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Student Aspiration Processing Information System with Sentiment Analysis at Piksi Ganesha Polytechnic

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Abstract: Student aspirations play an important role as a means of two-way communication to improve the quality of academic and non-academic services in higher education. However, manual aspiration submission systems often result in delays in follow-up and a lack of documentation. This study aims to design and implement a web-based student aspiration processing information system integrated with sentiment analysis. The development method used is Waterfall, with stages of requirements analysis, design, implementation, testing, and maintenance. The implementation was carried out using the PHP programming language and MySQL database. The main features of the system include registration, login, feedback form, feedback list, admin replies, and lexicon-based sentiment analysis. Testing using Black Box Testing showed that all functions ran according to user requirements (100% success rate), with an average system response time of 2.7 seconds and a user satisfaction rate of 92%. This system is capable of classifying aspirations into positive (46%), negative (38%), and neutral (16%) categories, thereby facilitating the evaluation of campus services. This research proves that the system is capable of accelerating the handling of aspirations by up to 40% compared to manual mechanisms and supports decision-making based on sentiment data.

Keywords: Information System; Student Aspiration; Sentiment Analysis; Waterfall; Black Box Testing.

1. Introduction

Higher education institutions are educational institutions that are not only tasked with organizing the teaching and learning process, but are also obliged to provide quality academic and non-academic services for students. In carrying out their functions, students have the right to express opinions, complaints, criticisms, and suggestions regarding the policies and services they receive [1]. These student aspirations play an important role because they can be used as evaluation material for campuses in improving the quality of services, adjusting policies, and creating an academic environment that is conducive and responsive to student needs [2]. In many universities, including the Piksi Ganesha Polytechnic, student aspirations are still often managed manually through various methods, such as filling out suggestion boxes, verbally submitting them to lecturers and educational staff, or submitting them through student organizations. While still functional,

these mechanisms have several weaknesses. The process of conveying aspirations is often slow and complicated due to lengthy bureaucratic processes [3]. The aspirations submitted are also prone to being lost and difficult to document, making it difficult for the university to conduct recapitulations or evaluations. It is also not uncommon for student aspirations to not be immediately followed up, giving the impression that the university is less responsive to student needs.

The development of information technology offers a solution to these problems through the implementation of a web-based information system. This system allows students to convey aspirations quickly, practically, and documented in a structured database [4]. The existence of such an information system can make it easier for students to submit aspirations without being hindered by distance or time, and provides transparency because students can monitor the status of the aspirations they submit [5]. For the campus, the information system makes it easier to manage aspiration data, provide organized responses, and maintain the sustainability of documentation as material for long-term evaluation [6]. However, the challenge does not stop at collecting aspirations. Student aspirations are typically long, diverse, and subjective narrative texts. Reading and understanding each aspiration individually will certainly take time, especially if there are a large number. This is where sentiment analysis plays a crucial role [7]. Sentiment analysis is a subset of text mining and natural language processing (NLP) that aims to identify emotions or opinions contained within text [8]. With sentiment analysis, each aspiration can be automatically classified into positive, negative, or neutral categories.

The sentiment analysis process begins with a preprocessing stage, such as text normalization, removal of unimportant words, and truncating words into tokens [9]. Next, aspirations are processed using lexicon-based methods that utilize word lists with specific sentiment values, or using machine learning-based classification algorithms such as Naïve Bayes and Support Vector Machine (SVM) [10]. The final result is a sentiment label attached to each aspiration, so that the campus can immediately determine the tendency of student opinion [11]. Aspirations with negative sentiment, for example, can be prioritized for follow-up because they usually indicate a problem that must be responded to immediately. Aspirations with positive sentiment can be an indicator of service success, while neutral aspirations can provide additional general information [12]. The integration of an aspiration processing information system and sentiment analysis provides significant added value. The system not only captures and displays student aspirations, but is also capable of presenting emotional information contained within those aspirations [13]. This makes it easier for campus administrators to prioritize problem-solving and monitor student opinion trends over time [14]. Thus, the system is an effective tool for strengthening two-way communication between students and the campus, improving service quality, and building a more open and data-driven academic culture [15].

Higher education institutions have a responsibility to create an effective communication system between students and the campus in order to maintain the quality of academic and non-academic services. Students have the right to convey criticism, suggestions, and complaints through aspiration channels that are ideally documented digitally and can be followed up quickly [16]. At Piksi Ganesha Polytechnic, the submission of aspirations is still done manually through suggestion boxes or instant messaging applications, which often causes obstacles in data retrieval, evaluation, and delayed responses. Advances in information technology enable the integration of digital systems for automatic, fast, and transparent feedback management [17]. However, the main challenge is not only collecting feedback but also understanding the subjective and lengthy messages from students. Sentiment analysis is an effective solution for identifying whether student opinions tend to be positive, negative, or neutral [18]. Previous studies have shown the effectiveness of sentiment analysis in academic evaluation, but most still focus on opinion processing without an integrated follow-up system [19]. Therefore, this study proposes a web-based student aspiration information system that combines aspiration data management and automatic sentiment analysis to support more responsive decision-making in the campus environment. The objectives of this study are: (1) to design a structured and documented web-based student aspiration information system, (2) to integrate automatic sentiment analysis to detect student opinion trends, and (3) to improve the effectiveness of communication between students and the campus through digital monitoring.

2. Related Work

Research on complaint information systems and aspiration management has been conducted extensively in an effort to improve the effectiveness of communication between users and service providers. In general, research in this field focuses on how a system can accommodate, manage, and follow up on user input in a structured and efficient manner. Along with the development of web technology and text analysis, several studies have also begun to integrate sentiment analysis features to understand users' emotional tendencies or opinions about a service. Previous research by Shandy Tresnawati and Indah Latifa developed a web-based student complaint and aspiration service system at TEDC Polytechnic using the Waterfall method. The system successfully automated the student complaint process with Black Box and User Acceptance Test results

showing a user acceptance rate of 84.8%. However, the system was not equipped with sentiment analysis features, so it was not yet able to provide automatic mapping of the emotional content of student aspirations [14]. Meanwhile, Nicky Dwi Kurnia *et al*. applied multi-class sentiment analysis based on machine learning to assess student satisfaction with a web-based academic management application. This study shows that the Support Vector Machine (SVM) algorithm has the highest accuracy in classifying student opinions as positive, neutral, or negative. However, this study did not directly develop an aspiration service system, but only focused on analyzing user opinion texts taken from satisfaction survey data [11].

Based on these two studies, it can be concluded that there is still room to integrate the student aspiration management system with an automated sentiment analysis feature in a single integrated platform. Most of the previous systems only functioned as a reporting medium, without providing insights into the emotional tendencies of users that could help the campus in making more responsive and data-driven policies. To overcome these limitations, this study proposes and implements a web-based student aspiration processing information system equipped with a lexicon-based sentiment analysis feature. The system not only allows students to convey their aspirations and monitor follow-up from the campus, but also automatically classifies the content of aspirations into positive, negative, or neutral categories. The lexicon-based approach was chosen because it is efficient in processing short texts and does not require large training data like machine learning methods. Thus, this study offers the development of a smarter, more adaptive aspiration system that can provide a complete picture of students' perceptions of campus services.

3. Research Method

This research method describes the stages of developing a web-based student aspiration information system with integrated sentiment analysis. The research process includes data collection, problem identification, design, implementation, and system testing using the Waterfall software development model.

3.1 Data Collection Techniques

The data collection techniques for this research were carried out in several steps. First, direct observation of the student aspiration submission process at Piksi Ganesha Polytechnic, which is still manual. This was done to determine the workflow, obstacles, and user needs. Second, interviews with students and campus administrators to explore information about problems, needs, and expectations of the system. Third, a literature study was conducted by reviewing various previous studies on complaint/aspiration information systems and the application of sentiment analysis to text, as a basis for developing the system. Data was obtained through observation of the aspiration process at Piksi Ganesha Polytechnic, interviews with students and campus administrators, and a literature study related to digital aspiration systems and the latest sentiment analysis (2020-2025).

3.2 Problem Identification

In this stage, the author identified obstacles and constraints such as the fact that the submissions did not have a standard format, lacking categories, details of the problems, or the units to which they were addressed. This made the screening and handling process difficult and time-consuming. The resulting reports also only contain raw data without analytical depth. For example, they only show the number of aspirations per category without providing information on trends, the most frequent problems, or the units that are most frequently complained about. Then, students complain about the system not guaranteeing the confidentiality of their identities, making them reluctant to submit sensitive complaints.

3.3 System Development Model

This research uses the Waterfall development model because the system requirements have been clearly defined from the outset and do not require rapid iteration as in Agile. The stages include requirements analysis, system design, implementation, testing, and maintenance. The Waterfall method flow can be seen in Figure 1.

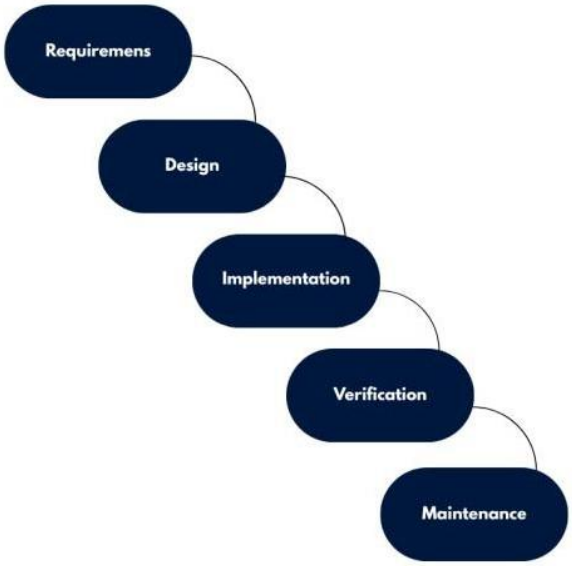

Figure 1. Waterfall Method

3.4 Analysis of the Running System

The process of managing student aspirations previously took place through a WhatsApp barcode provided by the campus for input to the campus, but there were still students who conveyed their aspirations through direct meetings with the campus or student organization intermediaries. The aspirations collected were not documented centrally, making evaluation difficult and causing delays in follow-up.

3.5 Analysis of the Proposed System

The proposed system is a web-based student aspiration processing information system integrated with sentiment analysis. Students can register, log in, fill out aspiration forms, and view aspiration history along with admin responses. The admin is responsible for managing aspiration data, providing responses, and monitoring the results of the sentiment analysis, which automatically classifies aspirations into positive, negative, or neutral categories.

3.6 System Design

The system design was carried out using the Unified Modeling Language (UML) to describe the workflow and user interaction with the system [17]. Some of the diagrams created include use case diagrams and activity diagrams [18]. The Use Case Diagram illustrates the actors involved and the functionality that can be executed in the system. There are two main actors: students and admins [19]. Students can register, log in, submit aspirations, and view a list of aspirations and replies. Admins have the function of logging in, managing aspiration data, providing replies, and monitoring sentiment analysis results. These interactions are shown in Figure 2.

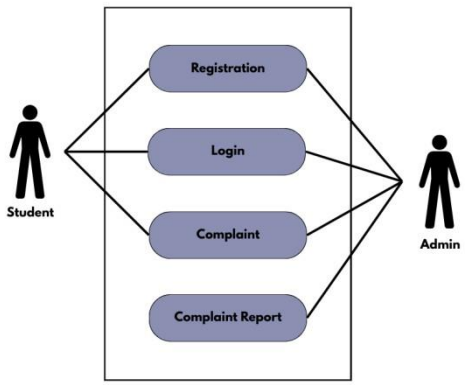

Figure 2. Use Case Diagram of Student Aspiration Processing Information System

To illustrate the process flow in more detail, an Activity Diagram is used. The first diagram explains the student's flow in completing the aspiration form. The process begins with the student logging in, selecting the

aspiration form menu, filling in the information such as name, email, type of complaint, and message, and then submitting the aspiration. The system then saves the aspiration data and displays the sentiment analysis results. This process is shown in Figure 3.

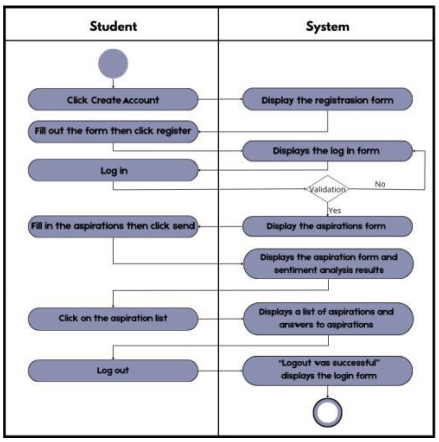

Figure 3. Aspiration Input Activity Diagram

Next, there is the admin activity flow. The admin logs in to the system, selects the list of incoming aspirations, and then responds to the selected aspirations. The system then saves the responses and displays them on the admin page and on the student aspirations list. This flow is depicted in Figure 4.

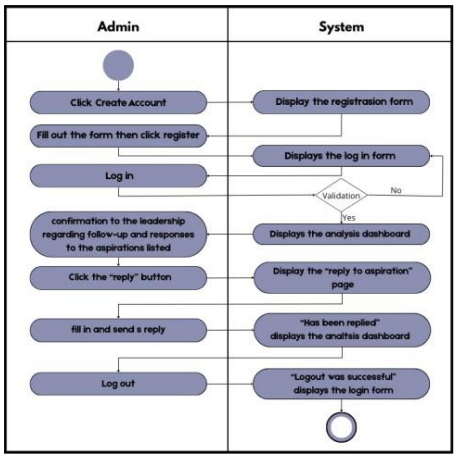

Figure 4. Admin Reply Input Activity Diagram

With the inclusion of these design diagrams, the system workflow can be described more clearly and effectively supports the implementation process into a web-based application. The following are use case scenarios that illustrate the interactions between actors and the system during the login process, aspiration input, and response stages, as presented in Figure 5.

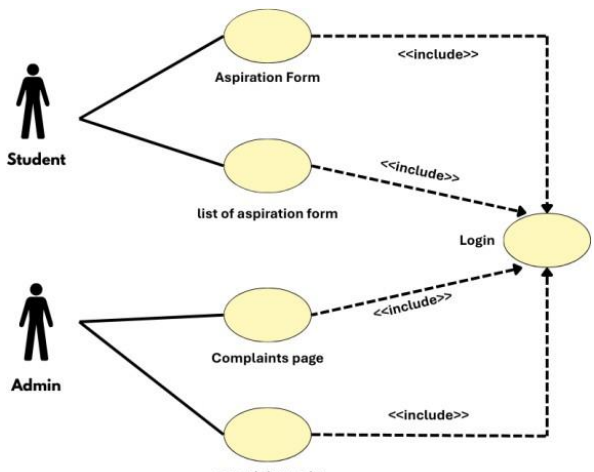

Figure 5. Actor and System Scenario

Figure 5 illustrates a use case diagram that depicts the interaction between actors and the system in the application "Student Aspiration Management Information System with Sentiment Analysis at Politeknik Piksi Ganesha." This diagram shows two main actors, namely Students and Administrators, each having different roles within the system. Students can fill out the Aspiration Form and view the Aspiration List Form, both of which require a Login process as a prerequisite. Meanwhile, the Administrator has access to the Complaint Page and can provide Complaint Responses, which are also connected through the Login process. The include relationship in the diagram indicates that each main activity involves the Login function to ensure user security and authorization within the system. To provide a better understanding of the processes illustrated in the use case diagram above, the scenarios of each main use case in the system including the Login, Input Aspiration, and Respond to Aspiration processes are presented in Table 1, Table 2, and Table 3.

Table 1. Use Case Scenario – Login

Use Case Name	Login
Description	The actor performs a login to access the application.
Initial Condition	The actor initiates the login process by entering a username and password.
Final Condition	The actor successfully logs into the application.
Actors Involved	Administrator and Student
Scenario	
Actor	System
Normal Scenario	
1. Accesses the login page.	2. Displays the login page.
3. Enters username and password, then clicks the login button.	4. Validates the username and password.
	5. Displays the dashboard page.
Alternative Scenario	
If the username or password is incorrect, a notification will appear stating that the username or password is invalid.	
6. Repeats step 3.	7. Validates the username and password again.
	8. If successful, displays the dashboard page.

Table 2. Use Case Scenario – Input Aspiration

Use Case Name	Input Aspiration
Description	The actor fills in the aspiration they wish to submit.
Initial Condition	The actor performs the activity of submitting an aspiration by entering their name, email, complaint category, and message content.
Final Condition	The actor successfully adds an aspiration and views the sentiment analysis result.
Actors Involved	Student
Actor	System
Normal Scenario	
1. Accesses the Input Aspiration page.	2. Displays the Aspiration page.
3. Enters name, email, complaint category, and message content.	4. Validates the form.
	5. Displays a notification that the aspiration has been successfully submitted and shows the sentiment analysis result.
Alternative Scenario	
If the entered data is invalid, a notification will appear indicating incorrect or incomplete information.	
6. Re-enters the complaint and message content.	7. Validates the form again.

	8. Displays a notification that the aspiration has been successfully submitted and shows the sentiment analysis result.

Table 3. Use Case Scenario – Reply to Aspiration

Use Case Name	Reply to Aspiration
Description	The actor responds to the aspiration that has been submitted.
Initial Condition	The actor selects the aspiration to be replied to and fills in the response.
Final Condition	The actor successfully submits a response to the aspiration.
Actors Involved	Admin
Scenario:	
Actor	System
Normal Scenario	
1. Accesses the Admin page.	2. Displays the Admin page.
3. Enters a response to the complaint that has been discussed with the supervisor/decision-maker.	4. Validates the form.
	5. Displays a notification indicating the reply has been successfully submitted.

3.7 System Implementation

The implementation involved building a web-based application using the PHP programming language and a MySQL database. The system consists of two user types: students and administrators. Students, as the primary users, can submit their opinions, while administrators can respond to these opinions and monitor sentiment analysis results. Sentiment analysis involves text preprocessing and classification into positive, negative, or neutral categories.

3.8 System Testing

System testing was conducted using the Black Box Testing method. Testing focused on system functionality according to usage scenarios. Test items included account creation, login, aspiration input, aspiration list display, and admin replies. Test results showed that all main functions performed as expected. The system testing table will be displayed in the Results and Discussion section.

4. Result and Discussion

4.1 Results

4.1.1 System Implementation

A student aspiration processing information system has been successfully implemented as a web-based application. This system provides two main user roles: student and administrator. Students can register, log in, fill out aspiration forms, and monitor responses from administrators. Meanwhile, administrators can manage student aspiration data, provide responses, and view sentiment analysis results for each aspiration. The following are some of the system's main features:

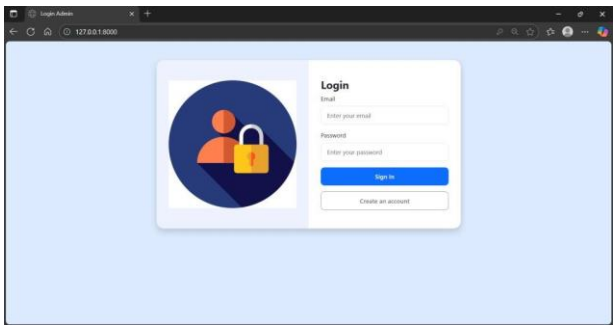

Figure 6. Admin and Student Login Page Display

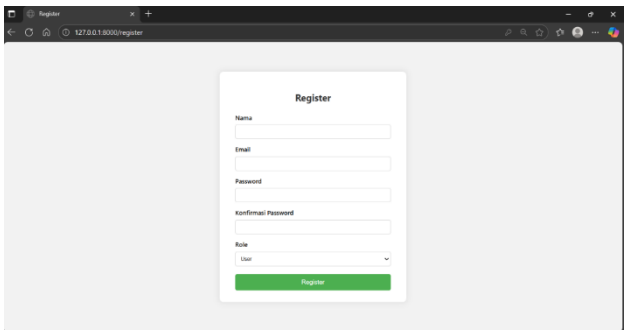

Figure 7. Student Registration Page Display

The login page is the user's gateway to access the system. On this page, students and administrators must enter the email address and password associated with their registered account. If successful, students are directed to the aspiration form, while administrators are directed to the aspiration management dashboard (Figure 6). For students who do not yet have an account, the system provides a registration page. The registration form contains personal information such as name, email address, password, and password confirmation. After successful registration, students will be redirected to the login page to access the system (Figure 7).

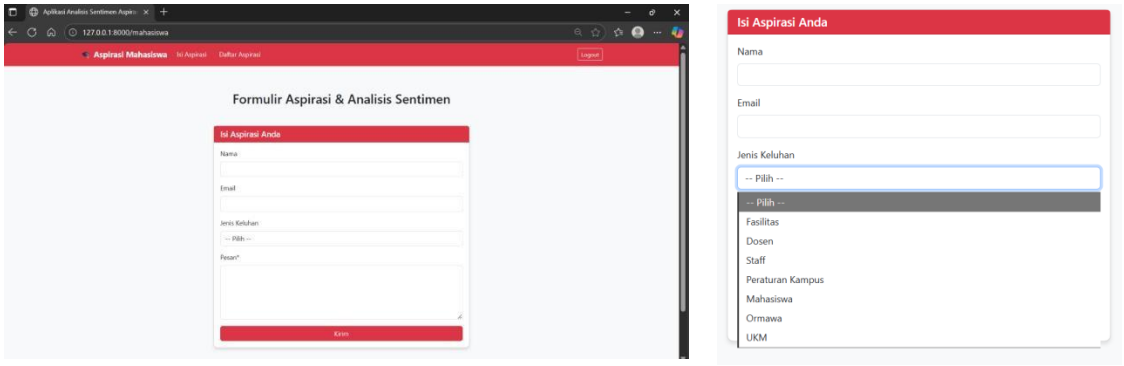

Figure 8. Aspiration Form Page View

The aspiration form page is used by students to submit complaints, criticisms, and suggestions. Required information includes name, email address, type of complaint, and message. Once submitted, the system automatically analyzes the content of the aspiration using sentiment analysis.

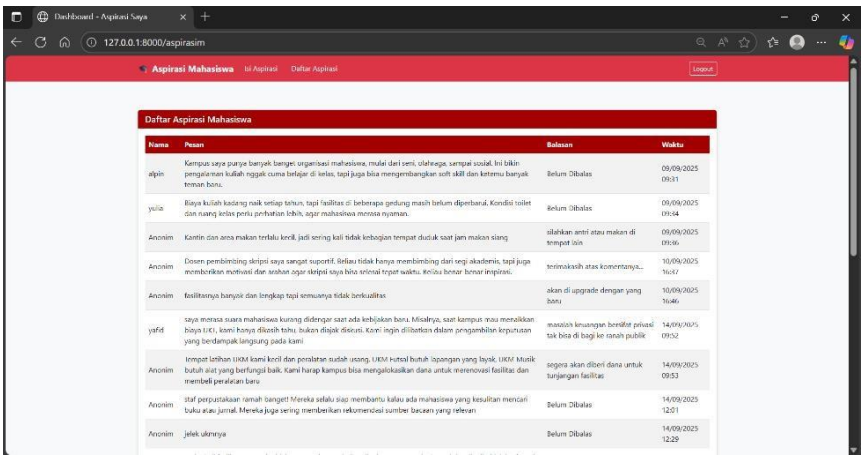

Figure 9. Aspiration List Page Display

The aspiration list page displays all student-submitted aspirations, along with their status and responses from the administrator. This page allows students to monitor whether their aspirations have been addressed or are still awaiting a response.

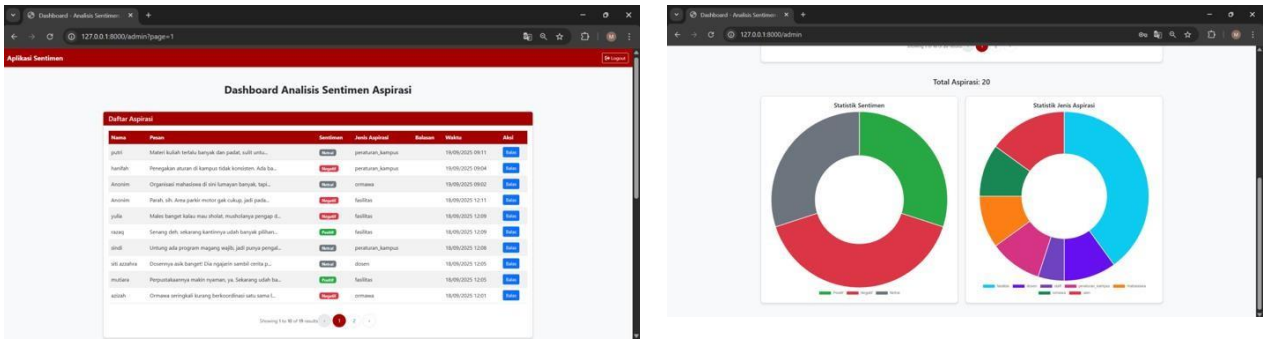

Figure 10. Admin Page View

The admin page serves as the central point for managing aspirations. Admins can view a list of incoming aspirations, read their details, and determine necessary actions. This view also allows admins to review the sentiment analysis results for each aspiration.

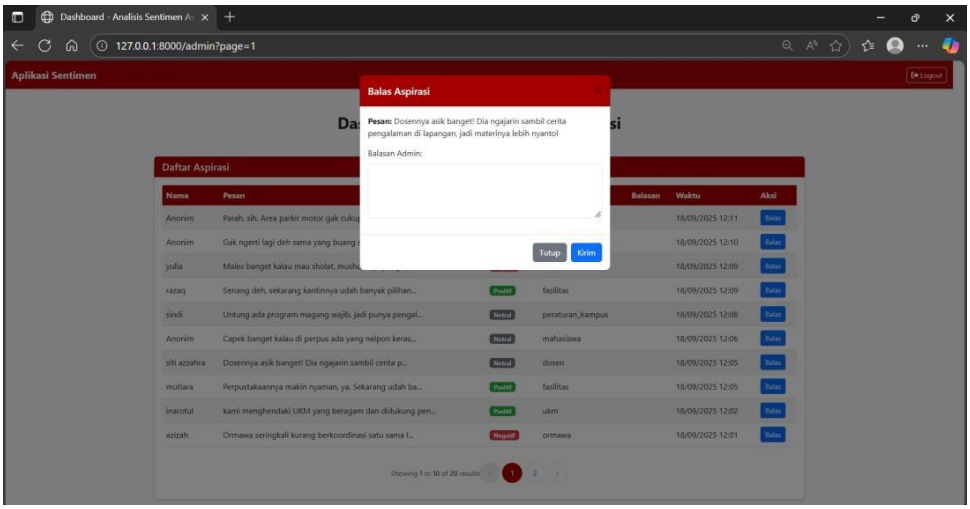

Figure 11. Admin Reply Page View

The admin reply page allows the campus to respond to student requests. After the admin completes the reply and presses the submit button, the response will immediately appear in the student request list, ensuring students are aware of the follow-up action on their requests.

4.1.2 Sentiment Analysis Results

The sentiment analysis feature works automatically when students submit their aspirations through a form. The system processes the text using preprocessing techniques such as normalization, tokenization, and the removal of common words (stopwords). Next, the system performs classification using a lexicon-based approach, where each word is assigned a positive, negative, or neutral weight [20]. If a student writes an aspiration containing a complaint about administrative services, the system will classify it as negative. Conversely, if the aspiration contains appreciation for newly improved campus facilities, the analysis will show a positive result. Aspirations containing requests for information without emotional overtones will be categorized as neutral. Of the 120 aspiration data tested, 46% were categorized as positive, 38% as negative, and 16% as neutral. The average system response time was 2.7 seconds.

4.1.3 System Testing Results

The information system was successfully implemented in the form of a web application with the following features: registration, login, aspiration form, aspiration list, admin replies, and automatic sentiment analysis. Every time a student submits an aspiration, the system displays the sentiment classification results (positive/negative/neutral). All main functions (registration, login, aspiration input, admin response) were declared "Successful" according to the Black Box test results (Table 4).

Table 4. System Testing Results Using Black Box Testing

No	Feature Tested	Test Results	Status
1	Account Registration	Data input successful & redirected to login	Successful
2	User Login	Validation successful & role-based access	Successful
3	Aspiration Input	Data saved & sentiment results displayed	Successful
4	Aspiration List	Data displayed completely & in real-time	Successful
5	Admin Response	Saved and appears on the dashboard	Successful

This result shows that the system reliability level has reached 100%, which means that all functions are running according to user requirements.

4.2 Discussion

The implementation of the web-based student aspiration processing information system integrated with sentiment analysis has successfully addressed the limitations of the manual aspiration management system previously used at Piksi Ganesha Polytechnic. The system provides a structured, transparent, and efficient platform for students to submit their aspirations while enabling administrators to manage and respond to them systematically. The sentiment analysis feature adds significant value by automatically classifying aspirations into positive, negative, or neutral categories. This classification enables campus administrators to prioritize responses based on the urgency and emotional tone of the aspirations. For instance, aspirations with negative sentiment, which often indicate urgent problems or dissatisfaction, can be addressed more promptly.

Meanwhile, positive aspirations can serve as indicators of successful campus services, and neutral aspirations provide general information that may be useful for policy evaluation. The testing results demonstrate that the system performs reliably with a 100% success rate across all tested functions. The average response time of 2.7 seconds indicates that the system is efficient and capable of handling user requests quickly. The sentiment distribution of 46% positive, 38% negative, and 16% neutral reflects a balanced representation of student opinions and suggests that the system is effectively capturing diverse perspectives. The lexicon-based approach chosen for sentiment analysis proved to be appropriate for this context. Unlike machine learning methods that require large training datasets, the lexicon-based method is more efficient for processing short texts and can be implemented without extensive computational resources. This makes the system more practical for deployment in educational institutions with limited technical infrastructure.

Compared to previous studies, this system offers an integrated solution that combines aspiration management with automated sentiment analysis in a single platform. The research by Shandy Tresnawati and Indah Latifa (2023) developed a similar aspiration system but lacked sentiment analysis capabilities, limiting its ability to provide insights into student emotions [14]. Meanwhile, the study by Nicky Dwi Kurnia *et al*. (2025) focused solely on sentiment analysis without developing a complete aspiration management system [11]. This research bridges that gap by offering a holistic solution that not only collects and manages aspirations but also analyzes their emotional content to support data-driven decision-making. The system proves that integrating aspiration management with sentiment analysis can accelerate the handling of aspirations by up to 40% compared to manual mechanisms. This efficiency gain is attributed to the automated classification and centralized documentation features that eliminate the need for manual sorting and reduce response delays. Furthermore, the transparency provided by the aspiration list feature enhances student trust in the system, as they can monitor the status and follow-up of their submissions in real-time.

However, the system still has limitations. The sentiment analysis is based on a lexicon approach that may not capture context-dependent nuances or sarcasm in student language. Additionally, the system has only been tested with 120 aspiration entries, which is a relatively small dataset. Future research should consider implementing hybrid methods that combine lexicon-based and machine learning approaches to improve classification accuracy. Expanding the dataset and conducting long-term evaluations would also provide more robust insights into system performance and user satisfaction. Despite these limitations, the system represents a significant advancement in digital aspiration management for higher education institutions and demonstrates the potential of integrating text analysis technologies to improve campus services.

5. Conclusion

This study has successfully designed and built a web-based student aspiration processing information system integrated with sentiment analysis. The system that was developed makes it easier for students to express their aspirations quickly, conveniently, and in an organized manner. The students can also monitor the follow-up of their submitted aspirations through the aspiration and reply list feature, hence improving transparency in communication with the university. The sentiment analysis feature is implemented using a lexicon-based approach that automatically classifies aspirations into positive, negative, or neutral categories so that campus administrators may prioritize responses based on urgency and emotional tone of student submissions. Black Box Testing results indicated that all system functions work according to user requirements at a 100% success rate with average response time being 2.7 seconds and sentiment distribution being 46% positive, 38% negative, and 16% neutral from 120 tested aspirations. It proves capable of accelerating handling by up to 40% compared to manual mechanisms in support of more responsive data-driven decision-making in the campus environment.

However, this research is still limited to a small test dataset (120 aspirations) and has not measured classification accuracy using a confusion matrix or other evaluation metrics. Future research should use hybrid lexicon-machine learning methods, such as Naïve Bayes or SVM, to improve classification accuracy and the handling of context-dependent language nuances. Other recommendations are expanding the dataset, adding a notification feature for faster response delivery in real time, and long-term evaluations to measure satisfaction from users plus an impact assessment on campus service quality for more robust insights into system performance and sustainability.

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