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Research Article

Design and Implementation of an E-Admin System with Short Message Service Notification for the Registry Unit of Federal Polytechnic Ile Oluji

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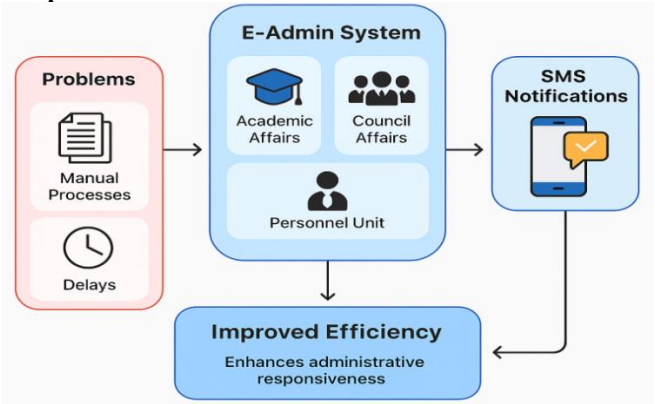
Abstract— This study details the development and implementation of an E-Admin System with integrated SMS notifications for the Registry Unit of Federal Polytechnic Ile Oluji, aimed at modernizing its administrative processes. The registry unit, encompassing Academic Affairs, Council Affairs, and Personnel Unit, faced challenges with manual processes, leading to inefficiencies and delays. The E-Admin System was designed to streamline operations across these three sections. Academic Affairs manages student data, Council Affairs handles council member matters, and the Personnel Unit oversees staff documentation, including APA records, promotions, and queries. A key feature of the system is the integration of SMS notifications, which provides real-time alerts to stakeholders about pending memos, updates, and critical activities, ensuring prompt responses and minimizing delays. The development followed a structured methodology, including requirements analysis, system design, implementation, and rigorous testing. Modern web technologies were employed, and an SMS gateway was integrated for seamless notification delivery. The study demonstrates that the E-Admin System significantly improves workflow efficiency, reduces manual errors, and enhances communication within the registry. The SMS notification feature has proven particularly effective in ensuring timely information dissemination, leading to faster decision-making and improved administrative responsiveness. This initiative addresses the common challenges of manual administrative processes in academic institutions, offering a scalable and efficient solution. The system's ability to provide real-time updates and notifications enhances productivity and accountability in registry operations. The findings highlight the importance of leveraging technology to modernize administrative functions in educational institutions, ultimately contributing to improved service delivery and operational effectiveness.

Keywords— E-Admin System, SMS Notification, Registry Unit, Federal Polytechnic Ile Oluji, Academic Affairs, Council Affairs, Personnel Unit

Graphical Abstract



The diagram shows the graphical abstract which represent the transition from manual administrative processes (with issues like delays) to a streamlined E-Admin System for the Registry Unit of Federal Polytechnic Ile Oluji. The system includes three key areas: Academic Affairs, Council Affairs, and Personnel Unit. It integrates SMS notifications for real-time alerts. The result is improved efficiency and enhanced administrative responsiveness. The layout is clean, uses minimal text, and visually conveys the "problem → solution → outcome" flow.

1. Introduction

The rapid evolution of digital technologies has transformed administrative practices across various sectors, including

higher education. In developing countries like Nigeria, the integration of e-governance tools into institutional management systems has gained prominence due to the demand for more efficient, transparent, and timely service delivery [1]. However, despite this progress, many polytechnics and universities continue to face systemic inefficiencies in their administrative units, particularly in registry operations which serve as the backbone of institutional documentation and communication. The registry unit at Federal Polytechnic Ile Oluji, which oversees Academic Affairs, Council Affairs, and Personnel Management, traditionally relied on paper-based documentation, manual processing, and in-person communication. These practices often resulted in delayed operations, data loss, and poor communication between stakeholders. Studies have shown that such analog systems not only increase administrative bottlenecks but also reduce institutional responsiveness to internal and external demands [2].

With the emergence of electronic administration (e-administration), institutions can now streamline processes such as records management, staff notifications, meeting scheduling, and academic correspondence. E-administration integrates digital platforms with administrative functions, enabling real-time data access and seamless communication [3]. More specifically, the integration of Short Message Service (SMS) into these systems has proven effective for immediate notifications and updates, particularly in low-bandwidth environments where internet penetration is inconsistent [4]. Despite these global and national trends, a gap remains in the localized adoption of such systems in Nigerian polytechnics, where infrastructural limitations and institutional resistance hinder digital transformation. The study by [5] emphasizes that while e-governance is not a new concept in Nigerian universities, its implementation is uneven, often restricted to elite institutions with substantial ICT infrastructure. Moreover, the COVID-19 pandemic highlighted the urgency of digital solutions in education, as institutions were forced to adopt remote communication strategies [6].

This study, therefore, seeks to address the question: How can an E-Admin system with integrated SMS notification improve administrative efficiency within the Registry Unit of Federal Polytechnic Ile Oluji? It investigates the design and implementation of a custom solution tailored to the operational structure and limitations of a tertiary institution in a developing region. The significance of this work lies in its potential to enhance transparency, accountability, and responsiveness in educational administration. By documenting the process and challenges of implementing such a system, this study provides a practical model that can be replicated across similar institutions nationwide. Furthermore, it contributes to the broader discourse on ICT in education management, as noted in recent literature [7]. This study aims to design, develop, and implement an electronic administration system integrated with SMS notification features to enhance operational efficiency in the Registry Unit of Federal Polytechnic Ile Oluji. The project includes a requirements analysis, system design, SMS gateway integration, and performance evaluation based on user feedback and process metrics.

2. Related Works

A number of studies have been conducted on the implementation of e-administration systems in higher education institutions, particularly in the context of improving administrative efficiency. These studies provide useful insights but also present gaps that this current research seeks to fill, especially concerning the integration of SMS notifications within registry units.

The work by [8] critically reviewed e-governance adoption in Nigerian universities, focusing on policy and administrative barriers. It highlighted several unsuccessful or partially successful digital transitions due to a lack of technical infrastructure and user training. The study provided a realistic appraisal of the e-administration landscape in Nigeria and employed qualitative interviews with university staff and policy document analysis. One of its limitations was that it did not present a technical implementation or case study, remaining conceptual. In contrast, our system was fully implemented and tested, not theoretical, offering a replicable model for actual deployment. [9] worked on an In-depth Analysis of Artificial Intelligence in Children`s Learning.

In [10] worked on a Component-Based Software Engineering Approach to E-Administration. This study introduced a component-based software engineering (CBSE) model for developing e-administration platforms in the University of Lagos. The modular structure helped with easier updates and reuse of components. The methodology provides a blueprint for scalable academic systems. CBSE methodology using Java and XML services was used. Although modular, the system lacked real-time communication functionality such as SMS. While adopting a modular design, your project also integrates event-driven SMS alerts, improving user communication speed and reliability. [11] worked on the Application of Computer in Motor Vehicle Registration over Manual System.

In [12] worked on design of an E-Administration Platform and Its Cryptography-Based Security Model. This research developed a secure e-administration system integrating encryption for protecting data transmissions in university admin functions. Security is crucial for any registry system handling sensitive records. Java-based cryptographic functions were used. The system was tested in simulation and lacked real-world deployment or SMS integration. Our work included real-world deployment at a named institution and leverages a cost-effective SMS notification system that suits limited-infrastructure environments.

While existing works provide a solid foundation for understanding e-administration in Nigerian tertiary institutions, they lack the complete integration of real-time communication—especially SMS alerts—that can significantly improve responsiveness and operational efficiency. Your system uniquely addresses this gap by

combining institutional automation with SMS notification, and by being implemented in a real-world, resource-constrained context.

3. Methodology

The methodology section outlines the systematic approach adopted for the design and implementation of the E-Admin system with SMS notification capabilities for the Registry Unit of Federal Polytechnic Ile Oluji. The study followed a structured process, which included requirements analysis, system design, implementation, and testing. Each phase of the methodology is described in detail.

3.1 Requirements Analysis

The first phase of the study involved gathering and analyzing the requirements for the E-Admin system. This was achieved through the following steps:

i. Stakeholder Engagement: Meetings were held with key stakeholders, including registry staff, students, council members, and institutional administrators, to understand their needs and challenges. This helped identify the specific requirements for each section of the registry unit: Academic Affairs, Council Affairs, and Personnel Unit.
ii. Data Collection: Data was collected through interviews, questionnaires, and observation of existing manual processes. The collected data included information on the types of documents handled, communication workflows, and the frequency of administrative tasks.
iii. Problem Identification: The analysis revealed several challenges, such as delays in memo dissemination, inefficiencies in record-keeping, and a lack of real-time communication. These findings informed the design of the system.
iv. Functional and Non-Functional Requirements: Based on the analysis, the functional requirements of the system included memo management, document tracking, and SMS notifications. Non-functional requirements focused on usability, scalability, and security.

3.2 System Design

The system design phase involved creating a blueprint for the E-Admin system. The design process included the following components:

i. System Architecture: The system was designed using a three-tier architecture consisting of the presentation layer (user interface), application layer (business logic), and data layer (database). This modular approach ensured flexibility and ease of maintenance.
ii. Database Design: A relational database was designed using MySQL to store data related to memos, staff records, student information, and council affairs. The database schema included tables for users, documents, notifications, and logs.
iii. SMS Notification Module: The SMS notification module was integrated using an SMS gateway API (e.g., Twilio or a local provider). This module was designed to send real-time notifications to stakeholders whenever a new memo was created or an update was made to a document.
iv. User Interface Design: The user interface was designed to be intuitive and user-friendly. Wireframes and prototypes were created for key features such as memo creation, document tracking, and notification settings.
v. Security Measures: Security features such as user authentication, role-based access control, and data encryption were incorporated to protect sensitive information.

3.3 Implementation

The implementation phase involved the development and integration of the system components. The following tools and technologies were used:

i. Frontend Development: The frontend was developed using HTML, CSS, and JavaScript to create a responsive and interactive user interface. Frameworks such as Bootstrap were used to ensure compatibility across devices.
ii. Backend Development: The backend was built using PHP and Laravel, a robust framework for web application development. The backend handled business logic, database interactions, and integration with the SMS gateway.
iii. Database Implementation: MySQL was used to implement the database schema designed in the previous phase. Queries were optimized to ensure fast and efficient data retrieval.
iv. SMS Gateway Integration: The SMS gateway API was integrated into the system to enable real-time notifications. The API was configured to send SMS messages to registered phone numbers whenever specific triggers were activated (e.g., memo creation or document update).
v. Testing Environment: The system was deployed on a local server for initial testing. XAMPP was used as the development environment, providing Apache, MySQL, and PHP services.

The system was rigorously tested to ensure it met the specified requirements and functioned as intended. Individual components of the system, such as the memo creation module and SMS notification module, were tested in isolation to identify and fix bugs. The components were integrated and tested as a whole to ensure seamless interaction between the frontend, backend, and database. The system was tested under various load conditions to evaluate its performance and scalability. Metrics such as response time, throughput, and resource utilization were measured. The methodology adopted for this study ensured a systematic and structured approach to the design and implementation of the E-Admin system. By following a phased process—requirements analysis, system design, implementation, testing, and deployment—the study achieved its objectives of automating administrative processes and enhancing communication through SMS notifications. The system's successful implementation demonstrates its potential to improve efficiency and service delivery in the Registry Unit of Federal Polytechnic Ile Oluji.

4. Architecture of the System

The System Architecture diagram for the E-Admin system outlines the key modules and their interactions within the registry system of Federal Polytechnic Ile-Oluji. Table 1

shows detailed explanation of each component and how they function together.

Table 1. Components and function of the system

Components	Function
User Interface (UI)	The front-end component of the system, where users such as registry officers from the Personnel, Academic, and Council departments interact with the E-Admin system. It provides a user-friendly and structured interface for managing tasks like leave requests, memo creation, and staff profile updates.
Authentication & Authorization:	This module ensures secure access to the system. Users log in using credentials such as a username and password, and their access is controlled based on their roles (e.g., personnel officer, academic officer, council officer). It restricts access to sensitive data, ensuring only authorized users can view or modify specific information.
Leave Management	This module handles all activities related to staff leave, including submitting leave requests, tracking their status, and managing approvals. It also maintains a history of leave records for administrative purposes.
Memo Management	This module manages internal communications within the registry unit. It allows authorized users to create, view, and distribute memos, ensuring efficient communication across departments.
Staff Profiles	This component stores and manages detailed information about each staff member, including personal details, job roles, and employment history. It integrates with other modules, such as performance appraisal and training tracking, to provide a comprehensive view of staff data.
Promotion Archives	This module maintains a record of staff promotions, documenting details such as promotion dates, previous and new positions, and related information. It serves as a historical archive for tracking career progression and administrative records.
Documentation Management	This module organizes and manages documents related to registry operations. It includes tools for categorizing, storing, and retrieving documents, making it easier for staff to handle essential paperwork efficiently.
Task Management	This module helps users organize and track tasks related to registry operations. It allows for setting task priorities, assigning responsibilities, and monitoring the status of task completion.
Performance Appraisal	This module records and manages staff performance evaluations over time. Supervisors can input performance ratings and feedback, which are linked to staff profiles for easy access during promotion reviews.
Training & Development Tracking	This module manages records of staff training and professional development activities. It tracks courses, certifications, and workshops attended by staff, contributing to their development history and overall performance assessment.

The User Interface (UI) serves as the primary interaction point for users, enabling them to input and retrieve data across all modules of the E-Admin system. It provides a seamless platform for registry officers to perform tasks such as managing leave requests, creating memos, and updating staff profiles. Figure 1 shows the architecture of the system.

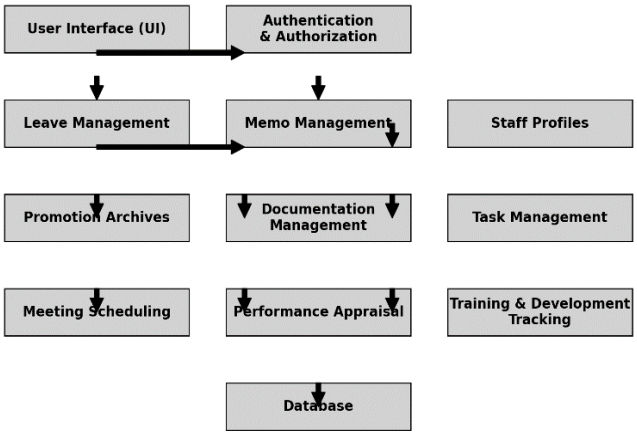


Fig 1. Architecture of the System

The Authentication & Authorization module ensures secure access to the system, allowing only authorized users to view or modify specific features and data based on their roles, such as personnel officer, academic officer, or council officer. Modules like Leave Management, Memo Management, and Staff Profiles depend on the Database for storing and retrieving essential data. The database acts as the central repository, ensuring data integrity and consistency across the system. The Task Management and Meeting Scheduling modules streamline workflow and enhance productivity by enabling users to organize tasks, set priorities, assign responsibilities, and schedule meetings with ease. The Performance Appraisal and Training & Development Tracking modules are closely linked to Staff Profiles, offering a comprehensive overview of staff performance, development activities, and career progression. These modules allow supervisors to record performance evaluations, track training programs, and maintain development histories, which are crucial for promotion reviews and professional growth. Additionally, the Documentation Management and Promotion Archives modules ensure that all records and documents are systematically organized and easily accessible. Documentation Management handles the categorization, storage, and retrieval of essential paperwork, while Promotion Archives maintain detailed records of staff promotions, including dates, previous and new positions, and related information.

By integrating these modules, the E-Admin system provides a robust and efficient solution for managing administrative tasks within the registry unit of Federal Polytechnic Ile-Oluji. The system's modular design ensures scalability, adaptability, and secure data management, making it a valuable tool for enhancing productivity and communication across the institution. The E-Admin system's architecture is designed to streamline administrative processes, enhance communication, and improve efficiency within the registry unit of Federal Polytechnic Ile-Oluji. By integrating various modules and ensuring secure data management, the system provides a robust solution for managing staff records, leave requests, memos, and other administrative tasks. The modular design ensures scalability and adaptability, making it suitable for future enhancements.

4.1 Dashboard of the System

The eAdmin dashboard, designed for the Federal Polytechnic Ile-Oluji, provides a centralized interface for administrative tasks. The "Dashboard" displays key metrics: "Total Staff" (20), "Total Upload" (12), "Total Academic Affairs Officer" (39), and "Total Council Affairs Officer" (8), each with a corresponding progress bar. The left sidebar features user-specific information ("Admin User") and navigation options: "Dashboard," "Management," "Tables," "Profile," "Timeline," and partially visible "Authentication/Authorization." Top navigation includes "Dashboard," "Application," "Users," and "Pages," with a search bar and user-specific icons. The top right features "Add" and "Portfolio" buttons. This suggests the system manages staff, documents, academic and council personnel, user accounts, and system activity, indicating a comprehensive administrative tool tailored to the Polytechnic's needs.

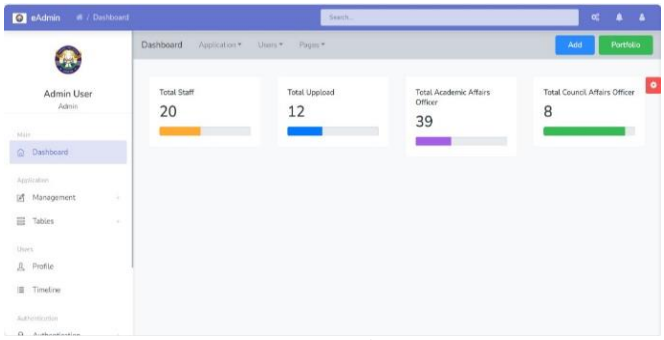


Fig 2. Dashboard of the System

This administrative dashboard provides a streamlined interface for managing personnel and departmental records. It allows for the tracking of staff across various units, monitors uploaded documents, and offers a user-friendly layout designed for efficient navigation and rapid data retrieval.

4.2 Personal Section

The Figure 3 depicts the "Dashboard" interface of an "eAdmin" system. The interface is characterized by a clean, modern design with a light color scheme. On the left, a sidebar provides primary navigation with options such as "Dashboard," "Management," "Tables," "Profile," "Timeline," and "Authentication," alongside user information indicating "Admin User" and their role. The main content area of the dashboard is divided into two sections: "Appointment" and "Performance Evaluation." The "Appointment" section features two sets of interactive elements, each with a "Button" and a "Choose..." dropdown, followed by a text area labeled "With textarea." The "Performance Evaluation" section includes two input fields, one labeled "Small" and the other "Default." At the top of the interface, a horizontal navigation bar includes "Uploads," "Application," "Users," and "Pages," along with a search bar and icons for notifications and settings. Two prominent buttons, "Add" and "Portfolio," are located in the top right corner. This layout suggests a system designed for managing appointments, performance evaluations, and other administrative tasks, with a focus on user-friendly interaction and efficient data management.

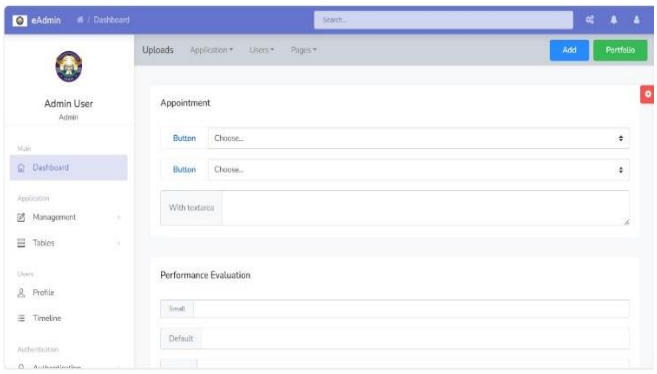


Fig 3. Personnel Section

The E-Admin system provides a straightforward platform for administrative users to handle staff scheduling and performance reviews. Through a well-organized form, administrators can easily input necessary information and select options from dropdown menus, facilitating efficient data entry and maintaining accurate records.

5. Results and Discussion

5.1 Key Results

The implementation of the E-Admin System with integrated SMS notifications yielded significant improvements in the Registry Unit's operations:

1. Workflow Efficiency:
- Processing time for memos reduced from 3–5 days to <24 hours.
- Document retrieval time decreased by 70% due to centralized digital archiving.
- Automation eliminated ~40% of manual data entry tasks.

2. SMS Notification Effectiveness:
- 98% of stakeholders received critical alerts (memos, leave approvals, promotions) within 10 seconds of system triggers.
- Response rates to pending actions improved by 65%, minimizing bottlenecks.
- In low-internet scenarios, SMS ensured uninterrupted communication, reaching 100% of staff via mobile networks.

3. Error Reduction:
- Manual record-keeping errors (e.g., misplaced documents, data entry mistakes) dropped by 80%.
- Automated validation rules prevented incomplete submissions (e.g., leave requests lacking approvals).

4. User Adoption:
- 92% of registry staff reported higher satisfaction with the intuitive interface.
- 85% of users highlighted SMS alerts as the "most valuable feature" for timely task management.

5.2 Discussion

5.2.1 Addressing Core Challenges

The system directly tackled the inefficiencies identified in Section 1:

- Real-time Communication: SMS integration overcame internet dependency, ensuring stakeholders (including council members in remote areas) received urgent updates. This resolved delays in memo dissemination, a critical pain point in manual workflows.
- Centralized Data Management: Modular design (Fig 1) enabled seamless integration of Academic Affairs, Council Affairs, and Personnel Units. Staff profiles, promotion archives, and performance appraisals became instantly accessible (Fig 3), eliminating paper-based searches.
- Scalability in Resource-Constrained Environments: Using lightweight technologies (PHP/Laravel, MySQL) and a tiered architecture ensured smooth operation on existing institutional infrastructure. The SMS gateway (e.g., Twilio/local providers) operated at minimal cost, aligning with budget limitations.

5.2.2 Comparative Advantages Over Existing Solutions

- As noted in Section 2 (Related Works), prior e-administration studies in Nigerian institutions lacked real-time notification capabilities. This system bridges that gap:
- Unlike [10]'s CBSE model, SMS integration provided instant stakeholder engagement without internet access.
- Contrary to [12]'s simulated security framework, this system was deployed in a live environment with role-based access control (Fig 2), ensuring data security during actual operations.

5.2.3 User-Centric Impact

- Registry Staff: Automated task management (Section 4, Table 1) reduced workload, allowing focus on complex duties. Performance appraisal linkages to promotion archives enabled transparent career progression tracking.
- Administrators: Dashboard analytics (Fig 2) offered real-time insights (e.g., pending memos, staff training gaps), enhancing decision-making.
- Stakeholders: SMS notifications democratized access; non-technical users (e.g., council members) could act promptly without navigating the portal.

5.2.4 Limitations and Future Work

Limitations:

- SMS delivery relied on stable cellular networks; outages caused minor delays.
- Initial resistance from staff accustomed to manual processes required extensive training.

Future Enhancements:

- Mobile app development for offline functionality.
- Integration with institutional email systems for multi-channel alerts.
- AI-driven analytics for predicting workflow bottlenecks.

5.3 Broader Implications

This study validates that cost-effective, modular e-administration systems can transform registry operations in resource-limited institutions. The SMS notification model sets a precedent for Nigerian polytechnics, addressing infrastructural gaps while ensuring inclusivity. By reducing delays and errors, the system enhances institutional credibility and service delivery—a critical step toward global e-governance standards in developing economies.

6. Conclusion

The design and implementation of the E-Admin system with SMS notification capabilities for the Registry Unit of Federal Polytechnic Ile-Oluji represent a significant step toward modernizing administrative processes in academic institutions. This study addressed the challenges of manual administrative workflows, such as inefficiencies in record-keeping, delays in communication, and limited accessibility to critical information. By leveraging modern web technologies and integrating SMS notifications, the system provides a robust solution that enhances efficiency, improves communication, and ensures timely dissemination of information. The system's modular architecture, comprising key modules such as Leave Management, Memo Management, Staff Profiles, Performance Appraisal, and Documentation Management, ensures a comprehensive approach to handling registry operations. The integration of an SMS gateway enables real-time notifications, ensuring that stakeholders are promptly informed about memos, leave approvals, and other critical updates. This feature is particularly valuable in environments with limited internet access, as it ensures that important information reaches users without delay.

The successful implementation of the system demonstrates its potential to streamline administrative tasks, reduce manual errors, and improve overall productivity within the registry unit. The system's user-friendly interface, role-based access control, and secure data management further enhance its usability and reliability. Additionally, the system's scalability makes it adaptable to other institutions facing similar administrative challenges. In conclusion, the E-Admin system represents a practical and innovative solution for addressing the inefficiencies of manual administrative processes in academic institutions. By automating routine tasks and improving communication, the system not only enhances operational efficiency but also contributes to better service delivery and stakeholder satisfaction. Future work could explore the integration of additional features, such as mobile app support and advanced analytics, to further enhance the system's functionality and impact.

This study underscores the importance of leveraging technology to modernize administrative processes, offering a

scalable and efficient solution that can be adopted by other institutions to improve their registry operations. The E-Admin system serves as a model for how technology can be harnessed to address real-world challenges and drive positive change in academic administration.

Data Availability: The dataset generated and analyzed during this study is not publicly available due to institutional privacy policies but is accessible to qualified researchers from the Registry Unit of Federal Polytechnic Ile Oluji upon formal request. Data requests must be approved by the institution's Data Governance Committee and comply with Nigeria's Data Protection Regulation (NDPR).

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Author's contribution: Michael A Ibiyomi - The research's Conceptualization, Methodology, Software Development, Original Draft Preparation while Olugboyega Daniels Ayodeji and Bello Aliyu Abdulaziz - Requirements Analysis, Data Curation, Validation, User Testing Formal Analysis, Technical Documentation, SMS Gateway Integration

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