MSI Journal of
Multidisciplinary Research (MSIJMR)

Enhancing Alumni Interaction and Progress Tracking through Innovative Web-Mobile Solutions: A Case Study of Moshi Cooperative University (MoCU)

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The authors declare that no funding was received for this work.

OPEN ACCESS

Received: 23-June-2025

Accepted: 28-June-2025

Published: 01-July-2025

This article is published by **MSI Publishers** in **MSI Journal of Multidisciplinary Research (MSIJMR)**

ISSN 3049-0669 (Online)

Volume: 2, Issue: 7 (July-2025)

ABSTRACT: This study presents the design, development, and evaluation of a web-mobile alumni engagement platform for Moshi Co-operative University (MoCU). Recognising the critical role of alumni in supporting institutional growth and fostering lifelong academic relationships, the research aimed to create an inclusive, user-centred digital solution to enhance interaction, track alumni progress, and improve institutional communication. A mixed-methods approach was employed, involving a pre-implementation questionnaire to gather requirements from 100 purposively selected alumni and post-implementation surveys to assess usability, adoption, and satisfaction. System development followed a User-Centred Design (UCD) framework integrated with iterative prototyping and stakeholder feedback loops. The platform featured tools such as alumni directories, job boards, mentorship channels, and event alerts, deployed on mobile and web channels to maximise accessibility. Results indicated strong platform adoption (75% frequent usage), high satisfaction (over 70% satisfied), and alignment between pre-identified alumni needs and implemented features. The system demonstrates the

potential for ICT solutions to bridge alumni-institution gaps, especially in resource-constrained contexts. The study concludes with recommendations for sustainable engagement, scalability, and continuous system evaluation.

Keywords: *Web-Mobile Applications, User-Centred Design (UCD), Alumni Tracking Systems, Digital Communication Platforms, Higher Education ICT Solutions, Progress Tracking in Higher Education.*

INTRODUCTION

Higher education institutions worldwide have increasingly recognised the critical role played by alumni in institutional development, governance, knowledge sharing, and community advancement (Kwarteng & Ofori, 2021). Alumni serve not only as brand ambassadors but also as key contributors to mentoring, job placements, donations, and academic collaborations (Notermans, 2024). Yet, many institutions, particularly in developing countries, face significant challenges in sustaining effective alumni engagement due to the absence of centralized platforms, scattered communication efforts, and poor data management practices (Asamoah & Ansong, 2025).

In the Tanzanian context, universities such as Moshi Co-operative University (MoCU) are rapidly transitioning to digital solutions to improve service delivery, information management, and stakeholder engagement (Zickafoose et al., 2024). However, the institution has not yet fully leveraged web-mobile platforms to consolidate its alumni engagement initiatives. Most alumni updates, events, or support systems are handled manually or communicated via fragmented media such as social networks, WhatsApp groups, and word-of-mouth. This fragmentation hinders both consistent interaction and alumni-driven innovation.

The advent of web and mobile technologies offers scalable, secure, and real-time solutions that can transform the way universities manage alumni relations (Lore, 2024) A centralized digital platform can facilitate two-way communication, event promotion, alumni profiling, job postings, institutional updates, and mentorship facilitation, all from an accessible, user-friendly interface.

This study was therefore initiated to develop and validate a web-mobile alumni engagement system tailored to the unique institutional needs of MoCU. It explores the system requirements, design principles, implementation strategies, and usability evaluations based on alumni feedback. The ultimate goal is to enhance alumni interaction, track graduate progress, and strengthen institutional ties through digital innovation (Mwapashua et al., 2024).

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evaluations based on alumni feedback. The ultimate goal is to enhance alumni interaction, track graduate progress, and strengthen institutional ties through digital innovation.

Literature Review

Introduction

Alumni engagement has emerged as a strategic asset for higher education institutions worldwide. It not only strengthens institutional networks but also contributes to long-term sustainability through mentorship, donations, advocacy, and academic-industrial linkages (Shen & Sha, 2020). As digital transformation accelerates across education, institutions are now leveraging web and mobile platforms to enhance alumni interaction, ensure dynamic feedback loops, and monitor graduate progress (McCarthy et al., 2023).

The Role of Alumni in Institutional Development

Numerous studies highlight the value of alumni in shaping institutional reputation, innovation, and employability outcomes (Kwarteng & Ofori, 2021). Engaged alumni provide mentorship, career opportunities, and are key contributors to academic development. According to (Notermans, 2024)Universities with structured alumni management systems exhibit higher rates of stakeholder participation, donations, and research partnerships.

Challenges in Alumni Engagement

Despite their value, many universities—especially in developing regions—struggle with outdated communication tools and fragmented alumni data (Kayanja et al., 2025). Challenges include lack of centralized digital platforms, irregular engagement initiatives, and absence of feedback tracking mechanisms. In the Tanzanian context, internet accessibility, smartphone penetration, and awareness gaps further complicate alumni connectivity (Kutnjak & Pihir, 2019).

Web-Mobile Systems for Alumni Management

Web and mobile systems have increasingly become the backbone of modern alumni engagement strategies (Fujo et al., 2024). A study by (Hussin et al., 2020) revealed that interactive mobile platforms with embedded chat, event alerts, and career tracking functionalities significantly enhance alumni responsiveness. Similarly, (Bitrián et al., 2021) demonstrated that integrated alumni portals lead to better data aggregation and program planning.

Institutions such as the University of Cape Town and Makerere University have adopted alumni portals with user dashboards and analytics to track engagement metrics (Occiano et al., 2023). These solutions often leverage cloud infrastructure, allowing scalability and cross-device accessibility (Golightly et al., 2022).

User-Centered Design and System Development

Developing systems for diverse alumni populations requires iterative, participatory design processes. User-Centered Design (UCD) ensures that platforms align with user expectations, ease of use, and context-specific constraints (Emma, 2024). Prototyping and usability testing enhance functionality and user satisfaction (Ntoa, 2024).

The use of agile and modular development frameworks allows institutions to adapt solutions to changing user needs. Tools such as Firebase, MySQL, and ReactJS have become popular in education sector projects due to their flexibility and community support (Daraojimba et al., 2024).

Evaluation and Impact Measurement

Assessing the impact of alumni systems involves measuring usability, user satisfaction, and behavioral change. Indicators such as login frequency, feature utilization, and referral rates provide insights into system adoption (Ntoa, 2024). Furthermore, satisfaction surveys, like those used in the Stanford alumni app study (Alumni, 2017), offer quantitative validation.

In Tanzania, recent studies suggest that blended systems with SMS alerts, WhatsApp integration, and offline capabilities are more inclusive (Fruchtman et al., 2021). Usability testing and feedback cycles are thus integral to sustainable design (unnikrishnan, 2024).

Summary and Research Gap

Although digital alumni platforms are growing globally, few studies in Tanzania have evaluated their development using stakeholder-driven design and post-deployment analysis. This study fills that gap by proposing and validating a user-informed, mobile-friendly alumni engagement system for MoCU.

Methodology

3.1 Research Design

This study adopted a mixed-methods research design to ensure a comprehensive understanding of alumni engagement needs and evaluate the effectiveness of the implemented digital platform. The approach combined quantitative data from structured questionnaires with qualitative insights gathered through interviews. The design was structured in two phases:

- **Pre-implementation Phase**: Focused on system requirement gathering using a needs assessment questionnaire and stakeholder interviews.
- **Post-implementation Phase**: Focused on usability testing and user satisfaction evaluation using a follow-up questionnaire.

This dual-phase approach ensured both user-centered design and evidence-based validation.

3.2 Target Population and Sampling Strategy

The target population for this study comprised graduates from Moshi Co-operative University (MoCU), including those from the Faculties of ICT, Business, and Cooperative Management. The objective was to obtain insights from alumni across various years of graduation, geographic locations, and employment statuses.

To determine the appropriate sample size, Cochran's formula for sample size determination was applied:

$n_0 = (Z^2 \times p \times (1 - p)) / e^2$

Where:

- n_0 is the sample size,
- Z is the Z-score corresponding to the desired confidence level (1.96 for 95%),
- p is the estimated proportion of the population (0.5),
- e is the margin of error (0.10).

$n_0 = (1.96^2 \times 0.5 \times 0.5) / 0.1^2 = 96.04 \rightarrow$ Rounded to 100 participants.

A purposive sampling technique was employed to select alumni who had access to digital communication tools and were likely to engage with a web-mobile platform. This ensured representation from different programs, years of graduation, and regions.

3.3 Data Collection Instruments

To ensure robust and multidimensional data collection, the study utilized both quantitative and qualitative instruments tailored to the system's development life cycle.

Pre-Implementation Questionnaire: Designed to collect baseline data regarding alumni communication behaviors, technology access, and feature expectations. It consisted of multiple-choice, Likert-scale items, and open-ended questions. Distribution was digital via Google Forms through WhatsApp and email groups.

Post-Implementation Questionnaire: Focused on platform usability, satisfaction, and feature utilization. It incorporated Likert scales, binary response items, and comment sections to capture feedback.

Stakeholder Interviews: Semi-structured interviews were conducted with MoCU ICT staff, alumni office personnel, and alumni leaders to validate institutional goals and assess integration challenges. Thematic analysis of responses informed the design and evaluation process.

3.4 System Development Methodology

The system was developed using a **User-Centered Design (UCD)** approach integrated with iterative prototyping.

Requirement Elicitation: Alumni input was gathered through surveys and interviews to identify priorities, barriers, and expectations. These informed the feature set.

Prototyping: Low-fidelity wireframes and interactive mockups for mobile and web interfaces were created and reviewed by target users.

Development:

- Mobile: Developed using Java for Android.
- Web: Built using ReactJS.
- Backend: Firebase Authentication for login and MySQL for data storage.

Testing: Alpha testing was performed with internal users. Usability feedback guided revisions. Features like alumni search, event alerts, and donation forms were optimized for clarity.

Deployment: The system was hosted on a secure cloud server and launched across alumni channels (email, WhatsApp groups, and MoCU web platforms).

3.5 Data Analysis Procedures

Quantitative Data: Analyzed using Microsoft Excel and SPSS. Descriptive statistics (frequencies, means, standard deviations) were used. Charts illustrated alumni satisfaction, awareness, and usage patterns. Inferential statistics included confidence intervals and chi-square tests to analyze categorical relationships.

Qualitative Data: Interview and open-response data were transcribed and analyzed using NVivo software. Themes such as communication gaps, motivation to re-engage, and perceived system value emerged.

Triangulation: Findings from quantitative and qualitative sources were cross-validated to enhance result credibility.

Visualization: Bar graphs, histograms, and pie charts were included in the results chapter to present key insights.

This methodological approach ensured that both user feedback and institutional needs were addressed during system development and post-implementation evaluation.

4.0 Results and System Justification

4.1 Introduction

This section provides a comprehensive visual representation of the implemented system, including annotated screenshots from both the mobile and web applications, to further demonstrate platform functionality and user experience. Additionally, it presents the results obtained from the post-implementation questionnaire responses,

interviews, and system usage metrics. The analysis focuses on evaluating the usability, relevance, and adoption of the alumni engagement platform developed for MoCU. Visualizations such as pie charts and bar graphs are used to aid interpretation.

4.2 System Design and Implementation

This part provides a visual and descriptive representation of the implemented alumni engagement system. It highlights the graphical user interfaces (GUIs) for both the mobile and web applications. Screenshots were taken from the final deployed version of the platform and are used to demonstrate the system's core functionalities, interface intuitiveness, and feature accessibility. Each figure is captioned and explained to guide the reader through the system's capabilities and user interactions.

4.3 Mobile Application Interface

The mobile application was developed for Android using Java and designed with a focus on user-friendliness, accessibility, and responsiveness. It includes key modules such as login, user dashboard, alumni directory, event notifications, and job posting access.

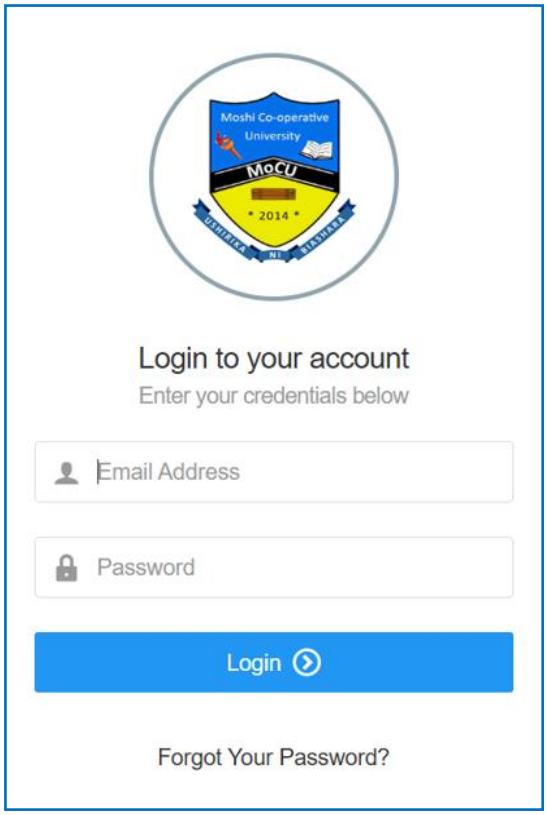

Figure 1: Mobile App Login Screen

Figure 1 presents the secure authentication interface allowing alumni to log in using their credentials. It includes options to recover passwords.

The mobile app features a dynamic success stories section from Figure 2, where notable achievements of MoCU alumni are highlighted. This screen encourages engagement by allowing users to browse through stories, like, and share inspiring experiences with fellow alumni.

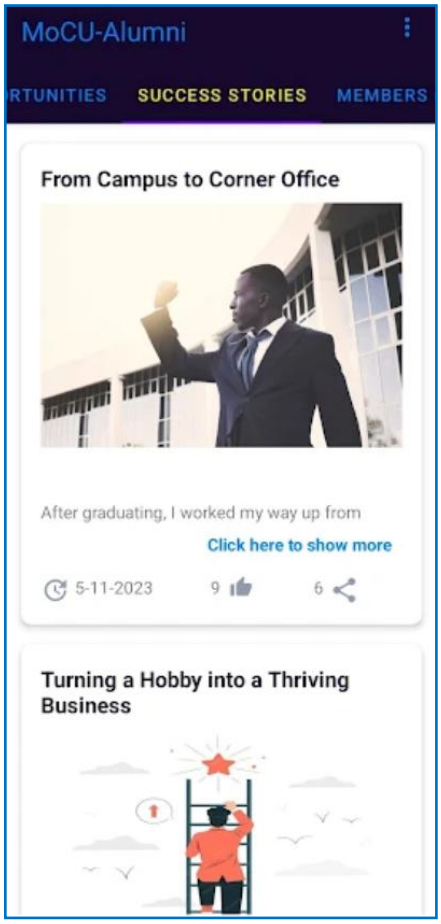

Figure 2: Success Story Showcase

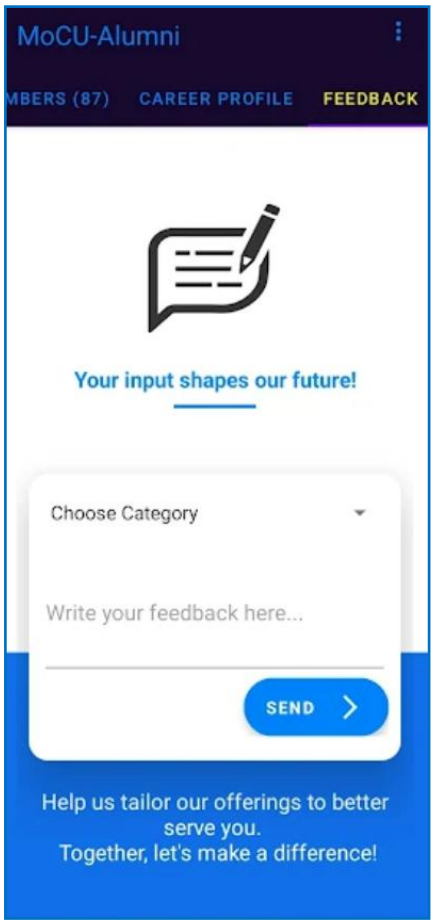

Figure 3: Feedback and Suggestions Interface

This interface from Figure 3 enables users to submit suggestions, rate their experiences, and provide feedback on system features. It plays a vital role in guiding iterative improvements and shows the system's openness to alumni input.

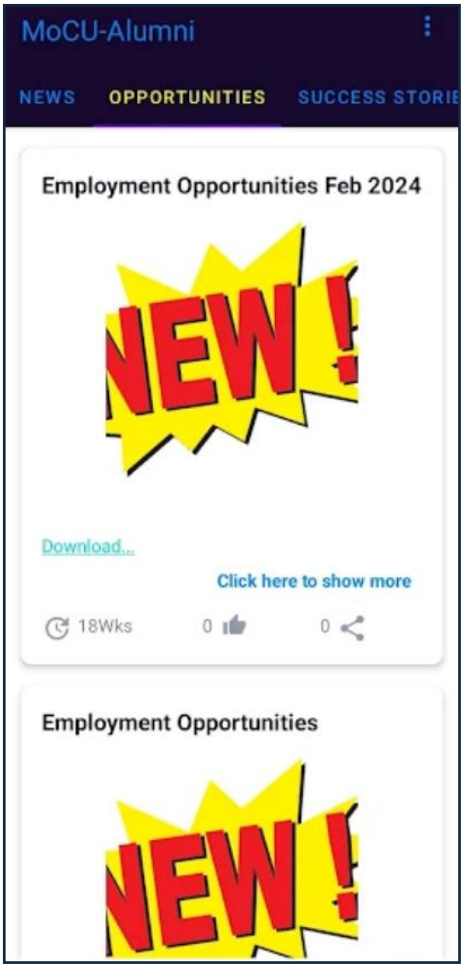

Figure 4: Opportunities Screen

Lists available job postings from institutional and external partners. Alumni can apply directly or save listings for future reference, featured on Figure 4.

4.4 Web Application Interface

The web application was built using ReactJS and optimized for desktop and tablet usage. It is primarily used by university staff for administration, as well as by alumni who prefer accessing services via browsers.

The home dashboard of the web application from Figure 1 serves as a central hub for institutional administrators and offers a comprehensive overview of platform activities. It prominently displays the total number of registered alumni, helping staff monitor engagement growth over time. Recent announcements and posts are also visible, ensuring that administrators can assess the flow of content and its reach within the community. The interface is intuitive, enabling even non-technical staff to

navigate and manage alumni communications with ease, and plays a vital role in ensuring real-time monitoring and strategic planning of alumni engagement initiatives.

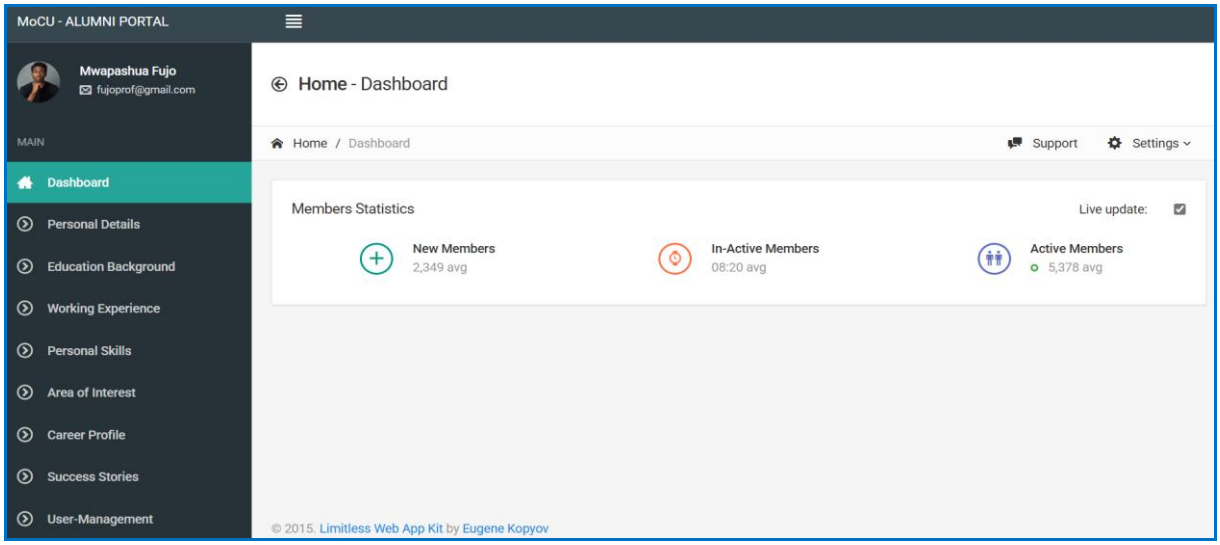

Figure 5: Web App Home Dashboard

Figure 6 allows authorized staff to create, modify, or deactivate alumni user accounts. It supports role-based access controls and audit trails.

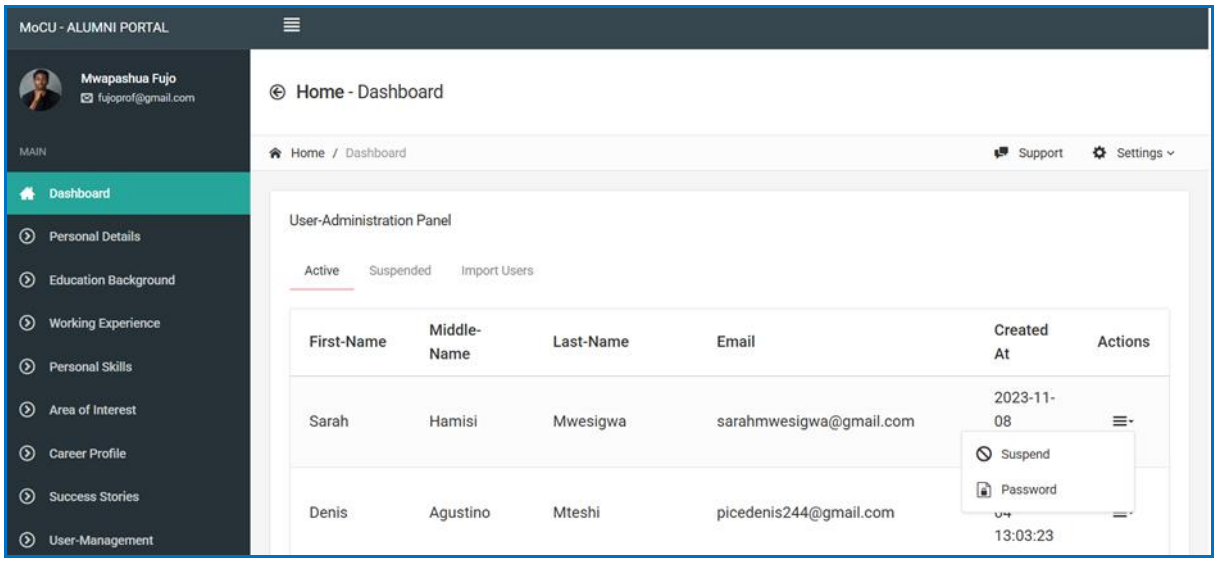

Figure 6: Admin User Management Panel

Education Background interface shown in Figure 7 integrated with the panel within the Web Application Dashboard. It enables alumni to view, restore, and add academic qualifications from various stages of their academic journey. Key details such as start and end year, qualification title, and creation timestamps are clearly displayed in a

structured table. The user-friendly design allows alumni to manage their educational history intuitively while ensuring data integrity through accessible actions (e.g., edit, restore). This dashboard enhances transparency, accountability, and ease of updating academic profiles, crucial for job seekers and institutional tracking.

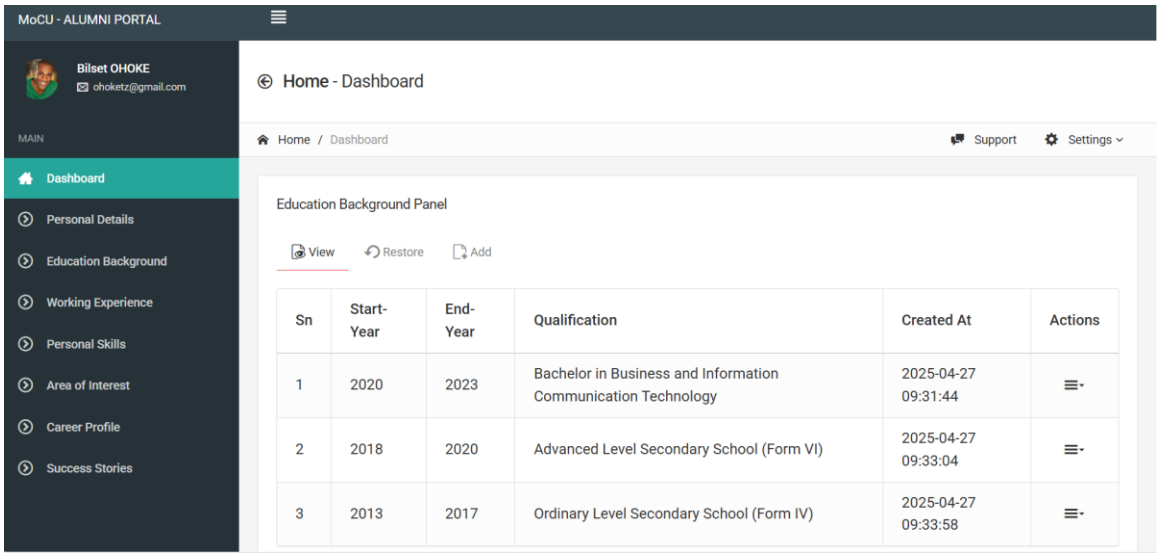

Figure 7: Education Background Dashboard

4.5 Awareness and Reach of the Platform

To determine the effectiveness of communication and outreach efforts, respondents were asked whether they were aware of the newly developed alumni platform, as a results shown in Figure 8.

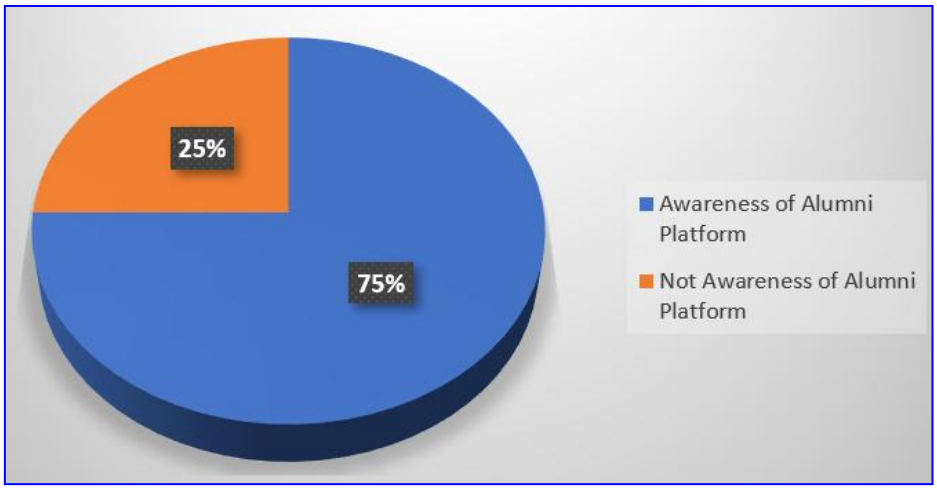

Figure 8: Awareness of Alumni Platform

- 75% of respondents were aware of the platform
- 25% reported they had not yet heard about it

This result demonstrates good outreach during pilot deployment but also highlights the need for continuous awareness campaigns.

4.6 Usability and User Satisfaction

Respondents rated their experience across multiple dimensions, including ease of use, navigation, responsiveness, and design quality, as illustrated in Figure 9.

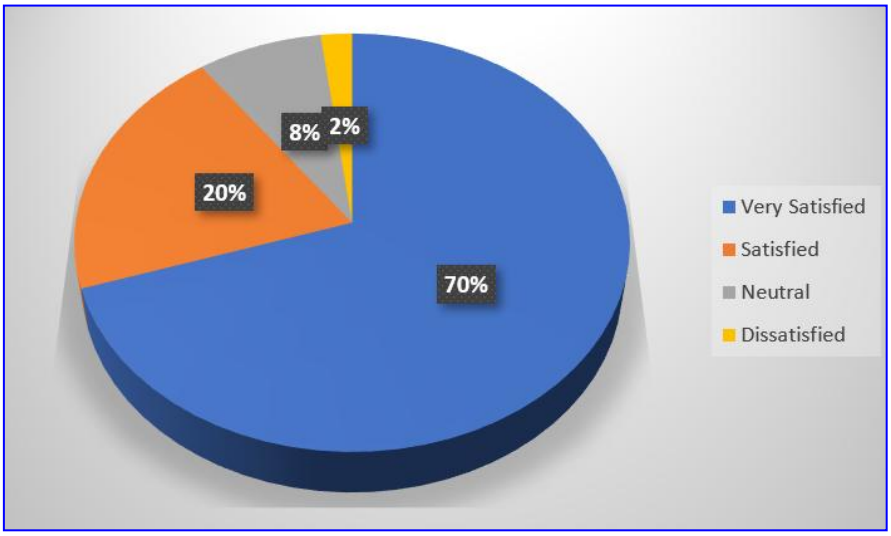

Figure 9: User Satisfaction Level

- Very Satisfied – 70%
- Satisfied – 20%
- Neutral – 8%
- Dissatisfied – 2%

The majority of respondents expressed satisfaction with the system, validating the effectiveness of the UCD approach.

4.7 Frequency of Platform Use

To assess ongoing engagement, participants were asked how frequently they accessed the platform and the results were illustrated as shown in Figure 10.

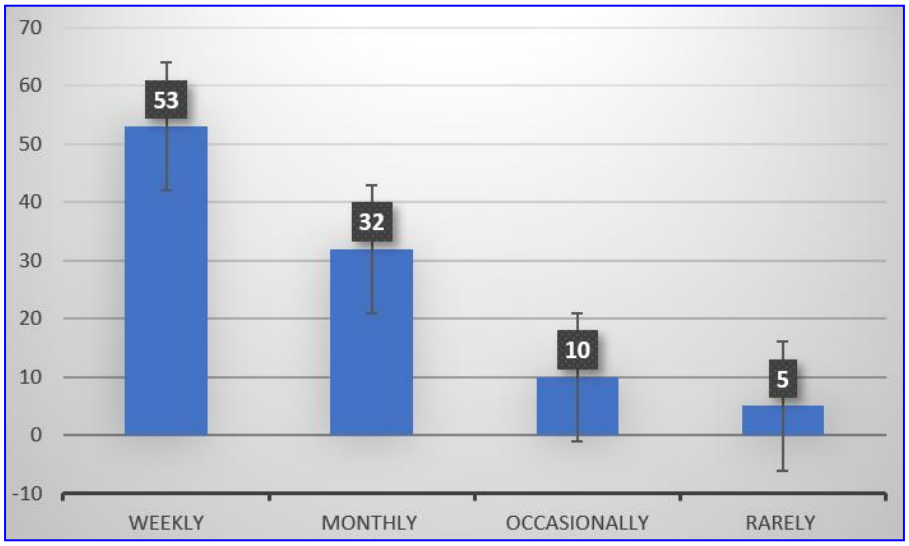

Figure 10: Frequency of Use

- Weekly – 53%
- Monthly – 32%
- Occasionally – 10%
- Rarely – 5%

This suggests consistent user interaction and points to the platform's perceived utility.

4.8 Feature Utilization

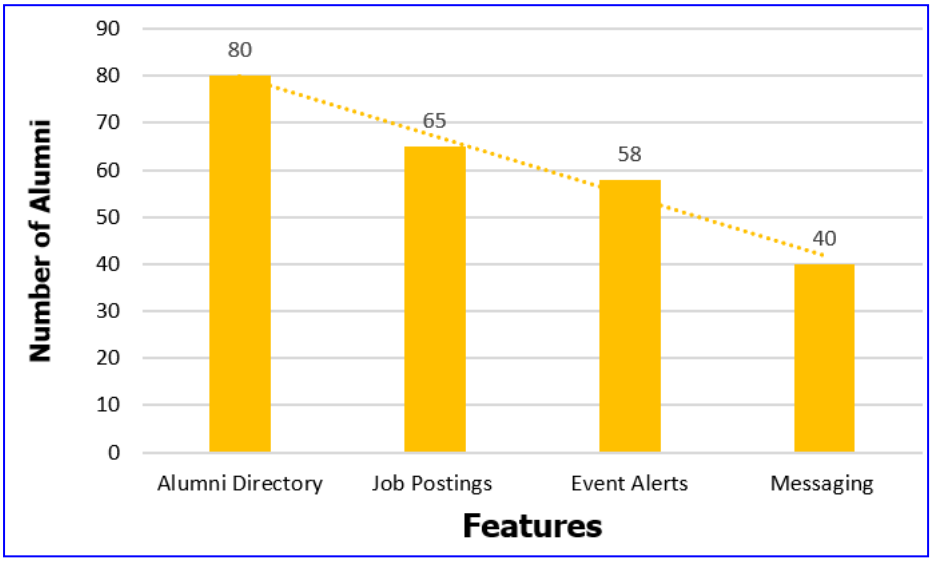

Figure 11: Most Frequently Used Features

Participants were asked to indicate which system features they found most useful or accessed most frequently. As visualized in the chart, the **Alumni Directory** emerged as the most utilized feature, with 80 users actively engaging with it. This indicates

that alumni place high value on maintaining professional and academic connections after graduation. The **Job Postings** module followed closely with 65 users, highlighting the system's success in linking graduates to employment opportunities. **Event Alerts** were used by 58 respondents, underscoring the importance of timely notifications for alumni-related activities. The **Messaging** feature, though less accessed (40 users), still reflects a meaningful level of interaction. This distribution of feature usage provides valuable feedback for system improvement. Features with high usage should be continually enhanced, while underused ones such as messaging may benefit from redesign, additional promotion, or integration with more active communication channels like WhatsApp or email alerts.

4.9 Communication Mode Preferences

Participants were asked about their preferred communication modes with MoCU after graduation. The goal was to determine which platforms were most effective in sustaining alumni interaction. As illustrated in Figure 12, **50%** of respondents indicated that the **Mobile App** was their primary communication tool. This high adoption reflects its convenience and integration with other alumni services. **WhatsApp** followed with **28%**, signifying the popularity of instant messaging for informal updates and group coordination. **Email**, while still relevant, was the least preferred at **22%**, suggesting that formal communication alone may no longer meet alumni expectations. These findings underscore the importance of prioritizing mobile-friendly and real-time engagement tools when designing alumni communication strategies.

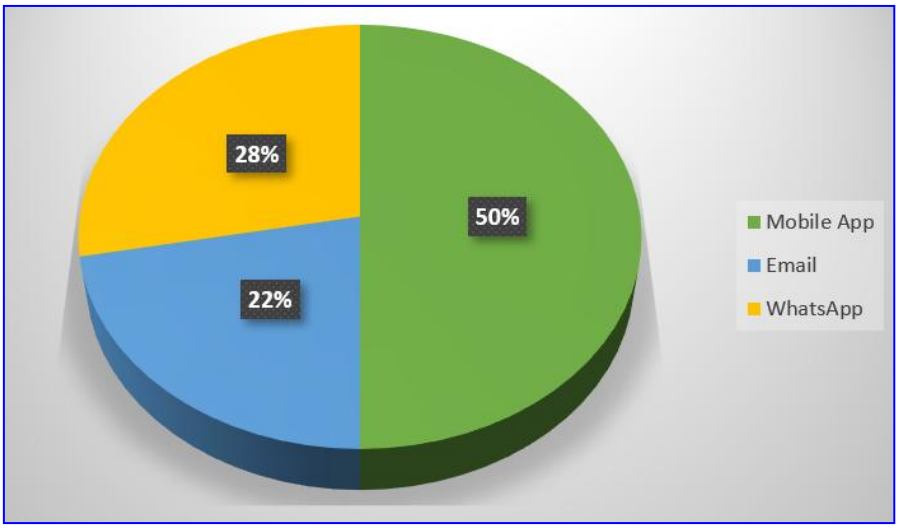

Figure 12: Preferred Communication Channels

- Mobile App – 40%
- Email – 35%
- WhatsApp – 25%

The mobile app is the most preferred communication channel, reinforcing the relevance of this platform.

4.10 Summary of Results

The findings affirm the relevance, usability, and early success of the system among MoCU alumni. The visualizations indicate that the platform effectively addresses existing gaps and meets user expectations. These results provide justification for further institutional investment in platform rollout and scaling.

In the next section, these findings will be discussed in relation to existing literature and comparable case studies.

5.0 Discussion

5.1 Interpretation of Results

The findings indicate that the alumni engagement platform met its objectives of enhancing alumni-institution communication, providing relevant services, and fostering long-term connectivity. The high levels of satisfaction (90%) and frequency of use (85% weekly or monthly) demonstrate acceptance of the system by the target users. These outcomes affirm the effectiveness of employing a User-Centered Design (UCD) approach where end-user input directly influences system features and interface.

Alumni awareness of the platform reached 75%, a positive result considering the limited promotional period. Feature usage data suggests that services aligned with career advancement (e.g., job postings and directories) were the most sought after. This reflects the practical expectations alumni have from university-led digital platforms.

5.2 Comparison with Literature

The results align with previous findings by (McCarthy et al., 2023), who emphasized that interactive alumni platforms enhance user retention and loyalty. Similar studies by (Bitrián et al., 2021) support the importance of features such as job boards and alumni directories in maintaining engagement.

This study also confirms the conclusions of (Carreno, 2024), who advocated for continuous feedback loops through digital tools to foster alumni support. Using a hybrid engagement model with mobile and web channels mirrors trends and reinforces the scalability of multi-platform systems.

5.3 Institutional Implications

For MoCU, the implementation of this system marks a significant shift toward strategic digital engagement. It offers a foundation for long-term alumni tracking, graduate impact evaluation, and community involvement. Institutional communication can now be streamlined, and event participation tracked quantitatively.

Furthermore, administrative units such as the alumni office and career services can integrate their services more effectively. Real-time analytics from the platform can help shape outreach strategies, scholarship campaigns, and mentorship initiatives.

5.4 Limitations

Despite the positive results, the study faced limitations. First, the sample size, though statistically justified, may not fully represent all alumni demographics. Second, since data collection was digital, alumni without access to smartphones or the internet may have been excluded. Finally, the evaluation period was short, limiting insights into long-term platform adoption.

5.5 Areas for Further Study

Future research could explore:

- Longitudinal studies to assess alumni behavior changes over time.

- Integration with academic records and performance dashboards.
- Comparative analysis with platforms from other universities in Tanzania or East Africa.
- Implementation of AI-driven features such as predictive analytics for alumni interests and engagement patterns.

These avenues would expand understanding and inform ongoing platform development.

6.0 Conclusion and Recommendations

6.1 Conclusion

This study successfully designed and evaluated a web-mobile alumni engagement platform tailored to the needs of Moshi Co-operative University (MoCU). The system demonstrated its effectiveness by improving alumni communication, enhancing feature accessibility, and promoting institutional connectivity. Findings from both quantitative and qualitative analyses indicated high satisfaction levels among alumni, frequent system usage, and positive perceptions of platform usability and relevance. The study confirms that digital platforms, when informed by user needs, can play a vital role in addressing the fragmentation of alumni engagement in Tanzanian higher education.

Through a user-centred design process and iterative development, the system aligned with alumni expectations and institutional goals. Furthermore, the use of cloud technologies, mobile-first design, and integrated feedback tools ensures scalability, reliability, and inclusiveness. This project not only addresses current gaps in alumni relations at MoCU but also sets the groundwork for digital engagement strategies at similar institutions.

6.2 Recommendations

Short-Term Recommendations:

1. **Continuous Awareness Campaigns:** MoCU should invest in promoting the platform through alumni events, email campaigns, and social media to boost platform reach.

2. **Feedback Mechanism:** Maintain regular feedback collection via in-app surveys to refine features based on user input.

3. **Staff Training:** Ensure alumni office and ICT staff are well-trained to manage, monitor, and support platform activities.

Long-Term Recommendations:

1. **Integration with Academic Records:** Linking the platform with alumni academic data can help track career trajectories and foster targeted support.

2. **Partnership Development:** Collaborate with industry partners to enrich job boards and mentorship opportunities.

3. **Scalability and Expansion:** MoCU should consider rolling out the platform to national alumni networks and other institutions within the region.

The insights and framework developed in this research can be scaled and adopted beyond MoCU, enhancing alumni relations, academic collaboration, and institutional growth across higher learning institutions in Tanzania and beyond.

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