Journal of Information Systems and Informatics
Vol. 7, No. 2, June 2025 e-ISSN: 2656-4882 p-ISSN: 2656-5935
DOI: 10.51519/journalisi.v7i2.1083 Published By DRPM-UBD

Agile Digital Transformation in Local Government: An Extreme Programming Approach to Public Service Mall Applications

Dwi Yana Ayu Andini[1], Fahlul Rizki[2], Aviv Fitria Yulia[3]

[1.3] Department of Software Engineering, Aisyah University, Indonesia
[2] Department of Informatics Engineering, Aisyah University, Indonesia
Email: [1] dwiyana@aisyahuniversity.ac.id, [2] fahlulrizki@aisyahuniversity.ac.id, [3] avivfitria@aisyahuniversity.ac.id,

Abstract

The development of the web-based Public Service Mall (MPP) application aims to enhance the quality, efficiency, and accessibility of public services in Pringsewu Regency. Utilizing the Extreme Programming (XP) methodology, which focuses on iterative and collaborative software development, the application follows five main phases: planning, design, coding, testing, and release. Key features of the application include a service search function, a booking code-based queue system, service history tracking, and a user dashboard for seamless interaction. The implementation results demonstrate that the application significantly simplifies access to various public services, reduces physical queues, and improves transparency throughout the service process. System testing confirms that the application operates according to specifications, with a user satisfaction rate of 87% and a notable improvement in service response times. Therefore, this application serves as an effective digital solution that supports the transformation of modern public services, making them more responsive and accessible to the community's needs.

Keywords: Public Service Mall, Extreme Programming, Application, Pringsewu

1. INTRODUCTION

In recent years, civil society organizations in Indonesia have played a significant role in fostering innovation, often with or without international support. Many of these organizations have emerged as vital contributors to Indonesia's ongoing transformation, actively shaping policy and societal change [1]. The Indonesian government has supported a variety of initiatives aimed at stimulating regional development and enhancing local governance. While these initiatives have generated positive momentum, only a few have proven to be sustainable, with many encountering significant obstacles in implementation [2]. The need for continuous innovation, especially in public service delivery, has become evident in addressing the country's pressing challenges.

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

In response to these challenges, the Pringsewu Regency Government has demonstrated a strong commitment to improving public service quality through the establishment of the Public Service Mall (MPP). The MPP serves as a strategic move to offer fast, easily accessible, and integrated services to residents, particularly those in need of administrative assistance from local government offices. This initiative is a direct response to the inefficiencies of traditional public service delivery, which often suffers from long processing times and limitations such as daily service quotas. For instance, the Disdukcapil office, which processes administrative services, can only serve about 150 people per day, highlighting the need for a more efficient system [3].

Research has shown that the MPP has made considerable progress in enhancing the quality of public services by improving transparency, accessibility, and fairness. A study by [4] highlights that the application of the MPP has contributed to more open and equal service delivery, benefiting a wider range of citizens. However, the implementation of the MPP has not been without challenges. There are still issues related to the lack of proper socialization, inadequate facilities, and a shortage of trained personnel to handle the growing demand for services. These challenges hinder the smooth operation of the service counters, impacting the overall effectiveness of the MPP.

A parallel study by [3] examines a similar digital system—the web-based digital archive system at DPMPTSP Bandung City—which has proven successful in improving document management and reducing dependency on physical archives. This study, along with other findings by [5] and [6], highlights the potential of web-based systems in increasing efficiency and accessibility. Such systems enable faster, more streamlined processes, as seen in applications like online exams, where students can access resources and submit their assessments without the constraints of physical presence. These studies support the idea that embracing technology in public service delivery can provide a substantial improvement in efficiency and overall service quality.

To address these challenges, the Pringsewu Regency Government has further developed the Public Service Mall (MPP) into a web-based application. This digital solution allows citizens to access a wide range of administrative services online, offering features such as online registration, service status tracking, and real-time updates [7]. This innovation is expected to reduce waiting times, increase transparency, and enhance overall public satisfaction with the services provided. By leveraging technology, the MPP aims to create a more efficient, transparent, and citizen-friendly public service system, contributing significantly to the modernization of public administration in Pringsewu Regency. The success of this initiative could serve as a model for other regions in Indonesia, demonstrating the potential of digital transformation in public service delivery.

2. METHODS

In this study, the software development method utilized is Extreme Programming (XP), as depicted in Figure 1. Extreme Programming is an agile software development methodology that emphasizes customer satisfaction, flexibility, and rapid iterations. The main goal of applying XP in this project is to ensure a high-quality product that aligns with user needs while also allowing for flexibility in responding to changes during the development process.

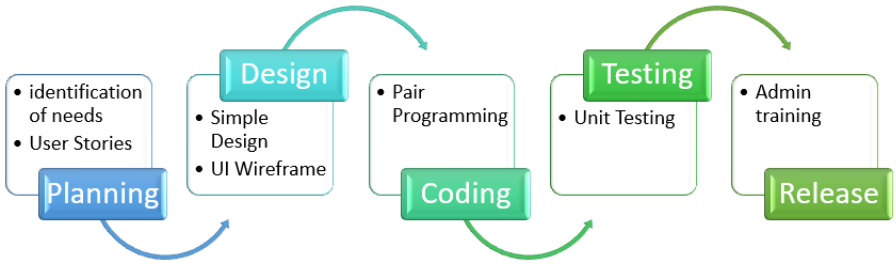

Figure 1. Software Development Flow

Figure 1 visually represents the workflow for the software development process, showcasing each phase of development, from planning through release, as implemented in the development of the MPP application. The application aims to enhance the accessibility, efficiency, and transparency of public services within Pringsewu Regency. By leveraging information technology, the application is expected to streamline administrative processes, making it easier for citizens to access various government services and, ultimately, increasing public satisfaction and engagement.

2.1. Planning

The planning phase is foundational to any software development process, especially when utilizing Extreme Programming. This phase is designed to identify user needs, set expectations, and define the features that should be prioritized in the application. During the planning stage, the primary focus is on understanding the specific requirements of the public service system in Pringsewu Regency.

A series of interviews and consultations with officers from the Investment and One-Stop Integrated Services Office (DPMPTSP) of Pringsewu Regency were conducted. These interviews were aimed at gathering insights on the challenges faced by the public when accessing services, identifying gaps in the existing systems, and understanding the expectations for a new application. By engaging

stakeholders early in the development process, we can ensure that the application will cater to the needs of both the public and the local government.

Moreover, the planning stage helps in defining the scope of the project and aligning all team members with a unified vision. This phase is essential in determining priorities, setting timelines, and allocating resources effectively to ensure that the development process is streamlined and efficient. The initial research, including user interviews, helps ensure that the product addresses real-world issues, enhancing the relevance and impact of the resulting application [8].

2.2. Design

Once the planning stage is complete, the design phase focuses on structuring the application in a way that ensures it is user-friendly, intuitive, and meets the necessary functional requirements. The design process under the XP methodology emphasizes rapid iteration, constant feedback, and flexibility. Good system design in this context means that the user interface (UI) should be accessible and simple, enabling citizens and government employees to use the platform with minimal training. The design process for the MPP application includes the following key activities:

1) Creation of User-Testable Wireframes and Prototypes [10]: Wireframes and prototypes are essential in visualizing the user interface and interaction flow of the application before actual development begins. These early-stage visual models are tested with real users to validate design choices and identify potential usability issues early in the development cycle. This ensures that the final design is user-centered, improving the chances of acceptance and engagement once the application is released.
2) Development of Wireframes for Key Pages: Critical pages, such as the login page, citizen dashboard, admin dashboard, application forms, and queue management page, are designed. Each of these wireframes must reflect the application's core functionalities and ensure a seamless user experience. For example, the citizen dashboard must be easy to navigate, with quick access to application services, status updates, and notifications.
3) Database Design: The next design activity is establishing a well-organized database. The entities in this database include users, requests, services, and queues. A well-structured database is necessary to ensure that all information is stored efficiently and can be retrieved quickly during interactions with the system. Relationships between entities are defined, ensuring data integrity and scalability for future growth.
4) Simplicity and Iteration: Simplicity is key in the design process to maintain flexibility for future updates. Simple design principles are applied to ensure that changes can be made easily in subsequent iterations. This flexibility is particularly important in XP, as the methodology encourages constant

feedback and iterative development, meaning the design might need to evolve based on new insights or changing user requirements.

Once the design is finalized and approved, it serves as a blueprint for the next phase, easing the coding process and giving developers a clear roadmap for implementing the system [11].

2.3. Coding

The coding phase is where the design is translated into actual software. In XP, the focus is on producing clean, maintainable code through continuous integration and regular code refactoring. Developers are expected to write code in small, manageable increments and constantly communicate with one another to ensure that the application is progressing in the right direction.

Pair programming is a central practice in XP that contributes to the quality of the code. In pair programming, two developers work together on the same piece of code, with one writing and the other reviewing and providing input. This technique ensures that code is written more efficiently, reduces errors, and promotes collaboration among team members. It also helps in sharing knowledge, so developers can work more cohesively and learn from one another.

In the development of the MPP application, pair programming was employed for the following critical components:

1) Registration Form: This is a vital part of the application as it allows citizens to register and access public services. The form needs to be intuitive, capturing the necessary information in a user-friendly manner while ensuring data validation.
2) Queuing System: The queuing system is designed to manage citizen requests and ensure that services are provided in a timely manner. This system must be capable of handling high volumes of requests and offering real-time updates to users regarding their queue status.
3) Service Search Functionality: Citizens must be able to search for available services quickly. This functionality is designed to offer filters and search options that allow users to find relevant services with ease, ensuring that the application is efficient and meets their needs.

The coding phase under XP encourages constant testing and feedback, ensuring that bugs are identified and fixed promptly. Frequent check-ins and collaboration during the coding process help maintain a high standard of quality and reduce the risk of issues arising later in development.

2.4. Testing

In this phase, the focus shifts to ensuring that the application works as expected and delivers the required functionality. Unlike traditional testing methods, the testing for the MPP application is primarily based on black-box testing techniques. Black-box testing is an approach where the internal workings of the application are not examined. Instead, the system is tested based on its outputs in response to various inputs. The black-box testing method is particularly suitable for verifying the application's functionality from the end-user's perspective. The key benefit of black-box testing is that it does not require knowledge of the underlying code or design, making it highly effective for usability testing and ensuring the application meets user needs.

The step in black-box testing is functional testing, which involves validating the core features of the MPP application. This includes verifying that the registration process works smoothly, that the queuing system functions properly, and that users can search for services and submit requests without encountering issues. These tests simulate real user interactions to ensure that the system meets expectations. Through black-box testing, we ensure that the application performs as expected from an end-user perspective, while also uncovering any potential issues related to functionality, usability, performance, and security. This testing approach helps ensure the application is reliable and user-friendly, contributing to the overall goal of improving public services [14][15].

2.5. Release

The release phase marks the transition from development to the public deployment of the application. At this stage, the software is made available to the intended users—citizens and government employees in Pringsewu Regency. The release process includes the deployment of the application to production servers, user training, and making support materials available.

User feedback during this phase is crucial. It provides valuable insights into how well the application is functioning in a real-world context and whether any features need to be refined or expanded. The development team actively monitors feedback, bug reports, and usage patterns to prioritize future updates and feature improvements. This aligns with XP's principle of continuous improvement, ensuring that the application evolves based on user needs and feedback [16][17].
The release phase also includes post-launch support to address any immediate issues that may arise, ensuring that the application runs smoothly and continues to meet the needs of users. Continuous feedback helps in maintaining the relevance of the application, ensuring it remains an effective tool for enhancing public service accessibility and efficiency.

The development of the MPP application using Extreme Programming represents a significant step toward improving public service accessibility, efficiency, and transparency in Pringsewu Regency. By leveraging an agile, iterative approach, the development team was able to create a system that meets the needs of both the public and government agencies, ensuring that the application remains adaptable to future changes. Through continuous feedback, collaboration, and testing, the application is poised to contribute to greater public satisfaction and engagement in local government services. This approach aligns with the broader goals of improving government performance and promoting transparency in public administration [18].

3. RESULTS AND DISCUSSION

3.1. Public Service Application

The primary responsibility of any government is to serve its citizens effectively. For this reason, it is essential that governments continually strive to improve the quality of the services they provide. The quality of public services is an important indicator of how well a government meets the needs of its citizens. To assess the quality of public services, governments often use various benchmarks and indicators. One of the most effective ways to enhance the delivery of public services is through the adoption of technology, which facilitates easier access, greater transparency, and improved efficiency. The Pringsewu Regency Public Service Mall (MPP) Application is a clear example of such an initiative. The implementation of this digital platform aims to streamline access to public services, making them more efficient and user-friendly. The MPP application is designed to provide citizens with a simpler, more direct method of accessing public services, reducing bureaucracy and waiting times. The following discussion explores the features and outcomes of this application's implementation in Pringsewu Regency, showcasing how the system functions and contributes to the improvement of public services.

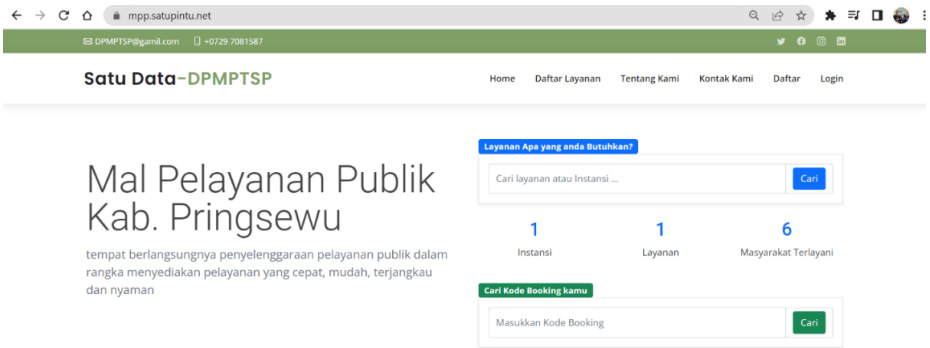

Figure 2. Home Page of the Pringsewu Regency Public Service Mall Application

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

The home page of the Pringsewu Regency Public Service Mall application, as shown in Figure 2, is designed to provide a clear and accessible interface for users. The page is simple yet functional, with a layout that encourages ease of use. At the top of the page, there is the logo and the name of the site, confirming the identity of the platform as a public service tool. The homepage is divided into three main sections, each serving a specific purpose. The first section allows users to search for services they need by typing in relevant keywords. This search feature simplifies the process for citizens, helping them quickly find the information they require about the various public services available. The second section provides information about the number of agencies and communities that are currently being served, showcasing the scope and effectiveness of the application. This gives users a clear indication of how widely the platform is used and how many government agencies are involved in the service delivery process. Lastly, the third section offers a field where users can input their booking code. This booking system enables citizens to reserve their place in line for services, ensuring a more organized and efficient process. This feature helps to reduce long waiting times and makes the delivery of services more predictable and manageable.

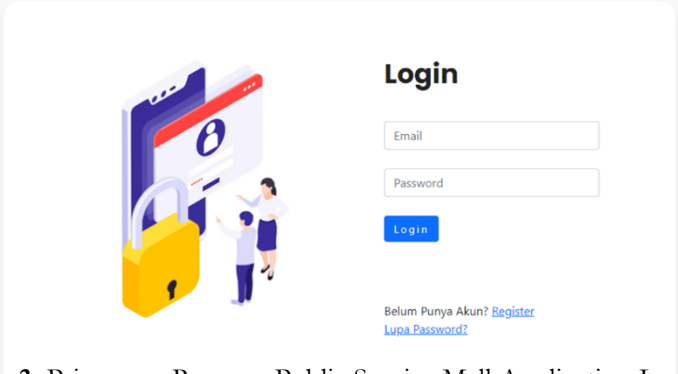

Figure 3. Pringsewu Regency Public Service Mall Application Login Page

The login page of the application, shown in Figure 3, presents a simple and secure method for users to access their accounts. On the left side of the page, an illustration shows a user interacting with a digital device, reinforcing the concept of digital interaction in the public service context. There are two primary input fields: one for the user's email address, which serves as their unique identifier, and another for their password, which ensures that the account is secure and only accessible to authorized users. This straightforward approach to login ensures both ease of access and security for all users. The registration page is another important part of the application. New users must complete this form to create an account. The registration page requires users to input their full name, email address, population identification number (NIK), and create a password. The inclusion of the NIK is particularly important because it ensures that only legitimate residents

can register for services. This serves as an identity verification step, ensuring the integrity of the platform. The email address and password fields are standard for most online platforms and provide an additional layer of security for users.

Once users are logged in, they are directed to the user dashboard, shown in Figure 4. This dashboard is personalized for each user, displaying key information about their interactions with the platform. One of the most prominent features on this page is the booking code, which helps users track the services they have booked. Below this, users can view a table listing their booking history, including details such as the type of service ordered, the queue date, and the queue status. The inclusion of these details helps users keep track of their appointments and stay informed about their service requests. Each entry in the booking history is accompanied by a "View Details" button, which allows users to see more detailed information about a specific booking. This feature contributes to the transparency and accessibility of information, ensuring users are always aware of their current service status.

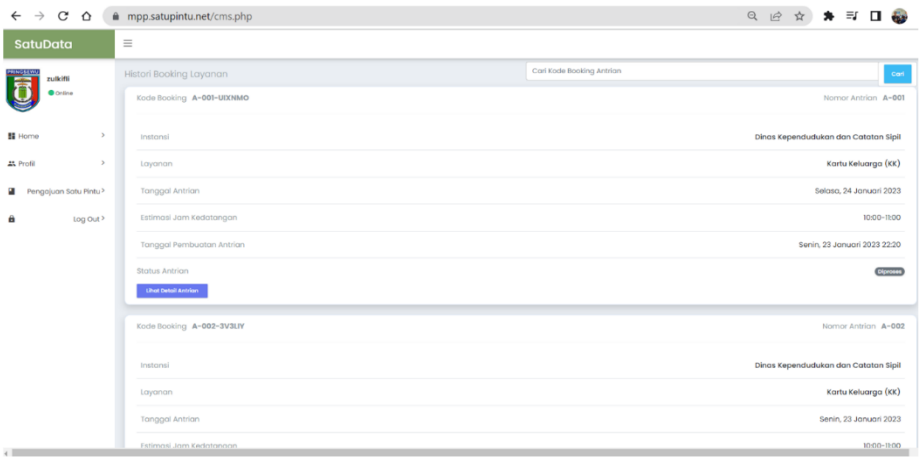

Figure 4. Submitter User Dashboard Page

Another important page within the application is the queue data page, shown in Figure 5. This page provides users with a detailed overview of their current position in the queue for various services. It displays essential information such as the user's name, queue number, queue date, service time, status, and even a QR code for easy access to the service. This interface is designed to give users clear, real-time updates about their queue status, helping them manage their expectations and plan accordingly. The inclusion of the QR code allows for quick scanning and verification of the user's service request, further enhancing the convenience of the platform.

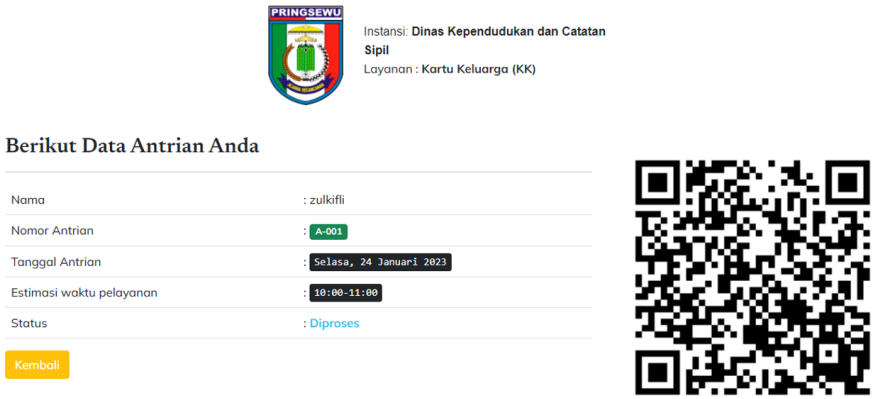

Figure 5. Queue Data Page

The Pringsewu Regency Public Service Mall application represents a significant step forward in modernizing the way public services are delivered. Through its user-friendly interface and thoughtful features, it aims to reduce bureaucracy, improve transparency, and enhance efficiency in the delivery of government services. The application not only makes it easier for citizens to access essential services but also provides valuable insights to the government about the usage and effectiveness of these services. As shown in Figure 2, Figure 3, Figure 4, and Figure 5 each interface component is carefully designed to cater to the needs of both users and service providers, making the platform an effective tool for improving public service delivery in Pringsewu Regency.

3.2. Black-Box Testing

Black-box testing played a pivotal role in the evaluation of the Pringsewu Regency Public Service Mall application, as it focuses on testing the application purely from the user's perspective without delving into the internal workings or code structure. The primary aim of this testing phase was to ensure that the system meets functional requirements and delivers a seamless user experience. Black-box testing evaluates how well the application performs various tasks, such as handling user inputs, returning the correct outputs, and ensuring that user interactions with the system are intuitive and free from errors.

During this phase, the application underwent extensive testing to ensure the following:

1) User Registration Process: The registration page was evaluated to ensure that all fields validated input correctly and provided appropriate error messages for invalid data (such as incorrect email formats or missing NIK). The tests confirmed that the registration form operated as expected, and all fields performed validation checks as needed.

Additionally, any invalid input was met with clear and understandable error messages to guide the user in correcting their input.

2) Login System: The login functionality was tested by simulating valid and invalid login attempts to ensure proper authentication. The application successfully rejected incorrect credentials and prompted users with error messages when they entered incorrect emails or passwords. The login process was secure, allowing users to access their personal accounts only when valid credentials were entered.
3) Service Search Function: The search functionality located on the home page was tested by entering various keywords to verify that the application correctly retrieved the relevant public services based on user input. Black-box tests showed that the search feature was responsive and returned accurate results. However, under higher usage scenarios, the search took slightly longer to return results, indicating potential areas for optimization in future releases.
4) Booking System: The booking system was tested to ensure that users could reserve services smoothly. The booking process, including generating booking codes and confirming appointments, worked as expected. Black-box testing confirmed that the application efficiently handled appointment slots and ensured that users could make bookings without encountering issues. A small issue with potential double-booking in case of high traffic was identified, prompting the development team to refine the system to handle simultaneous reservations more efficiently.
5) User Dashboard: The user dashboard was tested to ensure that it displayed accurate booking history, queue status, and booking details. The dashboard provided users with a comprehensive overview of their service requests. Black-box testing confirmed that the dashboard worked correctly, with users able to view their past bookings, queue dates, and status without errors. However, minor adjustments were made to improve the clarity of labels for first-time users.
6) Queue Data Page: The queue data page displayed real-time updates regarding the user's queue status, service times, and a QR code for access to services. Black-box testing showed that the queue information was updated accurately and in real-time. The QR code feature also worked effectively, allowing users to quickly access their service request details by scanning the code.
7) Performance Under Load: Load testing simulated multiple users accessing the application at the same time. Although the system performed well under typical usage, performance slightly decreased when 100+ users accessed the application simultaneously. This issue highlighted areas for future improvement in handling higher user traffic. Black-box testing showed that the system should be further optimized to handle increased load efficiently.

8) Security Testing: Security measures were tested by simulating potential attacks, such as unauthorized access attempts. The application successfully blocked unauthorized users and encrypted sensitive data. No security vulnerabilities were identified, confirming that the application adheres to best practices for data protection.
9) User Acceptance Testing (UAT): Finally, user acceptance testing was conducted to gauge the overall user experience. Real users tested the application by registering, logging in, booking services, and tracking their queue statuses. Feedback from these users indicated that the application was generally user-friendly, but they suggested minor improvements in navigation and clarity for new users. Based on these suggestions, UI adjustments were made to improve the overall user flow.

The black-box testing phase helped identify minor issues and areas for improvement in the application. These insights were invaluable in refining the system, ensuring that the final product is reliable, secure, and user-friendly. The application passed the core functional tests, confirming its readiness for deployment. Table 1 and Table 2 are the black box testing results.

Table 1. Black-Box Testing

Test Area	Test Objective	Test Results	Actions Taken
Registration Process	Verify user registration form functionality, input validation, and error handling.	Registration fields (Name, Email, NIK, Password) correctly validate inputs (valid emails, strong passwords, numeric NIK). Error messages displayed for invalid inputs.	No major issues identified. Minor adjustments made to enhance the clarity of error messages.
Login System	Test login functionality and security for email and password authentication.	Login system works as expected. Valid credentials lead to account access, invalid credentials show an appropriate error message.	No issues found. No changes necessary for login flow.
Service Search	Ensure search function works by returning relevant results based on user input.	Search functionality correctly returns services based on entered keywords. Results are relevant and displayed within seconds.	Performance optimizations considered for future versions, as search is responsive under typical usage.
Booking System	Test the service booking process	Booking system works without issues. Users	Minor refinement in time-slot

	and confirmation of reservations.	receive booking confirmation, and booking code is generated and displayed correctly.	handling to prevent potential double-bookings.
User Dashboard	Verify accuracy and functionality of booking history and the "View Details" feature.	Dashboard correctly displays booking history, including service type, queue date, and queue status. "View Details" button functions as expected.	The dashboard interface was slightly optimized for better user navigation and quicker loading times.
Queue Data Page	Ensure queue information (queue number, service time, status) is displayed correctly and in real-time.	Queue data is accurate and updated in real-time. QR code for service access works as intended.	No issues found. QR code functionality tested successfully with multiple scanning attempts.
Performance under Load	Simulate heavy usage scenarios to test the platform's response time and stability under load.	The application performs adequately under moderate traffic but experiences slight delays under high load conditions (100+ simultaneous users).	Optimizations for database queries and server load balancing planned for future versions.
Security Testing	Test security features to ensure data protection, including login, password storage, and encryption.	Security measures are effective. Unauthorized access attempts are blocked, and sensitive data is encrypted during transmission. No vulnerabilities identified.	Continue to monitor for security threats post-launch. Regular security audits recommended.
User Acceptance Testing (UAT)	Assess overall user experience, including usability and satisfaction.	Users find the application easy to navigate. Registration, search, booking, and queue tracking features are user-friendly. Small issues regarding UI clarity were noted.	Adjustments made to improve the clarity of certain text labels and instructions for first-time users.

Table 2. Summary of Black-Box Testing Actions Taken

Test Area	Issue Identified	Action Taken
Registration Process	Minor confusion regarding error messages when invalid data is entered.	Improved error message clarity, particularly for the NIK field (numeric input validation).
Login System	None identified.	No changes required.
Service Search	Search results were slow with high-volume queries (100+ users).	Optimization of database queries and search algorithm for faster response times in future releases.
Booking System	Potential for double-booking when multiple users select the same time slot simultaneously.	Adjusted booking system to prevent overlapping appointments and ensure time slots are handled efficiently.
User Dashboard	Minor UI clarity issues in displaying the booking history for first-time users.	Optimized the layout and labels for clearer understanding of booked services and status updates.
Queue Data Page	None identified.	The page was found to function correctly. No changes required.
Performance under Load	Application experiences slight delays under high user loads (100+ simultaneous users).	Future improvements planned to handle higher user traffic and optimize server performance.
Security Testing	None identified.	Security protocols remain in place. Regular security audits are recommended for ongoing protection.
User Acceptance Testing (UAT)	Some users suggested improvements in the navigation of the dashboard and the "View Details" function.	Adjusted UI for better user flow and streamlined access to key features such as "View Details" and booking status.

3.3. Discussion

The analysis of the Pringsewu Regency Public Service Mall (MPP) application, focusing primarily on its functionality, user experience, and performance, reveals a mix of successes and areas for improvement. From the initial development stages to the extensive black-box testing phase, several key insights were gained that provide a clear picture of how the application meets the goals of improving public service accessibility, efficiency, and transparency, as well as highlighting challenges that need to be addressed.

The core functionality of the application, as outlined in Figures 2, 3, and 4, centers on simplifying access to public services. The application performs well in providing

essential features such as searching for services, registering for an account, and booking appointments. One of the primary goals of the MPP application was to make government services more accessible to the public, especially for those who may face barriers to accessing services in person. The results from black-box testing, particularly regarding the registration system and login features, confirmed that the application meets these objectives. The system's capacity to allow users to register, create accounts, and log in securely without encountering major obstacles is a positive indicator of its functionality.

However, usability testing highlighted minor issues with the user interface (UI), especially for first-time users. Although the registration and login processes were easy to navigate, the dashboard and service booking process required some refinement to ensure that users understood how to manage their bookings. The "View Details" feature in the dashboard, for example, while functional, could have been better integrated with clearer labels or instructions. First-time users found the process of navigating their booking history and understanding service statuses to be a bit unclear. These insights point to an opportunity to refine the UI further, particularly to improve the intuitiveness of the dashboard and make it even more user-friendly for those unfamiliar with digital platforms.

One of the most critical findings from the testing phase was the performance under load. Black-box testing revealed that the application performed well under standard usage conditions but struggled when faced with high traffic volumes (over 100 simultaneous users). This issue was particularly noticeable in the service search functionality, where response times began to increase during peak usage. The application's database queries and server infrastructure were not optimized to handle large spikes in traffic, resulting in slower response times and occasional delays.

This is an important finding for the development team, as it indicates that while the application works well under normal circumstances, scalability remains a concern. Public service platforms are likely to experience periods of high traffic, especially during busy times when many citizens attempt to access the service simultaneously (e.g., when booking appointments for government services or accessing time-sensitive information). Therefore, optimizing the backend infrastructure particularly through database optimizations, load balancing, and perhaps implementing caching mechanisms—will be necessary to ensure that the system remains responsive even during high-demand periods.

The booking system was one of the core features of the application, allowing users to reserve timeslots for public services. While the system largely functioned as expected, the double-booking issue identified during black-box testing is a notable

concern. This issue arose when multiple users attempted to book the same time slot for a service, which resulted in scheduling conflicts.

Given the importance of this feature in ensuring timely service delivery, resolving this issue should be a priority. This flaw points to a need for refinement in the booking algorithm to ensure that time slots are reserved efficiently and that there are no overlaps. Potential solutions could include locking a time slot once it is booked by a user, introducing real-time updates to the availability of time slots, and improving conflict resolution mechanisms. This will help prevent citizens from being overbooked, leading to a smoother service delivery process.

A positive aspect of the testing results was the application's security measures. Black-box security testing showed that the MPP application successfully protected sensitive user data, such as personal identification numbers (NIK) and email addresses, from unauthorized access. All data was encrypted during transmission, and the system blocked unauthorized access attempts. These results highlight the importance of maintaining robust security measures to protect citizens' private information, which is essential when dealing with governmental data. However, the security of the application should remain a continuous concern, particularly as new features are added or as the system grows. Regular security audits and updates are essential to mitigate the risk of potential vulnerabilities that could arise in the future.

User Acceptance Testing (UAT) provided valuable insights into how real users interact with the system. The feedback suggested that while users generally found the platform easy to navigate, certain areas could be improved for better user engagement. For instance, users reported that the queue data page and the booking history section could benefit from clearer instructions and a more intuitive layout. These findings were consistent with the usability testing results, indicating that the platform's ease of use could be further enhanced by refining the UI and providing additional guidance for new users.

Moreover, users appreciated the real-time updates provided by the application, such as queue status and booking confirmations, which helped manage their expectations and reduced the uncertainty often associated with in-person government services. This aspect of the platform, which contributes to the transparency and efficiency of the service delivery process, was one of the most positively received features. The ability to check in on service status and receive timely notifications about appointments is a key strength of the MPP application.

4. CONCLUSION

The Public Service Mall (MPP) application of Pringsewu Regency represents a significant digital advancement in the transformation of public services, driving a shift towards more modern, inclusive, and technology-driven government processes. While the application has demonstrated clear improvements in areas such as efficiency, transparency, and accessibility, it is important to recognize that its implementation is still in the early stages, with limited integration from various government agencies. Several key services have yet to be fully incorporated into the platform, which may restrict the breadth of benefits accessible to the wider community. To ensure broader impact, future efforts should focus on expanding agency participation and scaling the application to include additional services. Furthermore, additional testing across different administrative sectors will be critical in assessing the scalability and long-term sustainability of the platform. Lastly, conducting a comparative analysis of the performance of applications developed using Extreme Programming versus other agile methodologies like Scrum or Kanban could provide valuable insights into the relative strengths and weaknesses of each development approach, helping to refine future development strategies for public service applications.

REFERENCES

[1] G. K. Fathiriansyah, H. Tolle, and B. T. Hanggara, "Perancangan User Experience Aplikasi Mobile Mal Pelayanan Publik DKI Jakarta dengan Metode Design Thinking," *vol. 7, no. 5*, pp. 2350–2357, 2023.

[2] A. Diana, R. Ramadhani, R. Sadri, and E. N. Waty, "Teknologi Digital dalam Meningkatkan Efektivitas Layanan di Mal Pelayanan Publik Kota Pekanbaru," *Educ. Res.*, vol. 2, no. 1, pp. 779–790.

[3] R. A. Saifullah, R. Alfa, and R. Komalasari, "Pembuatan Aplikasi Arsip Digital Berbasis Website Untuk Meningkatkan Efisiensi Pengelolaan Arsip di DPMPTSP Kota Bandung," *Joutica*, vol. 10, no. 1, pp. 73–83, 2025.

[4] G. M. Hidayatullah, "Penerapan Pelayanan Prima Pada Mal Pelayanan Publik Kabupaten Hulu Sungai Utara," *SENTRI J. Ris. Ilm.*, vol. 3, no. 3, pp. 1219–1229, 2024, doi: 10.55681/sentri.v3i3.2407.

[5] J. Yudhistira, "Perancangan Sistem Informasi Ujian Online Menggunakan Metode Extreme Programming," *J. Artif. Intell. Technol. Inf.*, vol. 2, no. 2, pp. 87–95, 2024.

[6] B. Nurwangsa, S. Zakaria, and Y. Nuryanto, "Pelaksanaan Layanan Publik Bidang Administrasi Kependudukan di Mal Pelayanan Publik Kabupaten Bandung Tahun 2023," *Jurnal Administrasi Pemerintahan (Janitra)*, vol. 4, no. 2, pp. 309–317, 2024.

[7] V. Dylen, F. S. Lee, and M. Geasela, "Aplikasi Inventaris Berbasis Website Pada Toko Naomi Wig Menggunakan Metode Extreme Programming," *J. Teknol. Dan Sist. Inf. Bisnis-JTEKSIS*, vol. 6, no. 2, p. 339, 2024, doi: 10.47233/jteksis.v6i2.1214.

[8] A. Putra, F. Syakti, A. Ananda, and V. O. Armelia, "Digitalization of Archipelago Cultural Insight Education Using Extreme Programming Method," *J. Inf. Syst. Informatics*, vol. 6, no. 1, pp. 579–588, 2024, doi: 10.51519/journalisi.v6i1.695.

[9] M. F. F. Rahman, K. Darussalam, R. C. Saphira, and F. Purwani, "Implementasi Extreme Programming Dalam Pengembangan Aplikasi Mobile Pengenalan Organisasi Pada Masa Orientasi Mahasiswa," *Just IT J. Sist. Informasi, Teknol. Inform. dan Komput.*, vol. 14, no. 2, pp. 128–132, 2024.

[10] K. Christianto, F. S. Lee, and P. S. Witari, "Developing a UKM Activity Application for Universities in North Jakarta Using Scrum," *vol. 6, no. 4*, pp. 3115–3128, 2024, doi: 10.51519/journalisi.v6i4.956.

[11] W. Nababan and E. G. V. Situmorang, "Strategi Peningkatan Keefektifan Mal Pelayanan Publik Pada Penyelenggaraan Pelayanan Administrasi Kependudukan Di Kabupaten Sumedang Menggunakan Analisis Soar Dan Matriks Qspm," *J. Regist.*, vol. 5, no. 1, pp. 1–19, 2023, doi: 10.33701/jurnalregistratie.v5i1.3343.

[12] A. B. Kusuma and N. Hadinata, "The Implementation of the Black Box Method for Testing Smart Hajj Application Ministry of Religion," *J. Inf. Syst. Informatics*, vol. 4, no. 3, pp. 673–686, 2022, doi: 10.51519/journalisi.v4i3.306.

[13] T. Kus, Y. Utami, and I. Nurdin, "YUME: Journal of Management Penerapan Aplikasi Smart Dan Mal Pelayanan Publik: Inovasi Kebijakan Berbasis Bukti Di Pemerintah Kota Bogor," *vol. 7, no. 2*, pp. 1534–1545, 2024.

[14] J. S. Setiawan, R. S. Oetama, and J. Andersen, "Enhancement Campus Office Supplies Requests Website Utilizing Rapid Application Development," *J. Inf. Syst. Informatics*, vol. 6, no. 2, pp. 1144–1158, 2024, doi: 10.51519/journalisi.v6i2.769.

[15] U. Geetha, S. Sankar, and M. Sandhya, "Acceptance testing based test case prioritization," *Cogent Eng.*, 2021, doi: 10.1080/23311916.2021.1907013.

[16] W. Christopher and I. R. Widiasari, "Penerapan Knowledge Sistem Informasi Penjaminan Mutu Fakultas Berbasis Web Di FTI-UKSW," *J. Inf. Syst. Informatics*, vol. 3, no. 1, pp. 31–44, 2021, doi: 10.33557/journalisi.v3i1.86.

[17] W. Afzal and A. Piadehbasmenj, "Cloud-based architectures for model-based simulation testing of embedded software," in *2021 10th Mediterranean Conference on Embedded Computing (MECO)*, 2021, pp. 1–8, IEEE.

[18] E. Y. Galimova, "Application of software testing methodology based on quality criteria and expert assessments to mobile applications," *IOP Conf. Ser. Mater. Sci.*, 2021.
[19] M. Deni, A. Yudhana, and S. Sunardi, "Implementasi Agile Method dalam Pengembangan Jurnal Elektronik di Lembaga Penelitian Non Pemerintahan (NGO)," *Jurnal Teknologi Informasi Dan Ilmu Komputer*, vol. 7, no. 4, pp. 709–718, 2020.
[20] D. Mutiarin, N. Khaerah, A. V. Irfa Nyssa, and N. Nasrulhaq, "E-government development: Catalysing agile governance transformation in Indonesia," *J. Contemp. Gov. Public Policy*, vol. 5, no. 1, pp. 87–110, 2024.
[21] M. A. Islam, R. Hasan, and N. U. Eisty, "Documentation Practices in Agile Software Development: A Systematic Literature Review," in *2023 IEEE/ACIS 21st Int. Conf. Softw. Eng. Res., Manag. Appl. (SERA)*, pp. 266–273, 2023.
[22] F. R. Halim, F. Astuti, and K. Umam, "Implementasi Prinsip Agile Governance Melalui Aplikasi PIKOBAR di Provinsi Jawa Barat," *Kolaborasi Jurnal Administrasi Publik*, vol. 7, no. 1, pp. 48–67, 2021.
[23] A. Elmustanizar, "Penerapan Agile Project Management Pada Pembuatan Sistem E-Warga Taman Cibodas Lippo Cikarang," *NUANSA INFORMATIKA*, vol. 16, no. 1, pp. 1–9, 2022.
[24] N. Apriliyani, E. Setiawan, and A. Muchayan, "Implementasi metode agile dalam pengembangan aplikasi pengenalan budaya berbasis web," *Jurnal Ilmu Komputer Dan Bisnis*, vol. 13, no. 1, pp. 8–21, 2022.
[25] A. F. Rahmadany, "Transformasi Digital Pengelolaan Keuangan Daerah dalam Mewujudkan Agile government pada Reformasi Birokrasi 4.0," *Jurnal Ilmiah Administrasi Pemerintahan Daerah*, vol. 16, no. 2, pp. 195–209, 2024.
[26] R. Vernanda, "Kesiapan indonesia menuju agile governance," *Konferensi Nasional Ilmu Administrasi*, vol. 3, no. 1, 2019.
[27] E. C. Sugiarto, "Transformasi Birokrasi Menuju Organisasi yang Adaptif. Agile, dan Fluid," *Biro Humas Kemensetneg*, 2021.
[28] S. F. Wamba, M. M. Queiroz, K. H. Tan, and B. Huo, "Guest editorial: digital transformation strategy and impacts during emergency situations," *Ind. Manag. & Data Syst.*, vol. 123, no. 1, pp. 1–9, 2023, doi: 10.1108/imds-01-2023-814.