Application, Information System and Software Development Journal
Appissode Journal
Vol. 3, No. 4, December 2025, Page 27-34
E-ISSN: 3032-5625, P-ISSN: 3032-5269

Implementation of the Rapid Application Development (RAD) Method for the Information System of Sultan Babullah Ternate Airport Facilities

Wahyu Joko Triyono Subroto[1], Lady Silk Moonlight[2*], Hadi Prayitno[3], Maulana Anifa Silvia[4]
Politeknik Penerbangan Surabaya, Indonesia

Corresponding Author: Wahyu Joko Triyono Subroto
Air Transportation Management Department
Politeknik Penerbangan Surabaya, Indonesia
Email: officialwahyujts@gmail.com

Article History

Received June 26, 2025
Accepted August 22, 2025
Published December 2025

Keywords

Rapid Application Development, Information System, Sultan Babullah Ternate Airport, Wordpress

Abstract

This study aims to develop an information system for facilities at Sultan Babullah Airport in Ternate to enhance the quality of information services for passengers and tourists, and to overcome the limitations of manual systems that have not been optimal in providing information on facilities, tourist destinations, and local culinary options. The method used is Rapid Application Development (RAD), with key phases including requirements planning, system design workshops with stakeholders, implementation using the WordPress CMS, and testing using the System Usability Scale (SUS). The developed system is a web-based information system that presents structured information about airport facilities, including flight schedules, facility details, tourist destinations, and local culinary recommendations. Usability testing involving 100 respondents yielded an average SUS score of 75.71, which falls within the "Good" category. This system has practical implications in improving the quality of information services and user experience at the airport. Additionally, the system supports digital promotion of regional tourism and serves as a model for implementing RAD in public information system development. This study presents novelty through the integration of tourism promotion features and airport facility information into a centralized web-based system. Moreover, the system implements real-time APIs to dynamically display arrival and departure schedules, a feature not commonly applied in similar airport information systems. The participatory and efficient RAD approach further enhances the strengths of the system's development process.

1 INTRODUCTION

Sultan Babullah Airport in Ternate plays a vital role in supporting mobility and the economy in the North Maluku region. Airports are often described as gateways to a region, area, or even a country, and they serve as a symbol of prestige that passengers remember [1]. According to data from the Central Statistics Agency of North Maluku Province, in December 2023, the number of arriving and departing passengers surpassed 30,000, marking a significant increase compared to previous years [2]. As a gateway to a region, an airport must provide excellent service, reflecting the success of its management. Passenger services must demonstrate high performance to ensure smooth, safe, comfortable, reliable, and high-capacity operations [1][3].

However, providing high-quality service is often challenged by manual management, particularly in delivering integrated information services to passengers and tourists. Such conditions can affect operational efficiency and diminish the travel experience. Facilities such as signage guiding passengers to exits, check-in counters, departure and arrival areas do not always guarantee that visitors can understand specific locations within the airport [4]. Another issue arises when visitors are unaware of the information already displayed on the airport's information boards [5]. These problems are commonly faced by first-time travelers, whether domestic or international, who often struggle to identify tourist destinations that match their preferences especially when the available information is insufficient or difficult to access. Moreover, the lack of guidance regarding local culinary recommendations may reduce the overall tourism experience, which should be a key attraction for visitors and an indicator of service quality [6][7]. One potential solution is to implement the Rapid Application Development (RAD) approach in developing an information system website for Sultan Babullah Airport. RAD is a software development life cycle (SDLC) method that enables faster development of information systems [8]. This approach consists of four phases: requirements planning, RAD design workshop, and implementation. The method is intended to produce a system within a short development time while maintaining relatively simple and focused features [9] [10].

Previous studies [11] [12][13] have shown that the implementation of a designed system results in significant changes, including increased time efficiency and improved information quality. urther research by [9] [14] confirms that RAD can be effectively applied in developing applications that address existing problems. Another relevant study regarding the development of a web-based airport map information system at Juanda Airport in Surabaya demonstrated success in enhancing services and user satisfaction by helping passengers navigate the airport more effectively [4].

Therefore, based on the identified problems and supporting research, there is a need for a solution that can overcome these challenges to improve airport service management. One such solution is the development of an integrated information system specifically designed to enhance service delivery at Sultan Babullah Airport. With this system in place, Sultan Babullah Airport will not only serve as a transportation hub but also as an information center that supports a safe, comfortable, and efficient travel experience. Furthermore, this system is expected to enhance the tourism appeal of North Maluku by promoting local destinations and culinary offerings.

2 METHOD

This study employs the Rapid Application Development (RAD) methodology, which is an iterative and incremental approach to software development [15]. This method was chosen due to several advantages, one of which is its ability to deliver results quickly while still meeting user requirements. The Rapid Application Development method was developed by James Martin in the 1980s. It was designed to facilitate relatively fast development while maintaining high-quality outcomes [16]. This method is considered appropriate for this study because it offers several key benefits, including the ability to dynamically adapt system development to user needs, a shorter development timeline, and the ease of performing evaluations and system refinements throughout the development process [17]. The research flow is presented in the following figure.

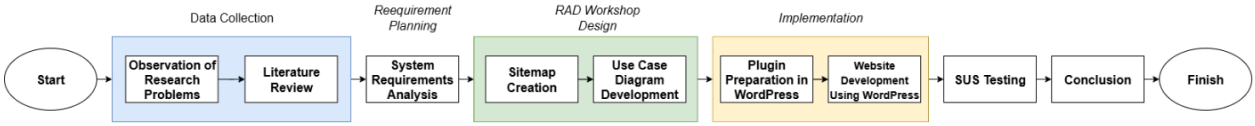

Figure 1. Research flow

Requirements Planning

This is the initial stage in implementing the Rapid Application Development (RAD) method. During this phase, an analysis is conducted on the information needs and existing problems to determine the objectives, system boundaries, constraints, and possible solutions [18]. Additionally, this stage aims to identify the required behaviors and activities of the system to be developed.

Workshop RAD Design

The second phase in the implementation of the Rapid Application Development (RAD) methodology involves designing the processes that will take place within the system and developing the user interface. This phase aims to determine the best solutions for solving identified problems, followed by the creation of business process designs and application designs based on the data collected [18]. During this stage, system development is conducted iteratively with repeated feedback loops. Additionally, this phase includes modeling the system architecture, focusing on analyzing system weaknesses using fishbone diagrams, conducting functional requirements analysis, modeling using Unified Modeling Language (UML), and designing the user interface [19]. The visual representation of the design and workflow of the system prototype is then presented to prospective users, who are expected to provide feedback. This feedback is subsequently used to refine the designed modules.

Implementation

This phase represents the final stage of the Rapid Application Development methodology. During this phase, all designs that have been created are implemented into an application intended to provide airport-related information, particularly tourism information, to airport visitors. The developed information system must adhere to the previously established design flow to minimize potential errors in the system development process [20].

System Usability Scale Testing

The System Usability Scale (SUS) is a questionnaire-based tool used to evaluate the usability or ease of use of a computer system from the user's subjective perspective. This instrument was first developed by John Brooke in 1986 and remains one of the most widely used methods for usability evaluation to this day [21]. The testing process involves applying the SUS method, which uses a Likert scale ranging from 1 to 5 (where 1 indicates "strongly disagree" and 5 indicates "strongly agree"). The SUS consists of 10 standardized questions [22]. These questions have been adapted into Indonesian and serve as the items used in the survey. The list of SUS questions can be found in the following table.

Table 1. Question of System Usability Scale [23]

No	Question
1	I think that I would like to use this system frequently.
2	I found the system unnecessarily complex.
3	I thought the system was easy to use.
4	I think that I would need the support of a technical person to be able to use this system.
5	I found the various functions in this system were well integrated.
6	I thought there was too much inconsistency in this system.
7	I would imagine that most people would learn to use this system very quickly.
8	I found the system very cumbersome to use.
9	I felt very confident using the system.
10	I needed to learn a lot of things before I could get going with this system.

Based on the list of questions mentioned above, a calculation will be conducted to determine the final System Usability Scale (SUS) score. The calculation procedure is as follows:

a. The score provided by respondents for each odd-numbered item is subtracted by 1 [23].
b. The score provided by respondents for each even-numbered item is subtracted from 5 [23].
c. The final SUS score is obtained by summing all the adjusted scores, dividing the total by the number of respondents, and then multiplying the result by 2.5 [23].

3 RESULTS

This study aims to develop an Information System for Facilities at Sultan Babullah Airport in Ternate using the Rapid Application Development (RAD) methodology. This method was chosen for its ability to accelerate the system development process by actively involving users in the design and development stages. The research was conducted through four main phases: Requirements Planning, RAD Workshop Design, System Implementation, and System Usability Scale (SUS) Testing. The results of each phase are presented as follows.

Data Collection

Data collection was carried out as the initial step to understand user needs, assess the existing conditions, and formulate an information system that aligns with stakeholder expectations. The data collection technique involved direct observation of the current information system implemented at Sultan Babullah Airport in Ternate. The results of the observation indicate that facility-related information remains limited, and some of the information presented in the existing system does not fully provide a comprehensive overview of the facilities available at Sultan Babullah Airport. The image below illustrates that the current system interface does not clearly convey relevant information. These observational findings are supported by screenshots taken from the website sultanbabullah-airport.com. The following are the key findings based on the observations conducted by the researcher.

Requirements Planning

The requirements planning phase in the Rapid Application Development (RAD) methodology is a continuation of the data collection process. After gathering data through direct field observations and interviews with relevant stakeholders, the next step is to analyze the data to systematically formulate the system requirements. During the data collection stage, the researcher observed the existing information system at Sultan Babullah Airport in Ternate and identified several shortcomings, including limited information, a non-interactive user interface, and a lack of supporting features. Based on the collected data, the researcher formulated the system requirements, which are categorized into functional requirements and non-functional requirements. The results of these requirements are presented in the following table.

Table 2. Functional Requirements

No	Functional Requirements
1	The system is able to display detailed information about airport facilities.
2	The system is able to display a list of airport facilities.
3	The administrator can add, edit, and delete content within the system.
4	The system provides more comprehensive and detailed information compared to the previous system.
5	The system is able to display data on tourism and local culinary attractions in the Ternate area.

Table 3. Non-Functional Requirements

No	Non-Functional Requirements
1	The system can be accessed via both desktop and mobile devices.
2	The user interface is easy to understand and navigate.
3	The system offers optimal data access speed.

Functional requirements include the system's ability to display detailed information about airport facilities, a list of local culinary options and tourist destinations, as well as the ability for administrators to manage content independently. In contrast, non-functional requirements focus on technical aspects such as ease of access across various devices, a user-friendly interface, and system performance in delivering information efficiently. These two categories of requirements are systematically summarized in Table 2 and Table 3, which serve as the foundation for the system's design. Furthermore, the results of this requirement analysis also act as key indicators of the system's success, since all developed features will be evaluated based on how well the system meets the identified needs. Therefore, the requirements planning stage functions not only as an initial phase but also as a core framework that guides the entire RAD-based system development process.

RAD Workshop Design

The RAD Workshop Design phase is a critical stage in the Rapid Application Development (RAD) approach, which emphasizes intensive collaboration between system developers and users or stakeholders. The main focus of this phase is to conduct the initial system design collaboratively and interactively. Discussions are held to identify both the functional and non-functional requirements of the system, as well as to define the flow of information that will be presented to users through the website. The results of this collaboration are documented in the form of a sitemap and a use case diagram. The sitemap serves to provide a general overview of the navigation structure of the information system being developed. It helps in identifying the main pages that will be available within the system and the relationships between those pages. The designed sitemap structure is as follows.

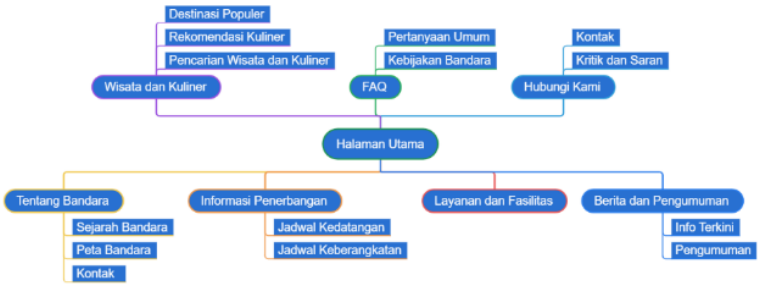

Figure 2. System Design Sitemap

The development of the sitemap for the Sultan Babullah Airport information system resulted in eight main menu items, namely: Home, Airport Facilities, Public Services, Flight Information, Culinary, Tourism, FAQ, and Contact. Each page is designed to be responsive and informative to support user needs. The Home page presents a brief overview of the airport, quick navigation links, and a flight schedule search feature. Other pages provide real-time flight information, details about airport services and facilities, as well as curated recommendations for local tourism and culinary spots to support regional tourism promotion. The FAQ and Contact features are intended to help users obtain direct information without needing to contact customer service. This entire structure is designed to enhance accessibility, convenience, and the overall user experience in planning their travel. The Use Case Diagram is used to illustrate the interactions between actors (users) and the system. This diagram helps visualize the system functionalities to be developed and identifies who will interact with each specific function.

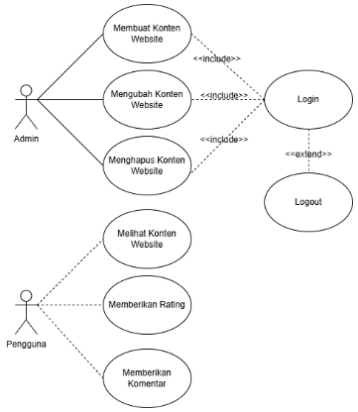

Figure 3. Use Case Diagram System

The use case diagram is utilized to ensure that each feature is associated with the appropriate actor and has a clearly defined usage flow. The diagram above illustrates the interaction flow between actors and the system in the context of content management and utilization on a website. There are two types of actors involved in the system: the Administrator and the User, each with distinct access rights and functionalities. The Administrator is primarily responsible for managing the website content. The Administrator must first log into the system to access management features. Once logged in, the Administrator can perform several actions, including creating new content, modifying existing content, and deleting content that is deemed irrelevant or in need of updating. Additionally, the Administrator can log out after completing the management tasks to ensure secure system access. On the other hand, the User represents general visitors or individuals accessing the website to obtain information. Users have the right to view content provided by the Administrator. Furthermore, users are given the ability to interact with the content through rating and commenting features. These features allow users to provide feedback on content quality and to express opinions, suggestions, or questions in an interactive manner.

Implementation

The implementation phase is one of the most critical stages in information system development. At this stage, all system designs formulated in the previous phases are realized into a functional product that can be used by end users. This phase involves translating the results of the needs analysis and system design such as the sitemap, use case diagram, and content structure—into a web-based system accessible via a browser. In this study, the implementation of the Sultan Babullah Airport Facilities Information System was carried out using the WordPress Content Management System (CMS) platform. WordPress was chosen due to its open-source nature, its large user community, and the availability of thousands of themes and plugins that can significantly accelerate the development process. The implementation results involved configuring and installing various supporting plugins to enhance the website's functionality and performance. The use of plugins on the website is presented in the following table.

Table 4. Support Plugin

Plugin	**Function and Description**
Elementor	Used as a page builder to simplify the Design Interface process. With its drag-and-drop features, users can create modern and responsive layouts without the need to write code.
Yoast SEO	Helps optimize content and page structure to be search engine friendly (SEO), making it easier for users to find the site via Google searches.
Image Optimizer	This plugin is used to optimize image sizes uploaded to the website, reducing file size without compromising visual quality.
WPJetpack	Jetpack is a multifunctional plugin that provides a suite of features for security, performance, and site management. In this system, Jetpack is primarily used for basic security—such as protection against brute force login attacks—and uptime monitoring, allowing administrators to be notified if the site experiences downtime.
MetForm	MetForm is used as a drag-and-drop form builder that integrates directly with Elementor. This plugin facilitates the creation of interactive forms, such as contact forms, feedback forms, or facility information request forms.

Each of the plugins mentioned above was selected based on proven stability, regular updates, and strong support from a large user community. By carefully preparing the required plugins at the early stages, the website development process became more efficient, as the core system features were already available and only needed to be customized according to the design and workflow requirements. In addition, the website also integrates an API (Application Programming Interface) to provide real-time data on flight arrivals and departures at Sultan Babullah Airport in Ternate. This request is directed to the GoFlightLabs API endpoint, which is configured using the airport's IATA code (TTE) and the flight type (arrivals or departures). The results of the API implementation are shown in the following figure.

```
function api_calling() {

    $cache_key = 'flight_data_cache';
    $data = get_transient($cache_key);

    if (false === $data) {

        $base_url = 'https://www.goflightlabs.com/advanced-flights-schedules?access_key=' . $accessKey;
        $types = ['arrival', 'departure'];
        $data = [];

        foreach ($types as $type) {
            $response = wp_remote_get($base_url . '&type=' . $type);
            if (!is_wp_error($response)) {
                $body = wp_remote_retrieve_body($response);
                $json = json_decode($body, true);
                $data[$type] = ($json["success"] && !empty($json['data'])) ? $json['data'] : [];
            } else {
                $data[$type] = [];
            }
        }

        // Simpan cache selama 5 menit
        set_transient($cache_key, $data, 5 * MINUTE_IN_SECONDS);
    }

    $json_combined = wp_json_encode($data);

    ob_start();
    ?>
```

Figure 4. API Implementation

After all the required plugins were prepared and configured, the next step was the website development process, which constitutes the core of the implementation phase for the Sultan Babullah Airport Facilities Information System. This development was carried out using the WordPress Content Management System (CMS). The website development process was conducted in a structured and systematic manner, beginning with the installation of WordPress, followed by basic system configuration, and the arrangement of the main pages displaying information related to airport facilities. The development was conducted in two environments: a local web server using LocalWP for the initial development and testing phase. The results of the Design Interface during the implementation process are presented in the following figure.

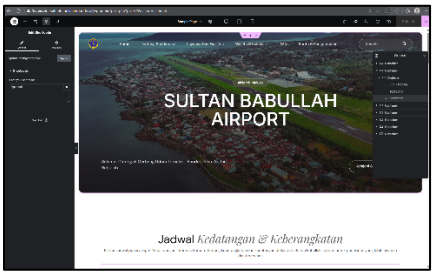

Figure 5. Frontpage Design Interface

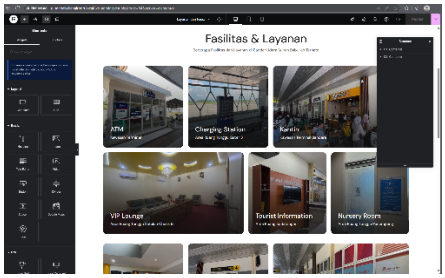

Figure 6. Facility and Service Design Interface

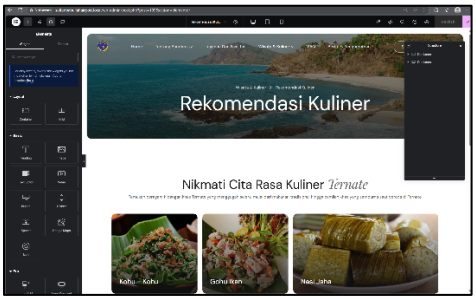

Figure 7. Culinary Design Interface

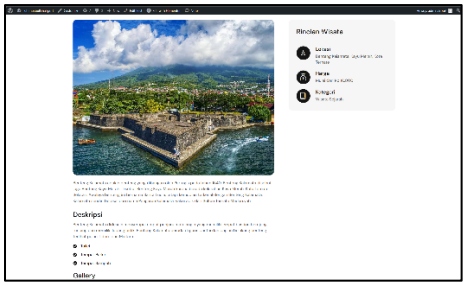

Figure 8. Tourism Design Interface

After the system implementation process was completed, the Sultan Babullah Airport Facilities Information System website was successfully published and made accessible online to the general public. The official URL of the developed system is as follows. https://develop.sultanbabullah-airport.com. This URL has been configured using a custom domain and is hosted on a server that supports the WordPress Content Management System (CMS) platform.

System Usability Scale Testing

System testing was conducted using the System Usability Scale (SUS) method to evaluate the usability level of the Sultan Babullah Airport Facilities Information System. A total of 100 respondents were involved in completing a questionnaire consisting of 10 statements, each measured using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). espondents represented a diverse group of users. The respondent criteria included individuals who are air transportation users, aged over 17 years, and who had accessed the website at least once [24]. This calculation was carried out for each respondent, from Respondent 1 to Respondent 100. The SUS score calculation results for all respondents are presented in detail in the following table.

Table 5. Individual Respondent Test Results

Respondent	**SUS Score**	**Usability Criteria**
Respondent 1	80	*Good*
Respondent 2	85	*Excellent*
Respondent 3	82,5	*Excellent*
Respondent 4	77,5	*Good*
Respondent 5	72,5	*Good*
…….	……	……
Respondent 100	72,5	*Good*

Table 5 presents the System Usability Scale (SUS) test results from 100 respondents regarding the Sultan Babullah Airport Facilities Information System. Each row in the table displays the individual SUS score along with the corresponding usability category based on that score. The categories refer to the standard SUS interpretation scale, which classifies results into several levels such as OK, Good, Excellent, and Best Imaginable. The individual scores were then aggregated using the average formula (total score divided by number of respondents). The average SUS score is presented in the following table.

Table 6. Average Result

Average	**Category**
75,71	*Good*

In this study, a total of 100 respondents participated in the testing. The primary objective of this test was to assess how well the developed system is accepted and used by users in terms of ease of use, comfort of interaction, and clarity of the information presented. The figure below illustrates the interpretation of SUS scores based on three evaluation approaches: Grade Scale, Acceptability Ranges, and Adjective Ratings. The average SUS score is then interpreted according to the evaluation scales shown in the figure below.

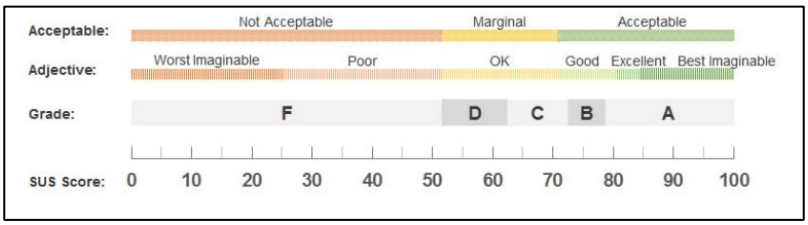

Figure 10. SUS Scale Score [22]

The testing results using the System Usability Scale (SUS) method from 100 respondents showed an average score of 75.71, which falls into the "Good" category, the "Acceptable" range under the Acceptability Ranges, and a "B" on the Grade Scale. The majority of respondents provided high scores, indicating that the system was perceived as easy to use, informative, and responsive. The high SUS score reinforces that the RAD approach was successful in delivering a system that meets user expectations. Although a few respondents gave moderate or average scores, this feedback serves as valuable input for future system improvements.

CONCLUSION

This study aimed to examine how the Rapid Application Development (RAD) method can be applied to develop an effective airport facility information system at Sultan Babullah Airport in Ternate. Based on the findings, RAD proved to be effective in building the system quickly and systematically through four main phases: data collection, requirements planning, RAD workshop design, and implementation. The data collection phase involved interviews and direct observation; the requirements planning phase focused on analyzing system needs; the RAD workshop design phase consisted of designing the sitemap and use case; and the implementation phase involved developing the website. To assess user acceptance, a System Usability Scale (SUS) evaluation was conducted, resulting in a score that falls within the "Good" category for the Sultan Babullah Airport facility system. Thus, the application of the RAD method in this study successfully addressed the limitations of the previous system and resulted in an effective information system that supports the improvement of public information services at Sultan Babullah Airport in Ternate.

REFERENCES

[1] M. Shobirin and H. Ali, "STRATEGI PENGEMBANGAN INFRASTRUKTUR DALAMMENINGKATKAN PELAYANAN PENUMPANGDI BANDAR UDARAINTERNASIONAL SOEKARNO HATTA CENGKARENG," *Sist. Inf.*, vol. 1, no. 2, pp. 60–69, 2019, doi: https://doi.org/10.31933/jemsi.v1i2.66.

[2] B. P. S. P. M. Utara, "Jumlah Penumpang di Bandar Udara Baabullah Ternate (Jiwa)," Badan Pusat Statistik Provinsi Maluku Utara. Accessed: Dec. 28, 2024. [Online]. Available: https://malut.bps.go.id/id/statistics-table/2/Mjk4IzI=/jumlah-penumpang-di-bandar-udara-baabullah-ternate.html

[3] M. A. Silvia, A. Bahrawi, Y. Suprapto, L. S. Moonlight, and B. B. Harianto, *Manajemen Pemasaran*. Surabaya: Smart Global Nusantara, 2025.

[4] A. B. Rahmah, A. Setiawan, T. Warsito, and P. P. Surabaya, "PENGEMBANGAN SISTEM INFORMASI APLIKASI PETA BANDARA BERBASIS WEBSITE UNTUK MENINGKATKAN PELAYANAN PENGGUNA JASA DI BANDARA INTERNASIONAL JUANDA SURABAYA," *Pros. SNITP (Seminar Nas. Inov. Teknol. Penerbangan)*, vol. 5, no. 2, pp. 1–8, 2021, doi: 10.46491/snitp.v5i2.1067 Afilda Bidayatur Rahmah.

[5] A. A. Haryani, "EVALUASI VISUAL DISPLAY PAPAN INFORMASI BANDAR UDARA AJI PANGERAN TUMENGGUNG PRANOTO DENGAN USABILITY TESTING," Universitas Brawijaya, 2021. [Online]. Available: https://repository.ub.ac.id/id/eprint/184239/6/ASRI ANINDITYA HARYANI.pdf

[6] S. G. Rorong, S. Sambiran, and I. Sumampow, "Kualitas Pelayanan Publik di Bandara Internasional Sam Ratulangi Manado," *J. Gov.*, vol. 2, no. 1, pp. 1–8, 2022, [Online]. Available: https://ejournal.unsrat.ac.id/v3/index.php/governance/article/view/37699

[7] M. A. Silvia, A. Bahrawi, Parjan, and L. S. Moonlight, *Ekonomi Transportasi Udara*. Surabaya: Smart Global Nusantara, 2025.

[8] Y. Sumaryana and G. Aristi, "Penerapan Rapid Application Development Dalam Sistem Penentuan Kelayakan Pembiayaan Koperasi," *Pros. Sains Nas. dan Teknol.*, vol. 1, no. 1, 2021, doi: 10.36499/psnst.v1i1.5111.

[9] M. A. Kurniawan, I. Fitri, and D. Hidayatullah, "Sistem Informasi Bimbingan Skripsi Menggunakan Metode Rapid Application Development Berbasis User Centered Design," *J. MEDIA Inform. BUDIDARMA*, 2021, doi: 10.30865/mib.v5i3.3068.

[10] R. P. S. Yudha, L. S. Moonlight, and T. I. Suharto, "Designing Information System Based on Website for Klinik Pratama At Politeknik Penerbangan Surabaya," *Proceeding Int. Conf. Adv. Transp. Eng. Appl. Soc. Sci.*, vol. 2, no. 1, pp. 838–844, 2023, doi: 10.46491/icateas.v2i1.1749.

[11] E. Matondang, Y. Gultom, D. M. S. Sembiring, S. Aminatunnisa, and E. Indra, "PENERAPAN METODE MONTE CARLO UNTUK SIMULASI SISTEM ANTRIAN SERVICE SEPEDA MOTOR BERBASIS WEB," *J. Sist. Inf. dan Ilmu Komput. Prima(JUSIKOM PRIMA)*, 2020, doi: 10.34012/jusikom.v2i2.442.

[12] E. Junirianto and D. S. Wita, "Pengembangan Aplikasi Antrian Online MAL Pelayanan Publik Samarinda," *Inform. Mulawarman J. Ilm. Ilmu Komput.*, 2020, doi: 10.30872/jim.v15i2.3117.

[13] A. Arnoldus and S. Suprihadi, "Web-based Patient Queuing System and Automatic Notification via WhatsApp Framework Codeigniter," *Int. J. Nat. Sci. Eng.*, 2021, doi: 10.23887/ijnse.v5i2.36766.

[14] M. Julkarnain and E. Mardinata, "Pengembangan Aplikasi Kamus Bahasa Bima-Inggris-Indonesia Menggunakan Rapid Application Development," *J. Inform. J. Pengemb. IT*, 2023, doi: 10.30591/jpit.v8i3.5692.

[15] D. Murdiani and M. Sobirin, "Perbandingan Metodologi Waterfall Dan Rad (Rapid Application Development) Dalam Pengembangan Sistem Informasi," *J. Inform. Teknol. dan Sains*, vol. 4, no. 4, pp. 302–306, 2022, doi: 10.51401/jinteks.v4i4.2008.