

Development of an Online Complaint Management System for Students of Confluence University of Science and Technology, Osara

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ABSTRACT

An online complaint management system is a digital platform designed to streamline the process of receiving, tracking, and resolving complaints from users. In the context of higher education, such systems are increasingly being adopted to improve student satisfaction and operational efficiency. At Confluence University of Science and Technology, Osara (CUSTECH), the current complaint resolution methods such as paper based submissions, verbal reports, and email communications are inefficient and ineffective. To address these issues, there is a need for an online complaint management system that streamlines the process, ensures real-time tracking of complaints, enhances transparency, and promotes efficient resolution. The methodology adopted for the system design was the Agile Methodology and the implementation leverages a three-tier architecture comprising of a front-end built with HTML, CSS, and JavaScript, a back-end powered by PHP, and a MySQL database for data storage for the implementation of key modules, specifies hardware and software requirements, and documents the testing processes to ensure the system meets its functional and performance requirements. This project was undertaken to address the critical inefficiencies in traditional complaint handling methods at CUSTECH, including paper-based forms, verbal reports, and emails, which result in delays, lack of transparency, and eroded student trust. While the current implementation offers role-based dashboards and real-time analytics, future enhancements should integrate AI-driven complaint categorization, SMS notifications, MFA authentication, and a mobile app to further boost accessibility and administrative responsiveness, serving as a scalable model for academic institutions.

(Key Words: Artificial Intelligence, Custech, Online Complaint Management System)

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I. INTRODUCTION

An online complaint management system is a digital platform designed to streamline the process of receiving, tracking, and resolving complaints from users. In the context of higher education, such systems are increasingly being adopted to improve student satisfaction and operational efficiency (Uwah & Etim 2024). However, without data-driven insights, university management struggles to make informed decisions regarding service improvement and policy changes (Alfa, et al., 2021). Also, Uwah & Etim, (2024) observed that management of student complaints is critical in running an institution of learning either conventionally or distance mode. Students frequently face difficulties in tracking the progress of their complaints, and in many cases, unresolved issues remain unattended for extended periods. The lack of a structured, accessible, and transparent system prevents effective communication between students and university administrators, leading to frustration and eroding trust in the institution's ability to address their concerns. Furthermore, the availability of historical complaint data will support evidence-based policy formulation and resource allocation, enabling the institution to address areas requiring improvement systematically.

This research aims to develop and implement an automated system that provides students with a seamless platform to submit, track, and receive feedback on their complaints, while also equipping university administrators with tools to manage complaints efficiently and make informed decisions based on analytical reports. Proper handling of complaints ensures that students of Confluence University of Science and Technology, Osara completes their studies without any hurdles. The objective of the study is to critically review existing works on student complaint management system, design a user-friendly web-based platform for

students to submit complaints efficiently and Implement secure authentication, real-time tracking and notification features that keep students informed about the status of their complaints as well as test and evaluate the system for efficiency. The proposed online complaint management system for CUSTECH will incorporate an automated escalation mechanism to ensure that unresolved complaints are promptly forwarded to higher authorities for attention. Additionally, the system will include data analytics and reporting capabilities, enabling the university to identify recurring issues, evaluate administrative response times, and make data-driven decisions to improve service delivery. This initiative aligns with global trends in higher education, where institutions are increasingly leveraging technology to improve administrative processes and enhance the student experience

A study by Emuoyibofarhe et al., (2023) demonstrated that universities adopting digital complaint systems experienced faster resolution times and higher student satisfaction. Furthermore, user-centered design principles have been widely applied to ensure that such systems are intuitive and accessible to all users, including those with disabilities as observed by (Kanimozhi et al., 2020). Despite these advancements, challenges remain, particularly in ensuring data security and scalability. Cybersecurity frameworks, such as the CIA triad (Whitman & Mattord, 2011), offer valuable insights into protecting sensitive user data.

Complaint management systems (CMS) are designed to facilitate the reporting, tracking, and resolution of complaints within an organization. These systems enhance transparency, accountability, and efficiency in resolving issues raised by users (Uwah & Etim 2024). In educational institutions, an effective CMS ensures that student grievances are addressed promptly, thereby improving institutional trust and student satisfaction (Carlson et al., 2023). Several studies have explored online complaint management systems in different domains. According to Pio et al., (2023) the reliance on manual or email-based complaint handling methods, are inefficient and prone to delays. Therefore, Modern CMS leverage web-based platforms with automated tracking and escalation mechanisms (Pulungan et al., 2023) with Institutions like Harvard and MIT successfully implementing digital grievance portals, that demonstrates improvements in student engagement and administrative response times.

According to Uwah & Etim, (2024), an efficient OCMS can significantly improve user satisfaction by providing a transparent and accessible platform for lodging complaints. Similarly, Merang et al., (2022) argue that such systems help organizations identify recurring issues and implement corrective measures, thereby enhancing overall service quality. These findings underscore the need for a robust OCMS at Confluence University to address student concerns promptly and effectively.

A recurring theme in the literature is the importance of user-centric design in OCMS. As highlighted by Arif et al., (2022), systems that prioritize ease of use, intuitive navigation, and accessibility are more likely to be adopted by users. For instance, features such as simple complaint submission forms, real-time status tracking, and mobile compatibility were found to enhance user engagement (Padiku et al., 2024). These insights suggest that the OCMS for Confluence University should focus on creating a seamless and user-friendly experience for students.

Data Privacy and Security

Data privacy and security are critical concerns in the design of OCMS, as these systems handle sensitive user information. According to the General Data Protection Regulation (GDPR, 2018), organizations must implement robust security measures to protect user data from unauthorized access and breaches. Studies by OWASP (2021) and NIST (2020) recommend encryption, secure authentication, and regular security audits as best practices for safeguarding data. These findings highlight the need for the Confluence University OCMS to incorporate advanced security features, such as multi-factor authentication and end-to-end encryption, to protect student data.

Theoretical framework

Two theoretical Frameworks were analyzed for this study which are the Information System Success Model and Technology Acceptance Model.

Information System Success Model (ISSM)

The Information Systems Success Model by DeLone and McLean (2003) provides a foundation for evaluating the success of information systems.

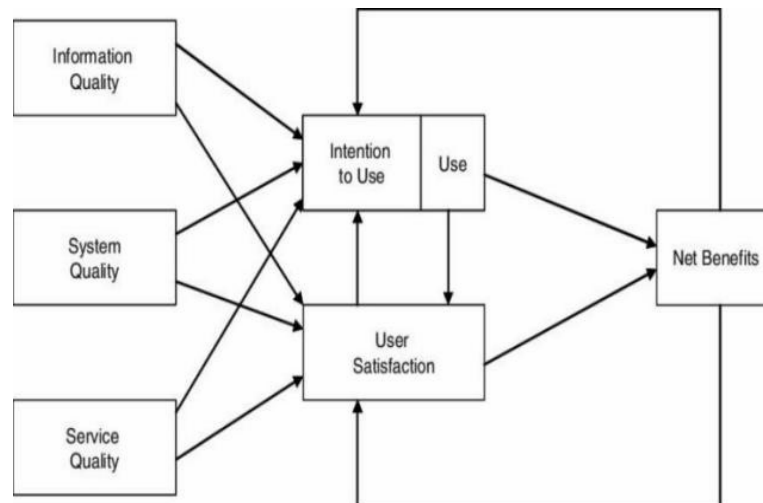


Figure 1: Information Systems Success Model (DeLone and McLean, 2003)

Figure 1 shows the six key dimensions of the information System Success Model

- i. System Quality: Measures the performance of the system (e.g., usability, reliability, and response time).
- ii. Information Quality: Assesses the accuracy, completeness, and relevance of the information provided by the system.
- iii. Service Quality: Evaluates the support and maintenance provided to users.
- iv. User Satisfaction: Reflects the users' perception of the system's effectiveness.
- v. Intention to Use: Indicates the likelihood of users adopting the system.
- vi. Net Benefits: The overall impact of the system on users and the organization.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) (Davis, 1989) explains how users accept and use technology.

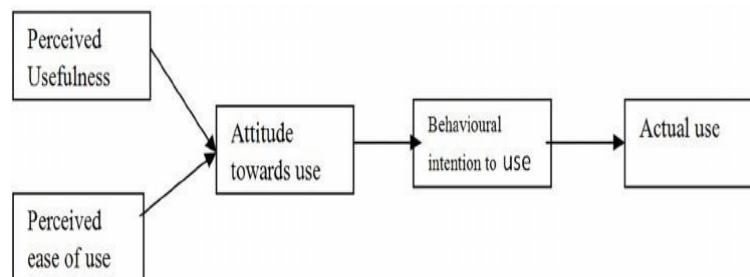


Figure 2; Technology Acceptance Model (TAM) (Davis, 1989)

Figure 2 shows the two main focuses of the Technology Acceptance Model.

- i. Perceived Usefulness (PU): The degree to which users believe the system will enhance their performance.
- ii. Perceived Ease of Use (PEOU): The degree to which users find the system easy to use.

Both theories were adopted as a guide in the evaluation of the complaint management system's effectiveness, user satisfaction and to ensure the complaint management system is user-friendly and meets the needs of students and administrators.

II. METHOD

System Design Methodology

An Agile methodology was used as the most suitable approach for this project, this decision is based on a thorough analysis of Agile's strengths, which emphasis on user-centric approach, continuous feedback from students and administrators, ensuring the system is intuitive, accessible, and tailored to their needs. This ensures the university can start using the system sooner, improving student satisfaction and trust.

The choice of this design method was dependent on several factors, including the project's complexity, the need for flexibility, and the ability to adapt to changing requirements. Real-world examples, such as the

University of Oslo's student feedback system and a government grievance redressal system, demonstrate Agile's effectiveness in similar projects. By addressing its weaknesses through proper planning and stakeholder engagement, the methodology enabled the design and delivery of a robust, secure, and user-friendly system for Confluence University.

System Architecture

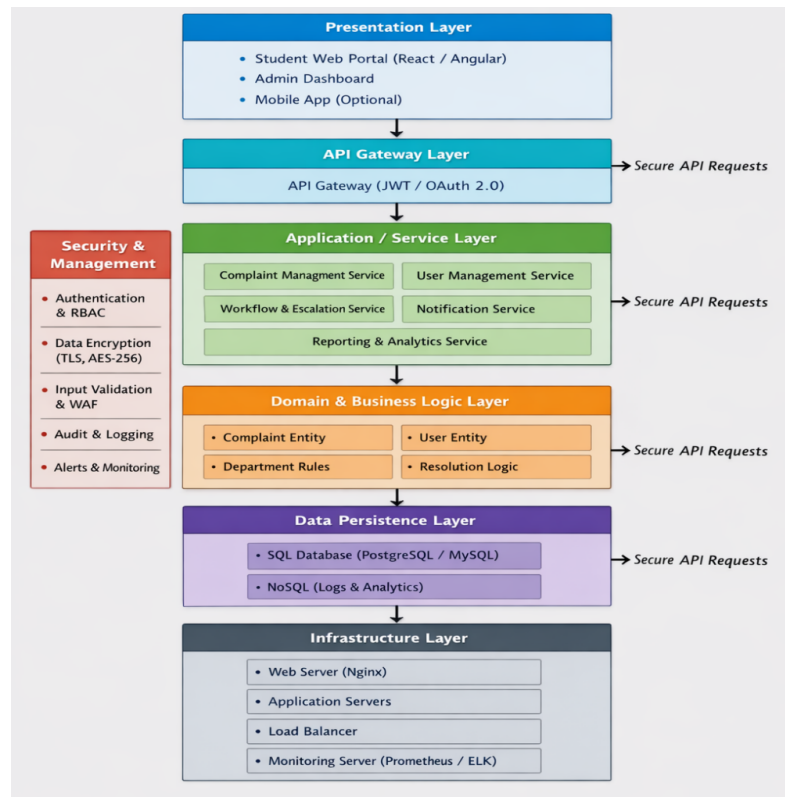


Figure 3. System Architecture Overview

The project, uses a three-tier layer architecture as shown in figure 3 consisting of the presentation layer, application layer, and database layer. The architecture ensures scalability, modularity, and ease of maintenance, while addressing the limitations of existing systems like the University of Melbourne's Student Complaint and Feedback System.

Sequence diagram

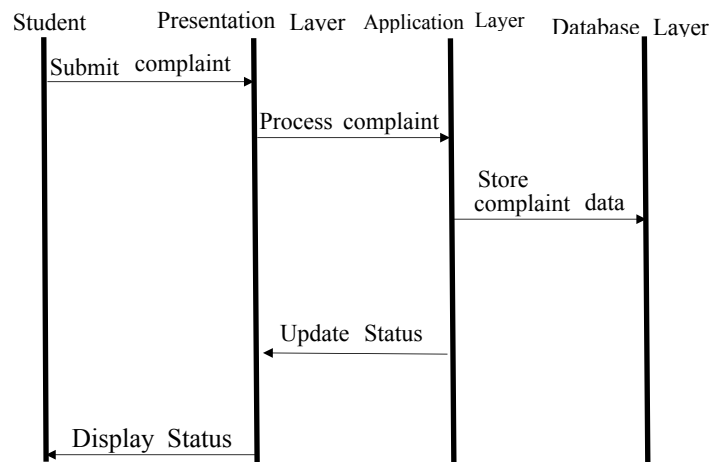


Figure 4: Sequence Diagram of Proposed System

The sequence diagram in figure 4 shows the step-by-step interaction between the student, presentation layer, application layer, and database layer during a complaint submission. The student submits a complaint through the presentation layer, which sends the data to the application layer for processing. The application layer stores the complaint in the database layer and updates the status, which is then displayed to the student. This diagram emphasizes the system's real-time responsiveness and efficient handling of user requests.

Flowchart diagram

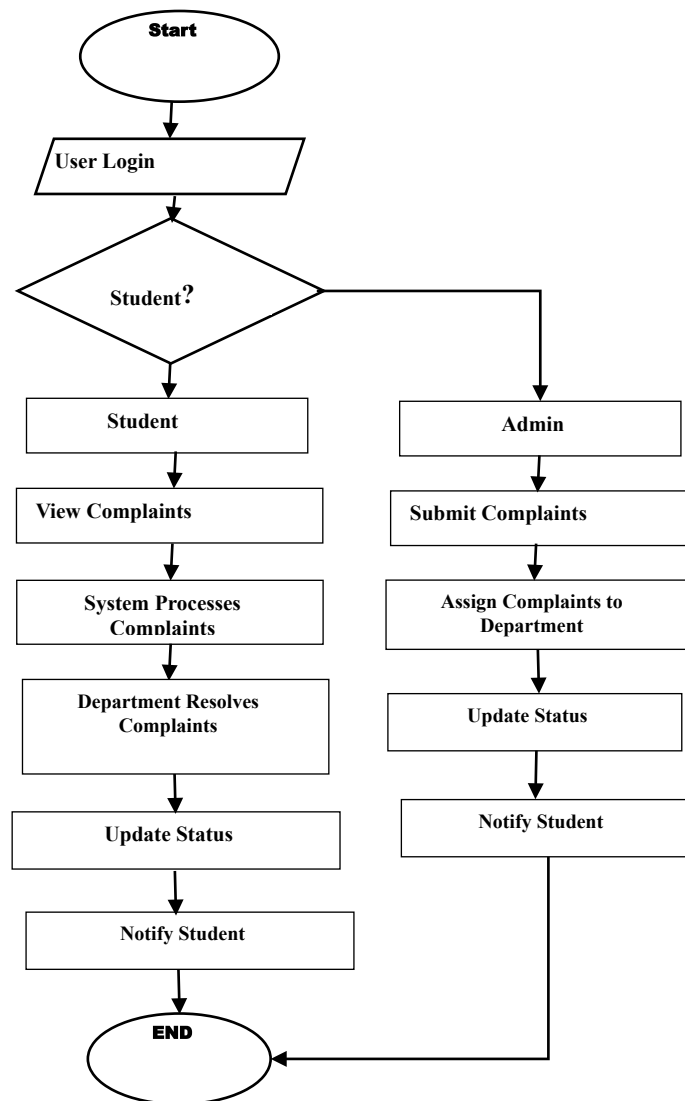


Figure 5: Flowchart Diagram of ProposedSystem

Figure 5 shows the flowchart diagram which outlines the workflow of the complaint management process. It starts with the student submitting a complaint, which is then processed by the system. The complaint is stored in the database, and its status is updated. Finally, the student is notified of the status change. This diagram provides a clear, step-by-step visualization of the system's core functionality, ensuring a smooth and efficient complaint resolution process.

Use case diagram

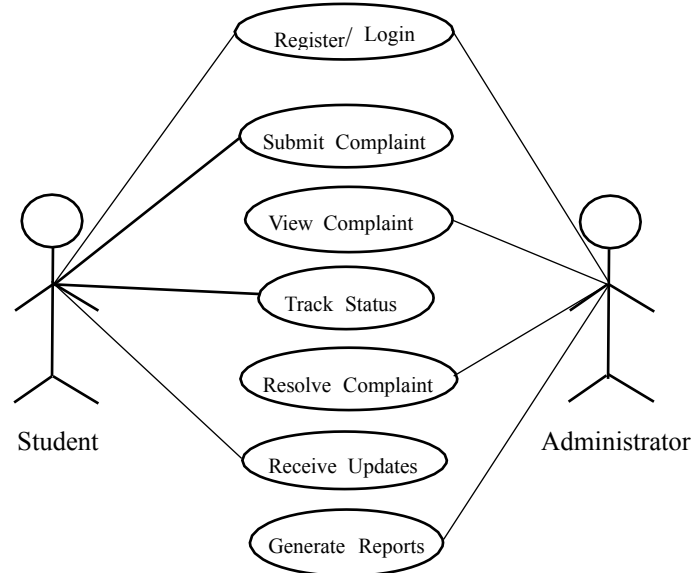


Figure 6: Use Case Diagram of Proposed System

The use case diagram in figure 6 highlights the key interactions between the system’s primary users, students and administrators and the system itself. Students can submit complaints, track their status, and receive updates, while administrators can assign, resolve complaints, and generate reports. This diagram provides a high-level overview of the system’s functionality, emphasizing its user-centric design and the distinct roles of students and administrators.

Database Design

The database design for the Online Complaint Management System is structured to ensure efficient storage, retrieval, and management of data. It is designed to support the system’s core functionalities, such as complaint submission, status tracking, and administrative management. The database consists of several interrelated tables, including Users, Complaints, Departments, Assignments, and Notifications, each serving a specific purpose while maintaining data integrity and security. Below is an outline of the key tables and their attributes, supported by a diagram:

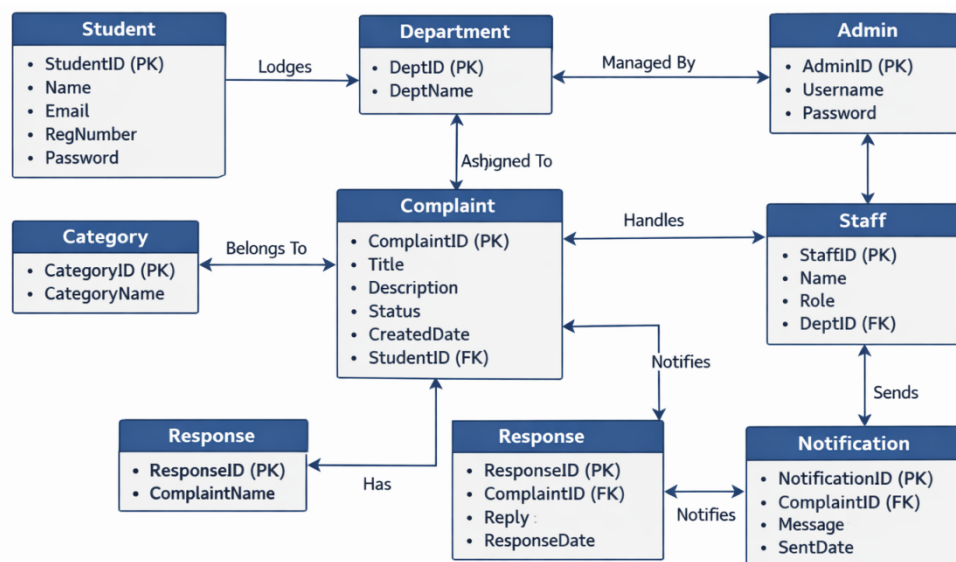


Figure 7: Database Structure Diagram

System Implementation

The OCMS was developed using a combination of HTML, CSS, and JavaScript for the front-end, PHP for the back-end, and MySQL for the database layer. These technologies were selected for their compatibility, widespread use, and ability to create a robust, scalable, and user-friendly system tailored to CUSTECH's needs. HTML, CSS, and JavaScript were used for the Front-End which provided the structural foundation for the user interface, enhancing the visual appeal, ensuring a responsive and accessible design that adapts to various devices, including desktops and smartphones. Also adding interactivity, enabling dynamic features like real-time form validation, status updates, and asynchronous communication with the back-end via AJAX. PHP was used for its simplicity, robust support for web development, and seamless integration with MySQL. As a server-side scripting language, PHP handles the business logic, processes user requests, and facilitates communication between the front-end and the database. Its extensive libraries and frameworks, such as PDO for secure database interactions, make it suitable for building a secure and efficient complaint management system.

MySQL was used for its reliability, scalability, and efficiency in managing relational data. It supports structured storage of user profiles, complaints, and status updates, with features like indexing and foreign key constraints ensuring data integrity.

The OCMS comprises several modules, each developed to address specific functionalities. The User Authentication Module that ensures secure access to the system by verifying user identities, the Complaint Submission Module that allows students to submit complaints efficiently. The Complaint Tracking Module which enables students to monitor the status of their complaints in real time. The Notification Module that keeps users informed about complaint updates and the Admin Dashboard Module that provides administrators with tools to manage complaints and generate reports.

Development Environment Setup:

XAMPP was installed to provide a local development environment with Apache, PHP, and MySQL. The MySQL was used to create the database tables (Users, Complaints, Status, Notifications, etc.) using phpMyAdmin.

While Testing and Debugging was conducted iteratively during development to identify and fix bugs, using browser developer tools and PHP error logs.

System Testing

The System was tested to evaluate the OCMS as a whole to ensure all components worked together. Test cases included end-to-end complaint submission, tracking, and resolution processes. Test data used include; valid and invalid login credentials (e.g., correct email/password, incorrect password, non-existent user) and the results confirmed successful login for valid credentials, appropriate error messages for invalid inputs, and proper session management. The submitted test complaints with various inputs (e.g., valid/invalid titles, descriptions, file uploads) results showed successful storage in the database and error handling for oversized files or missing fields. While tested report generation and complaint assignment with sample data showed accurate data retrieval and interactive chart functionality.

III. RESULT

The results obtained from the implementation and evaluation of the Online Complaint Management System (OCMS) developed for Confluence University of Science and Technology, Osara (CUSTECH). The evaluation focused on functional performance, system efficiency, user acceptance, and administrative effectiveness, in line with the study objectives and the adopted Information System Success Model (ISSM) and Technology Acceptance Model (TAM). System evaluation was conducted through integration testing, user acceptance testing (UAT), and observational performance analysis using realistic complaint scenarios and sample institutional data. Functional testing confirmed that all core modules of the OCMS operated as intended. End-to-end workflows ranging from user authentication to complaint resolution and notification were executed successfully without critical system failures. The most notable improvements were observed in tracking visibility, record retrieval, and assignment speed, directly addressing the inefficiencies identified in the problem statement. User Acceptance Testing (UAT) was conducted with a small but representative group of students and administrative staff. Participants interacted with the system by submitting complaints, tracking progress, and generating reports. Overall, users expressed confidence and willingness to adopt the system, indicating strong alignment with technology acceptance principles.

Table 1: Evaluation of System Performance Metrics

Evaluation Metric	Manual Complaint	Proposed OCMS	Observed Improvement
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	Process		
Complaint Submission Time	High (manual form filling, queues)	Low (instant web submission)	Significant reduction
Complaint Tracking	Not available	Real-time dashboard	Fully enabled
Response Visibility	Low	High	Improved transparency
Complaint Assignment	Manual routing	Automated assignment	Faster escalation
Record Retrieval	Time-consuming	Instant database query	Improved efficiency
User Feedback Availability	None	Integrated	Newly introduced

The proposed OCMS outperforms the manual system across all evaluated metrics as shown in Table 1.

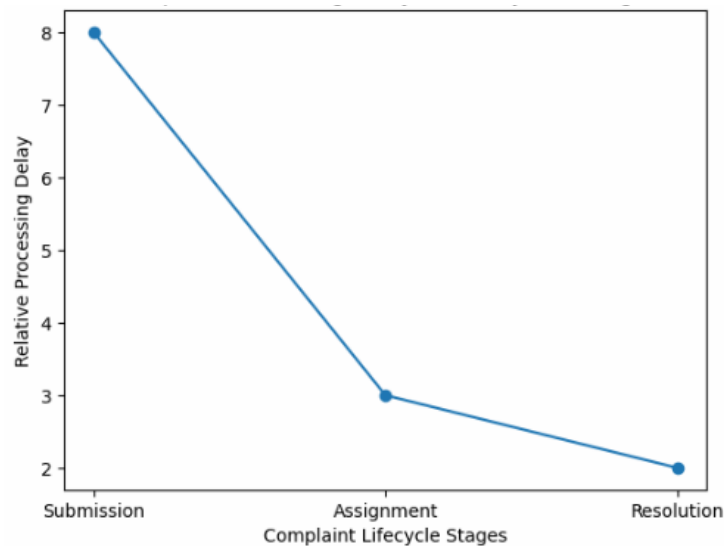


Figure 8: Complaint Processing Delay Across System Stages

The graph in figure 8 illustrates the relative processing delay at each stage of the complaint lifecycle (Submission → Assignment → Resolution). The graph shows a sharp decline in processing delay after the submission stage. This confirms that the automated routing and real-time status updates significantly reduce delays once complaints enter the system workflow. The lowest delay at the resolution stage demonstrates the effectiveness of structured administrative handling enabled by the OCMS.

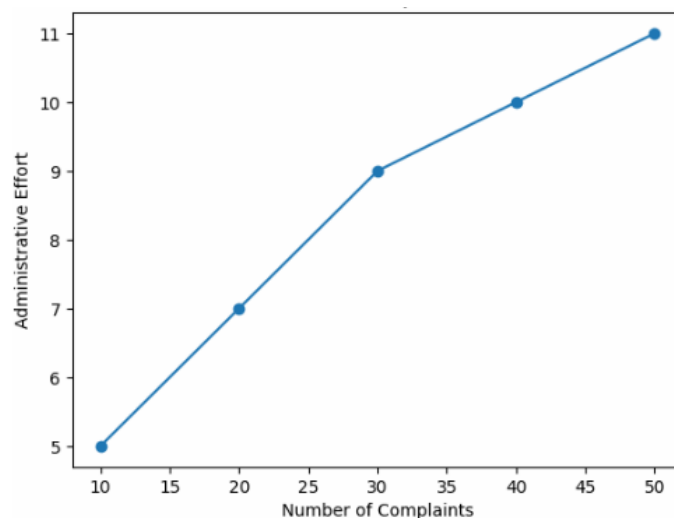


Figure 9: Administrative Effort as Complaint Volume Increases

The graph in figure 9 presents the relationship between the number of complaints handled and the administrative effort required. Although administrative effort increases with complaint volume, the growth is gradual rather than proportional. This indicates that the system scales efficiently, allowing administrators to

manage higher complaint volumes without a corresponding increase in workload. The result validates the system's scalability and supports its suitability for institutional deployment.

IV. DISCUSSION

The output of the system confirms that the proposed Online Complaint Management System meets its design objectives and also contributes meaningfully to administrative efficiency, user satisfaction, and institutional transparency. By grounding system evaluation in established theoretical frameworks and empirical trend analysis, the study demonstrates both technical rigor and practical relevance, positioning the OCMS as a viable digital transformation solution for higher education institutions.

The was a significant improvement in transparency and response visibility directly contribute to user satisfaction and intention to use two critical success dimensions in the ISSM framework. By enabling students to track complaints independently without repeated follow-ups, the system shifts complaint management from a reactive to a proactive institutional process. Also, the positive outcomes from user acceptance testing provide empirical support for the Technology Acceptance Model (TAM). Beyond technical performance, the findings have important implications for institutional governance and service delivery. The availability of structured complaint data enables evidence-based decision-making, allowing university management to identify recurring issues, evaluate departmental responsiveness, and allocate resources more effectively.

V. CONCLUSION

The Online Complaint Management System developed for CUSTECH represents a transformative step toward modernizing complaint management in higher education. By replacing inefficient paper-based and email-based processes with a web-based platform, the system enhances transparency, efficiency, and student satisfaction. The Agile methodology facilitated iterative development, incorporating stakeholder feedback to create a user-centric system. Features like real-time tracking, automated notifications, and analytics empower both students and administrators, fostering trust and accountability. The project did not only address CUSTECH's immediate needs but also sets a foundation for continuous improvement in administrative processes, contributing to a more student-friendly academic environment.

While the system demonstrates strong functional and operational performance, the evaluation was conducted within a controlled testing environment and a limited user group. Future studies should incorporate longitudinal deployment data to measure sustained usage patterns, resolution timelines, and institutional impact over multiple academic sessions. Additionally, integrating AI-driven complaint categorization, mobile application support, and multi-factor authentication would further strengthen system intelligence, accessibility, and security.

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