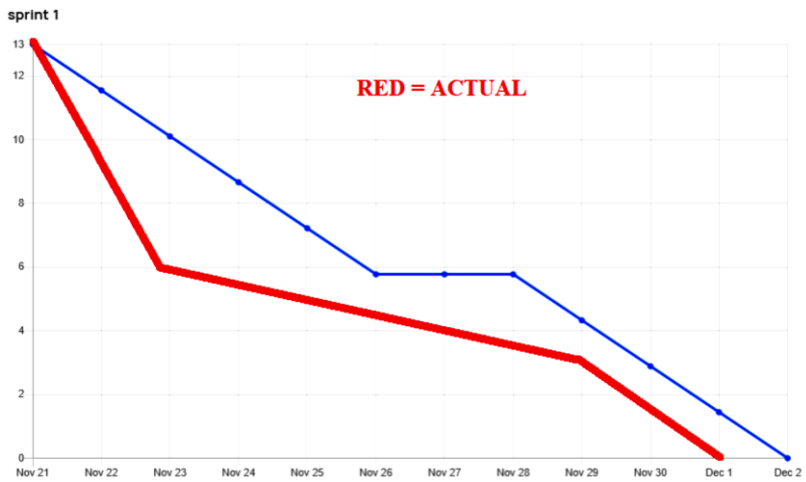

Figure 7. Burnddown Chart for Sprint 1.

The Burndown Chart for Sprint 2 slowed down because three members experienced work delays for several days. Figure 8 shows the Burndown Chart created for this second sprint, which shows the actual red line is not parallel to the ideal blue line. The actual line slowed down for several days, so it can be concluded that this second sprint experienced work delays.

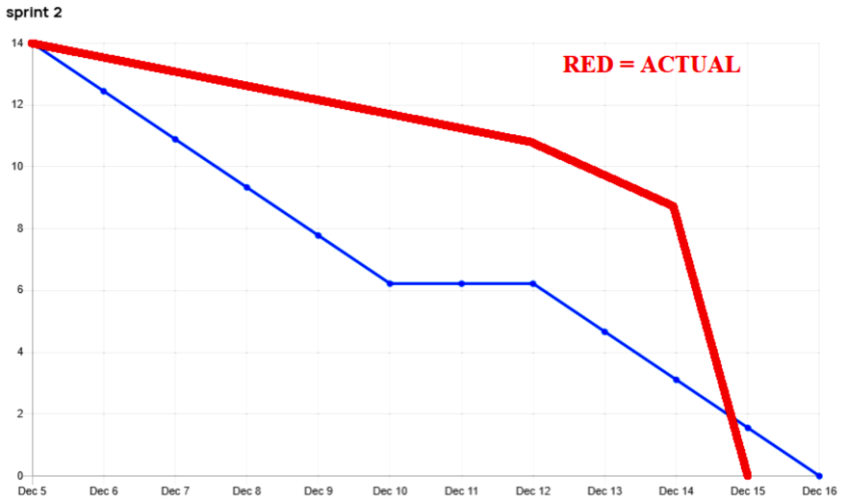

Figure 8. Burnddown Chart for Sprint 2.

The Burndown Chart for Sprint 3, as shown in Figure 9, shows the actual red line parallel to the ideal blue line, indicating that this sprint experienced no delays.

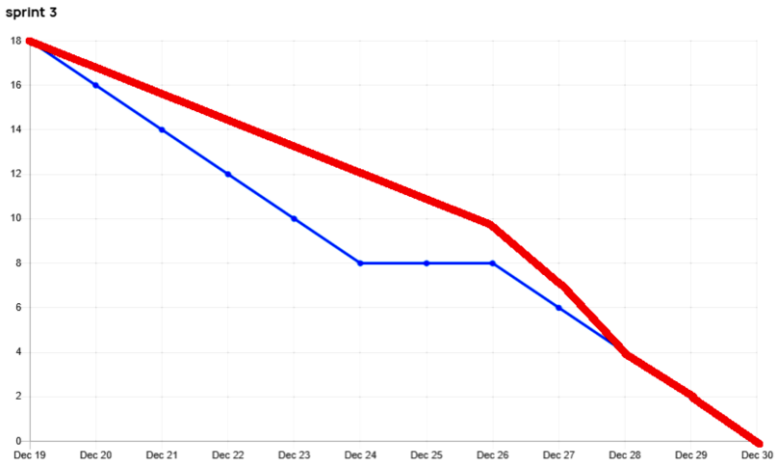

Figure 9. Burnddown Chart for Sprint 3.

Determining Velocity

Determining velocity requires the total story points worked on in a sprint. It's known that the total story points worked on from one sprint to the final sprint has shown a fairly steady increase as shown at Table 6.

Table 6. Velocity.

Sprint	Story points worked on
Sprint 1	13
Sprint 2	14
Sprint 3	18

Calculating Cycle Time

Cycle time is calculated from the duration of work on a single user story or task within a sprint. One user story, the CRUD airplane ticket project, had a very long processing time of up to 8 days. However, Table 7 was also shown that all user stories had a stable cycle time, thus proving the team was working efficiently .

Table 7. Calculating Cycle Time.

User Story	Cycle Time (day)
Application flow analysis	1
Splash screen page	1
Login and registration pages	2
Home page and its features	4
Settings page and its features (Profile)	6
Ticket details	8
Wishlist feature	3
Flight ticket order history (Transaction history)	4
Flight ticket order (Buy ticket)	5
Booking status/proof of booking	2
Default login (Guest feature)	5
Flight ticket CRUD	5
Notifications	2

5. Conclusion

Based on the results of the final project research, it can be concluded that the backlog is well-structured and managed through the development of a product backlog, supported by use case diagrams, activity diagrams, and class diagrams. Changing client needs can be effectively managed through sprint reviews and product backlog revisions. Daily stand-ups and sprint retrospectives can strengthen communication between team members. The use of the Agile Scrum method in the development project for the GarudaNih online ticket booking website platform proved to be a solution to the problem, as evidenced by the results of the burndown chart, velocity, and cycle time tests.

Based on the research findings on Travel Website Development Project Management using the Agile Scrum Method, several recommendations can be made for further implementation to optimize the method: (1) More in-depth training is needed for all team members, particularly in understanding the concepts of sprints, backlog refinement, and their respective roles in Scrum. This will further enhance teamwork effectiveness. (2) It is recommended to add Lead Time and Defect Density as additional metrics to measure the quality of project development results.

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