Optimization of New Student Admission Process through a Web-Based System: Enhancing Speed, Accuracy, and Real-Time Monitoring

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Abstract
Education is the key to national progress; therefore, an effective system is required to support the admission process of new students. Manual and semi-digital registration systems that are still used in several schools often cause problems such as delays in data processing and the risk of inaccurate information. This study aims to design and develop a web-based student admission system that improves efficiency, speed, and accuracy in processing registration data. The development method applies an object-oriented approach with stages of requirements analysis, system design, implementation, and testing. Data were collected through observation, interviews, and documentation studies at the selected school. The implementation results show that the developed application can process applicants' data faster than the previous method and minimize input errors. In addition, the system facilitates admission committees in monitoring data in real time. Thus, the web-based student admission system is expected to become an innovative solution to support the digitalization of education in Indonesia.
Keywords— *Student admission system, online registration, information system, web-based application*

1. INTRODUCTION

The influence of information technology on the world of education cannot be stopped. Education is required to continuously adapt to technological developments in order to improve the quality of learning [1]. Information technology is part of computer-based information systems and other supporting technologies for data and information management [2]. The presence of technology has made daily activities easier, including in the process of new student admissions (NSA) through online systems. By accessing the school website, prospective students can obtain information about the school profile, learning environment, and achievements without having to visit the school directly [3].

However, many schools still rely on manual systems for admitting new students. Previous studies show that information about NSA is often disseminated only through brochures distributed by the admission committee or word of mouth among staff, which limits its reach to a wider community. In addition, the manual registration process requires considerable time and poses a risk of inefficiency for both schools and applicants [4]. For instance, SMK XYZ still applies a manual registration process in which parents must fill out forms and submit required documents directly. This method is considered inefficient, as internet technology should be utilized to support institutional activities [5][6].

Several studies have highlighted the advantages of web-based NSA systems. Lili Indah Sari et al. (2022) [7] found that prospective students no longer needed to come to school because they could register through a web application by filling in forms and uploading documents online. Similarly, Sasmita [8] developed a new student admission website for SMPN 5 Pagaralam, which

successfully addressed school challenges, especially in searching and classifying data. Mardiawati et al. (2022) [9] pproposed a web-based registration information system that provides prospective students with access to requirements, test schedules, registration fees, and graduation announcements, along with the ability to print test cards independently. Effendy and Monika [10] demonstrated that a new student registration system at SMA PGRI 2 Palembang was more efficient in terms of cost, time, and energy. Likewise, Sidik and Rahmawati [11] showed that by simply connecting to the internet, students could register anytime and anywhere.

From this review, a critical research gap can be identified regarding the operational limitations of existing systems. Most developed NSA platforms focus purely on the front-end registration interface without providing automated data validation mechanisms or real-time monitoring features for school administrators. Without proper validation at the input stage, schools frequently encounter high error rates in applicant identities, late reporting, and fragmented data storage. Furthermore, the absence of a real-time data monitoring feature prevents the admission committee from tracking active applicant metrics efficiently [12].

Therefore, this study aims to develop an optimized web-based new student admission system equipped with automatic input validation and a real-time tracking dashboard. The system is specifically designed to enhance data processing speed, minimize human input errors, and provide the admission committee with an instant overview of applicant distribution, thereby accelerating the entire administrative workflow.

2. RESEARCH METHODS

This study employs the Waterfall method, a systematic and sequential system development model consisting of analysis, design, implementation, testing, and maintenance stages [13][14]. This method was chosen to ensure that the application development process proceeds step by step in a structured manner, allowing the research objectives to be achieved. The stages of the Waterfall method in this study are illustrated in Figure 1 [15].

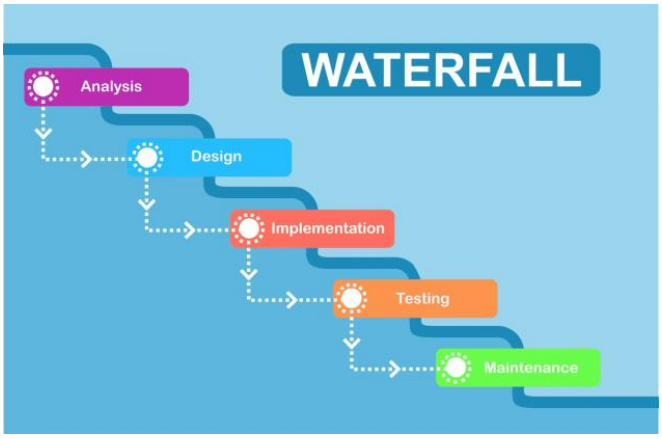


Figure 1 Tahapan Metode Waterfall

1. Analysis Stage

At this stage, an analysis was conducted on the existing manual student admission system (PPDB) at SMK XYZ. System requirements were modeled using Unified Modeling Language (UML) through Use Case Diagrams and Sequence Diagrams. The analysis results served as the foundation for designing the new system.

2. Design Stage

The system was designed to meet user requirements based on the analysis results. UML was applied to develop Class Diagrams, Activity Diagrams, and Statechart Diagrams. The database was designed using MySQL, while the user interface was developed with Dreamweaver CS5.

This stage also involved designing the algorithm and software architecture to support system implementation.

3. Implementation Stage

The design results were translated into program code. A web-based PPDB system was developed, including database configuration, interface integration, and customization according to school requirements.

4. Testing Stage

Testing was conducted to ensure that the system functions as required. This study used Black Box Testing, focusing on verifying the system's logic and functionality. The aim was to minimize input errors and ensure that the system output met user expectations.

5. Maintenance Stage

After implementation, maintenance activities were carried out, including bug fixing, feature enhancement, and further development to ensure sustainable system usage.

2.1 Data Collection Methods

To obtain the research data, three methods were applied:

a) Observation

Direct observation was conducted at the student admission section of SMK XYZ to study the ongoing manual procedures .

b) Interview

Interviews were carried out with the PPDB committee and school administrative staff to gather insights on system requirements and challenges in the manual process.

c) Literature Review

References were collected by reviewing books, reputable journals, and online sources related to student admission information systems and software development methodologies [16].

3. RESULTS AND DISCUSSION

The developed student admission information system not only accelerates the registration process but also optimizes school operational activities by reducing time and costs. Through this system, both prospective students and the school administration can obtain accurate and fast information to support decision-making .

3.1 Usecase Diagram

The system's functionality is illustrated using a Use Case Diagram (Figure 2). This diagram shows the interactions between the actors and the system. In this study, there are three actors: students as the primary users who register, administrative staff who manage the registration data, and school leaders who monitor the reports. The entire student admission process is represented by eleven use cases that reflect the system's functional requirements .

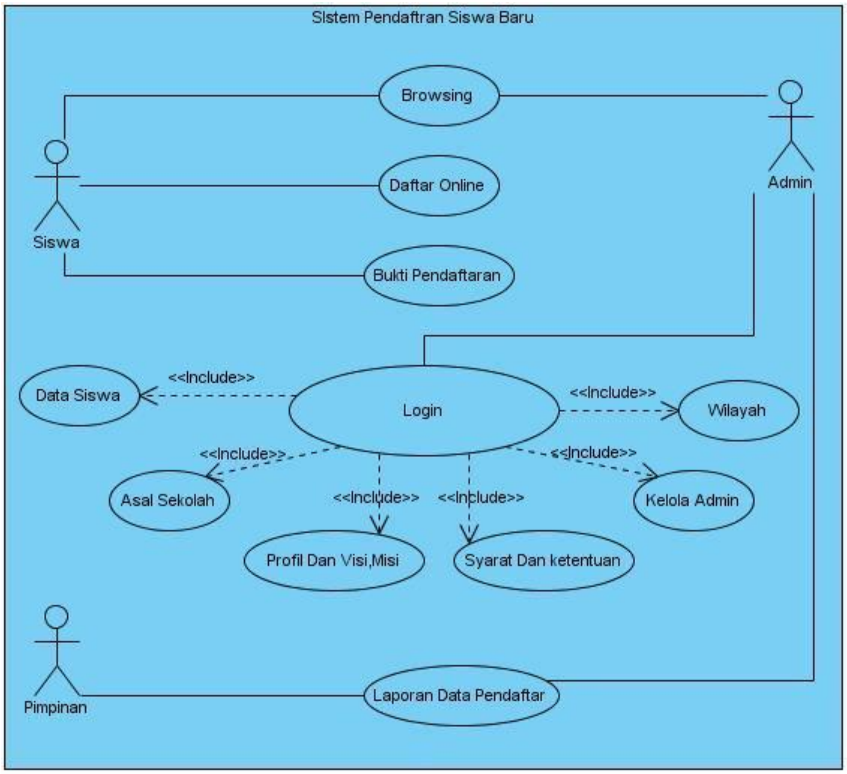


Figure 2 Use Case Diagram Pendaftaran Siswa Baru

3.2 *Main Menu Interface*

The main menu serves as the navigation hub within the system (Figure 3). Through this menu, users can access key pages such as the registration form, login, student data, and reports. The presence of the main menu simplifies user interaction, making the system more efficient .



Figure 3 Tampilan Menu Utama

3.3 Registration Form Interface

The registration form (Figure 4) is used by prospective students to fill out their personal data, including the Student National Identification Number (NIS), name, place and date of birth, gender, religion, address, sub-district, phone number, email, previous school, parents' names, parents' occupations, and a student photo. Once all data is entered, students can save it by clicking the “Register” button. This feature ensures that student data is recorded completely and structurally .

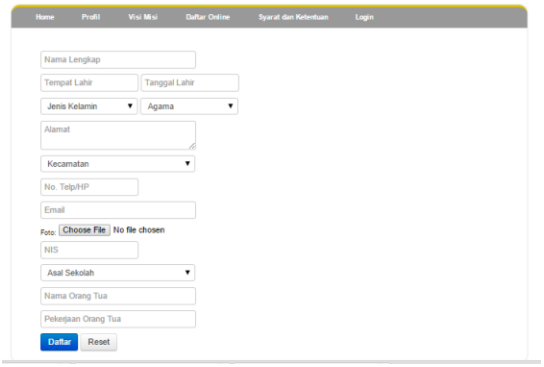


Figure 4 Registration Form Menu

3.4 Login Menu Interface

The login menu (Figure 5) is used to access the system based on user access rights. Students, administrative staff, and school leaders log in using a username and password. The system will deny access if the login credentials do not match. Additionally, passwords can be updated as needed to maintain data security .

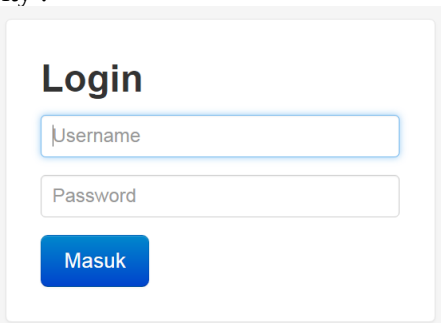


Figure 5 Login Menu

3.5 *Student Data Menu Interface*

After the student data is entered, the system automatically stores and manages it within the database. Through the student data menu (Figure 6), staff can display complete student information both on the screen and in the form of a printed report. This feature helps the school compile new student admission administrative reports quickly and accurately .

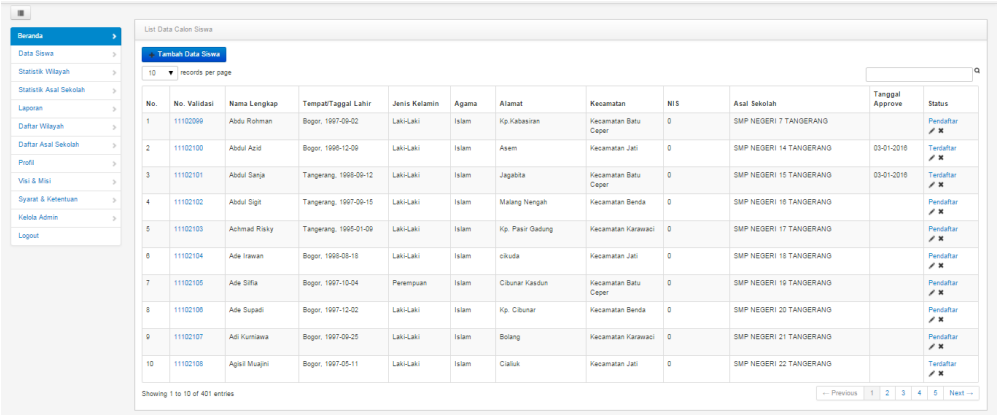


Figure 6 Student Data Menu

3.6 *System Testing*

The testing phase was conducted using the Black Box Testing method, which focuses on the system's functionality. Several test scenarios were carried out, such as login inputs, completing the registration form, and managing student data. The test results show that:

a. The system displays an error message if the input is incomplete or does not match the format.
b. Valid data can be processed successfully and generates the required output.
c. All main menus function correctly according to the predefined design.

Table 1 Black Box Testing Results

No	Test Scenario	Input	Expected Output	Actual Output	Status
1	Login	Correct username & password	Access the dashboard	Access the dashboard	Valid
2	Login	Incorrect username or password	Error message “Login failed”	Error message “Login failed”	Valid
3	Student Registration Form	All required fields filled correctly	Data successfully saved	Data successfully saved	Valid
4	Student Registration Form	Empty fields exist	Error message “Required field”	Error message “Required field”	Valid
5	Document Upload	File format .pdf/.jpg	File successfully uploaded	File successfully uploaded	Valid
6	Document Upload	File format other than pdf/jpg	Error message “Invalid format”	Error message “Invalid format”	Valid
7	Print Registration Card	Valid student data	Registration card appears (PDF)	Registration card appears (PDF)	Valid
8	Logout	Click the logout button	Return to the login page	Return to the login page	Valid

These test results prove that the system is capable of meeting the school's needs in the new student admission process more effectively compared to manual methods.

Table 2. Comparison of the Legacy System (Manual) and the New System (Web-Based)

Aspect	Manual System (Legacy)	Web-Based System (New)
Registration	Filling out paper forms, error-prone	Online via forms, automatic validation
Processing Time	± 15–20 minutes per student	± 5 minutes per student
Data Management	Paper archives, difficult to search	Digital database, instant search
Documents	Manual photocopies, risk of loss	Document upload, stored within the system
Data Correction	Requires erasing/rewriting	Direct editing within the system
Reports	Generated manually, time-consuming	Automated and real-time
Cost Efficiency	Paper, ink, physical storage	Minimal paper, more cost-effective
User Satisfaction	Committees & students often faced time constraints	Faster, easily accessible, practical

The table above demonstrates that the new web-based system enhances time efficiency, accuracy, and user convenience compared to the legacy manual system.

3.7 Evaluation and Users

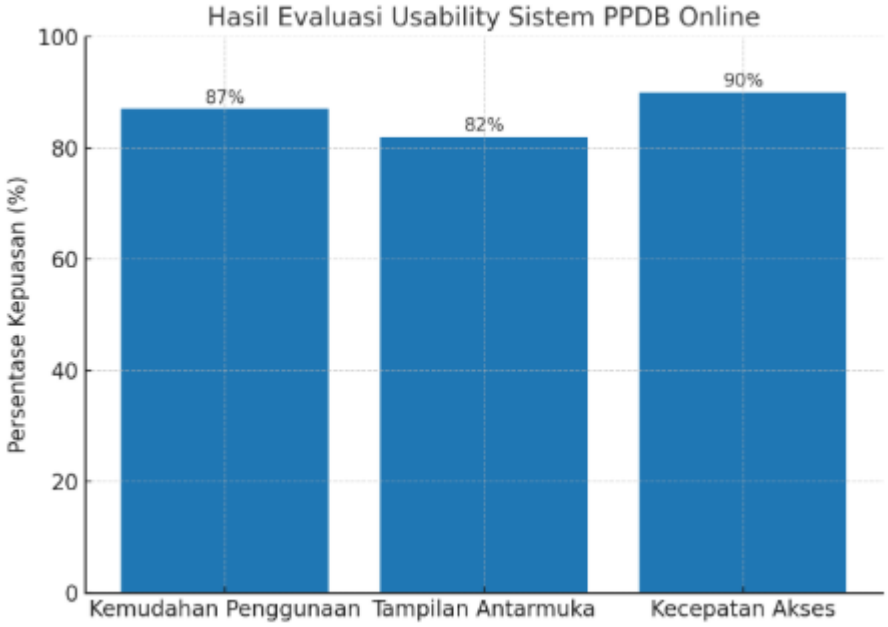
In addition to technical testing, a direct evaluation of the system was conducted through a limited trial involving the New Student Admission (PPDB) committee and several students as prospective users. This evaluation utilized a simple questionnaire based on usability aspects, which included ease of use, interface design, and access speed.

Table 1. Recapitulation of Usability Questionnaire Results

Usability Aspect	Responding in Agreement (%)	Notes

Ease of use	87%	Easy to use without prior training
Interface design	82%	Attractive and informative layout
Access speed	90%	Fast access compared to the manual method
Average	**86.3%**	**"Good" Category**

Out of 30 respondents (10 committee members and 20 prospective students), the majority assessed that the system successfully met their needs, particularly in terms of speed and ease of use. Overall, the user satisfaction level falls into the "Good" category, indicating that the system not only functions well technically but is also well-received by its users.



Based on the results of the user evaluation regarding the online PPDB system, positive feedback was obtained with a relatively high satisfaction level across three main aspects: ease of use, interface design, and access speed. The access speed aspect achieved the highest score at 90%, demonstrating that the system is capable of providing a fast and stable response during the registration process. Ease of use followed in second place with a score of 87%, indicating that the majority of users found the system easy to understand and operate without significant obstacles. Meanwhile, the interface design received a score of 82%, which, while still quite good, suggests room for improvement in design aesthetics to make it more appealing and intuitive for users. Overall, these results reinforce that the online PPDB system is not only technically functional but also well-received by its users, making it a reliable digital solution to support the new student admission process.

Although the evaluation results indicate positive acceptance, several improvements are suggested to enhance the quality of the online PPDB system in the future. First, regarding the interface design aspect, the system could be enhanced with a more modern layout, more

consistent color schemes, and more intuitive menu placement to facilitate user navigation. Second, despite the already high access speed, optimization of the server and bandwidth remains necessary to anticipate user surges during peak registration periods. Third, in terms of ease of use, it is recommended to add interactive assistance features such as a user guide (help center) or a simple chatbot, enabling students and parents to resolve issues independently. The implementation of these suggestions is expected to not only maintain system performance but also elevate the overall user experience.

4. CONCLUSION

Based on the results of the research and the implementation of the web-based New Student Admission (PPDB) system, it can be concluded that this system significantly enhances the effectiveness and efficiency of the registration process. Data processing, which was previously manual and posed risks of delays and input errors, can be minimized through this digital system. Furthermore, the real-time monitoring feature allows the admission committee to monitor the number of applicants, document completeness status, and the selection process more quickly and accurately. This system also provides convenience for prospective students and parents to register without space and time constraints, thereby supporting the digitalization of education in Indonesia.

5. SUGGESTED

For further development, the Online PPDB system should be equipped with various additional features, such as online payment integration, automated notifications via email or WhatsApp, and an analytical dashboard to assist the committee in evaluating admissions. In terms of security, it is highly critical to enhance data protection by implementing encryption, two-factor authentication, and regular backups to prevent leaks or loss of applicant data. Furthermore, schools need to conduct socialization and training for both the committee and prospective applicants to ensure the system's usage runs optimally. Given the potential surge in the number of applicants in the future, the system must be designed with high scalability through the use of high-capacity servers or cloud-based technology. Equally important, periodic evaluations must be conducted to measure system performance, gather user feedback, and adapt features to the latest needs in the educational field

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