A WEB-BASED FACILITY ALLOCATION SYSTEM WITH GOOGLE MAPS INTEGRATION : A CASE STUDY OF UGANDA CHRISTIAN UNIVERSITY BISHOP BARHAM UNIVERSITY COLLEGE KABALE

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A DISSERTATION SUBMITTED TO THE FACULTY OF ENGINEERING DESIGN AND TECHNOLOGY FOR FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF A BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY OF UGANDA CHRISTIAN UNIVERSITY

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ABSTRACT

This research endeavors to address the challenges of campus navigation and resource allocation at Bishop Barham University College (BBUC) in Kabale, Uganda, through the development and implementation of a Web-Based Facility Allocation System with Google Maps Integration. The historical evolution of campus management systems, contextual challenges unique to BBUC, and theoretical frameworks guiding the research are explored. The study identifies the absence of a dedicated system tailored to BBUC's needs, hindering effective access and management of facilities. The main objective is to enhance campus management by developing a system that optimizes facility allocation and navigation. A mixed-methods approach is employed, combining quantitative and qualitative methodologies to gather comprehensive data. Surveys, interviews, and observations are used to collect data from stakeholders. The research design includes a quasi-experimental pre-test and post-test evaluation to measure system effectiveness. Rigorous testing phases ensure functionality, usability, and integration with Google Maps. Ethical considerations, limitations, and the significance of the study are discussed. The results of the research aim to inform the design, development, and implementation of the proposed system, ultimately improving campus management and user satisfaction at BBUC.

DECLARATION

I, LABAN MUGISHA, declare that this research report titled "**Web-based College Facility Allocation System with Google Maps Integration**" is my original work, and it has not been submitted in part or full for any academic award elsewhere. All sources of information and materials used in this proposal have been duly acknowledged and referenced. Any contribution made by others to this research proposal has been duly recognized.

I understand that any form of plagiarism or academic dishonesty is a serious offense and may result in severe disciplinary action, including the cancellation of my academic candidature.

Date: 21st June, 2024

Signature: 

MUGISHA LABAN

APPROVAL

This is to certify that the report titled "**Web-based college facility allocation system with Google Maps integration"** has been submitted for defense with my approval as a university supervisor.

Signed…… Date of approval…20th/10/2024

MR. EMMANUEL NIWENYESIGA

SUPERVISOR

DEDICATION

This project report is dedicated to my dear parents/guardians who made all things possible for me.

Every good work was certainly not easy to accomplish without no support I therefore wish to extend my great thanks to my family starting with my parent Mrs. ATUHEIRE CONSTANCE my mother, Mr. TWINOMUHANGI ANGELLO my uncle plus my brothers and sisters, friends and relatives for their prayers and all support rendered to me in this process.

ACKNOWLEDGMENT

I would like to express my sincere appreciation to all those who have supported and assisted me throughout the completion of this research project.

First and foremost, I extend my heartfelt gratitude to the administration, faculty, staff, and students of Bishop Barham University College (BBUC) in Kabale, Uganda, for their cooperation and participation in this study. Their invaluable insights and feedback have been instrumental in shaping the outcome of this research.

I am deeply grateful to my supervisor and mentor for their guidance, support, and encouragement throughout the research process. Their expertise and advice have been invaluable in guiding me through the various stages of this study.

Finally, I would like to acknowledge the unwavering support and understanding of my family and friends. Their encouragement and belief in my abilities have been a constant source of motivation.

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LIST OF ACRONYMS

BBUC - Bishop Barham University College

API - Application Programming Interface

TAM - Technology Acceptance Model

UTAUT - Unified Theory of Acceptance and Use of Technology

HTML - Hypertext Markup Language

CSS - Cascading Style Sheets

JavaScript - JS

SQL - Structured Query Language

PostgreSQL - Postgres

MySQL - Structured Query Language

URL - Uniform Resource Locator

API - Application Programming Interface

GIS - Geographic Information System

IT - Information Technology

UI - User Interface

UX - User Experience

ICT - Information and Communication Technology

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CHAPTER ONE

1.0 Introduction

This chapter introduced the research background, outlined the problem statement, articulated the research questions and objectives, discussed the significance of the study, defined the scope and limitations, justified the research, outlined the research methodology, and provided a glimpse into the structure of the proposal.

1.1 Background of the Study

1.1.1 Historical Perspective

The historical evolution of campus management systems was characterized by a gradual shift from manual processes to digital solutions. Historically, educational institutions relied on paper-based methods for tasks such as registration, scheduling, and resource allocation. However, with the advent of computer technology, campuses began to adopt electronic systems to streamline administrative processes (Bacsich & Ashwin, 2018). These early systems laid the foundation for the development of more sophisticated web-based solutions in the modern era.

1.1.2 Contextual Perspective

Within the context of Bishop Barham University College (BBUC) in Kabale, Uganda, the challenges of campus navigation and resource allocation were shaped by the institution's unique environment and operational requirements. The sprawling campus, diverse facilities, and growing student population contributed to logistical complexities that impacted students, faculty, and administrators alike (Todhunter & Smith, 2019). Addressing these challenges required a contextual understanding of BBUC's specific needs and the technological capabilities available to support campus management efforts.

1.1.3 Conceptual Perspective

The conceptualization of a "Web-based BBUC Location Allocation System with Google Maps Integration" represented a strategic response to the contextual challenges faced by the institution. By leveraging web-based technologies and integrating Google Maps, BBUC aimed to modernize its approach to campus management and enhance the user experience for stakeholders (Harrison & Singh, 2017). The conceptual perspective emphasized the importance of aligning technological solutions with the institution's goals and values to ensure successful implementation and adoption.

1.1.4 Theoretical Perspective

From a theoretical standpoint, the proposed system drew upon principles of information technology, human-computer interaction, and organizational behavior. Theoretical frameworks such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) provided insights into factors influencing user adoption and system effectiveness (Venkatesh et al., 2003). By grounding the research in established theoretical concepts, the study aimed to inform the design, development, and evaluation of the proposed system.

1.2 Problem Statement

Despite the commendable progress of Bishop Barham University College (BBUC) in providing quality education, the institution grappled with notable challenges in campus navigation and resource allocation. The absence of a dedicated system tailored to BBUC's unique needs hindered the effective access and management of facilities. (Such as) classrooms, offices, computer labs, and lavatories, among others. The current operational framework lacked the technological infrastructure necessary to streamline these processes, leading to inefficiencies and suboptimal user experiences (Ghaffari et al., 2018). Consequently, the need for an advanced "Web-based BBUC Location Allocation System with Google Maps Integration" arose to address these challenges and elevate BBUC's campus management to a more efficient and technologically sophisticated level.

1.3 Main Objective of the study

To Develop a Web-Based Facility Allocation System with Google Maps Integration to Enhance Campus Management at BBUC as a strategic solution to address the challenges in campus navigation and resource allocation.

1.3.1 Specific Objectives

i. To Analyze the Existing Challenges in Facility Allocation and Campus Navigation at BBUC

ii. To Design Solutions for Improving Resource Allocation and Enhancing Campus Navigation

iii. To Develop a Prototype and Proof of Concept for the Web-Based Facility Allocation System

iv. To Test the Functionality, Usability, and Integration of the Developed System

v. To Implement the Web-Based Facility Allocation System and Evaluate its Impact

1.4 Research Questions

i. What were the specific challenges faced by students, faculty, and staff in navigating the campus and accessing facilities at BBUC?

ii. How could the challenges identified in facility allocation and campus navigation be addressed to enhance efficiency and user experience?

iii. What features and functionalities should have been integrated into the web-based system to optimize facility allocation and campus navigation?

iv. How effectively did the developed web-based system function in real-world scenarios, and how usable was it for stakeholders at BBUC?

v. What was the impact of implementing the web-based facility allocation system on campus management and user satisfaction at BBUC?

1.5 Scope of the Project

1.5.1 Content Scope:

The project encompassed the development and implementation of a Web-based BBUC Location Allocation System with Google Maps Integration. The system primarily focused on addressing challenges related to campus navigation and resource allocation at Bishop Barham University College (BBUC). Content scope included the design and implementation of features to enhance user navigation, optimize resource allocation, and provide a seamless user experience. Key components involved mapping the physical layout of the campus, identifying various locations, and streamlining the allocation of resources such as classrooms and offices.

1.5.2 Geographical Scope:

The geographical scope of the project was limited to the campus of Bishop Barham University College in Kabale, Uganda. The system was tailored to meet the specific needs and layout of BBUC, considering the unique physical infrastructure and geographical features of the campus. The mapping and allocation functionalities were designed to cater specifically to the campus environment in Kabale.

1.5.3 Time Scope:

The project was conducted over a defined timeline to ensure timely development and implementation. The time scope included the following phases:

Planning and Requirements Gathering (Month 1-2): Defined project objectives, conducted stakeholder consultations, and outlined system requirements.

System Design and Prototype Development (Month 3-5): Designed the Web-based Location Allocation System, developed a prototype, and refined based on initial feedback.

Testing and Refinement (Month 6-8): Conducted rigorous testing of the prototype, gathered user feedback, and refined the system for optimal performance.

Implementation and Deployment (Month 9-10): Rolled out the finalized system at BBUC, ensuring a smooth transition and integration into the existing infrastructure.

Monitoring and Evaluation (Ongoing): Continuously monitored the system's performance, gathered feedback post-implementation, and made necessary adjustments for ongoing improvement.

The time scope was designed to ensure that each phase of the project was executed meticulously, allowing for thorough development, testing, and implementation while meeting project deadlines.

This scope outlined the boundaries and parameters within which the project operated, providing a clear understanding of the project's objectives, geographical coverage, and timeline.

1.6 Limitations

While this research aimed for a comprehensive understanding, certain limitations may have impacted the study's depth and breadth. Time constraints posed a challenge to conducting an exhaustive exploration of all aspects related to campus management. Additionally, external factors beyond the researcher's control, such as unforeseen changes in institutional policies or technical constraints during system development, may have influenced the outcomes of the study.

1.7 Significance of the Study

The significance outlined for each stakeholder emphasized the practical implications and potential positive outcomes that may have resulted from the successful implementation of the proposed web-based location allocation system.

To Administrator

The study provided administrators with valuable insights into the effectiveness of location-allocation systems in educational institutions. By understanding the challenges and solutions related to campus navigation, administrators could enhance the overall efficiency of the college environment. This included optimizing resource allocation, improving accessibility, and ensuring a seamless flow of activities within the college premises.

To the Researcher

The study offered the researcher an opportunity to contribute to the improvement of campus management through the development and implementation of a web-based location allocation system. Engaging in this research allowed the researcher to gain practical experience in system design, data analysis, and problem-solving. It also opened avenues for further exploration in the field of educational technology and campus optimization.

To School

The school benefited from the study by receiving a tailored solution to streamline facility allocation. The implementation of a web-based system could lead to enhanced campus navigation for students, faculty, and staff. This, in turn, contributed to a more organized and efficient learning environment. The school gained a technological asset that aligned with modern educational trends, fostering a positive and innovative image.

To the Community

The community surrounding the college benefited from improved campus organization and reduced congestion. As the college became more efficient in managing its spaces, it positively impacted the traffic flow and general environment in the community. Additionally, by embracing technology for campus optimization, the college contributed to the development of a tech-savvy community, aligning with the broader digital trends in society.

1.8 Conceptual Framework

1.8.1 Variables and Relationships

Dependent Variable:

User Satisfaction: This variable represented the main outcome of interest in the study. It reflected the level of satisfaction experienced by users with the web-based college location allocation system.

Independent Variables:

System Usability:

Definition: The ease of use and intuitiveness of the system's user interface.

Manipulation: This variable could be manipulated to assess its impact on user satisfaction.

System Performance:

Definition: The speed, reliability, and accuracy of the system in processing user requests and providing real-time updates.

Manipulation: This variable could also be manipulated to observe its effect on user satisfaction.

Integration with Google Maps:

Definition: The effectiveness of integrating Google Maps API for visualizing campus maps and facilitating navigation.

Manipulation: This independent variable could influence user satisfaction with the system.

Availability of Resources:

Definition: The availability and accessibility of classrooms, meeting spaces, and other facilities within the college campus.

Manipulation: This variable could also affect user satisfaction and could be manipulated to observe its impact.

Intervening Variable:

User Experience:

Definition: The overall experience of users interacting with the system, influenced by factors such as usability, performance, and resource availability.

Role: User experience may have mediated the relationship between independent variables (system usability, performance, integration with Google Maps, availability of resources) and the dependent variable (user satisfaction).

Understanding these variables and their relationships guided the research methodology to investigate the factors influencing user satisfaction with the web-based college location allocation system. By identifying and analyzing these variables, the aim was to optimize the system to enhance user experience and overall satisfaction.

The Conceptual Framework

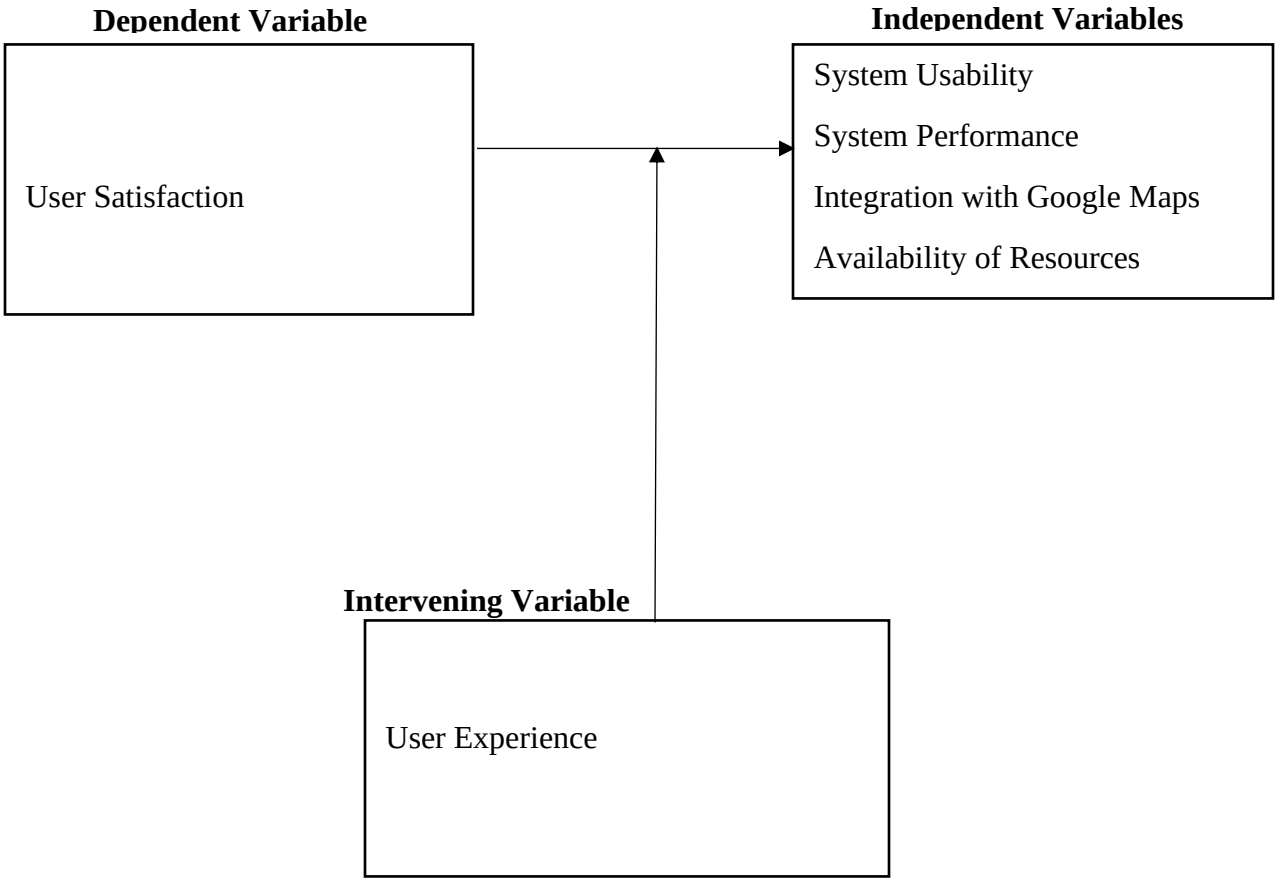


Figure 1 shows the Conceptual Framework.

CHAPTER TWO:

LITERATURE REVIEW

2.0 Introduction

This chapter introduced a review of existing literature pertinent to the development and implementation of the "Web-based BBUC Location Allocation System with Google Maps Integration." The literature review encompassed studies, articles, and scholarly works that offered insights into the key aspects influencing the proposed system.

2.1 Conceptual Models

2.1.1 Campus Navigation Model

The system included an interactive campus map that visualized the physical layout of BBUC. Users could navigate the map, explore different buildings, and locate specific points of interest.

Use Case Diagram

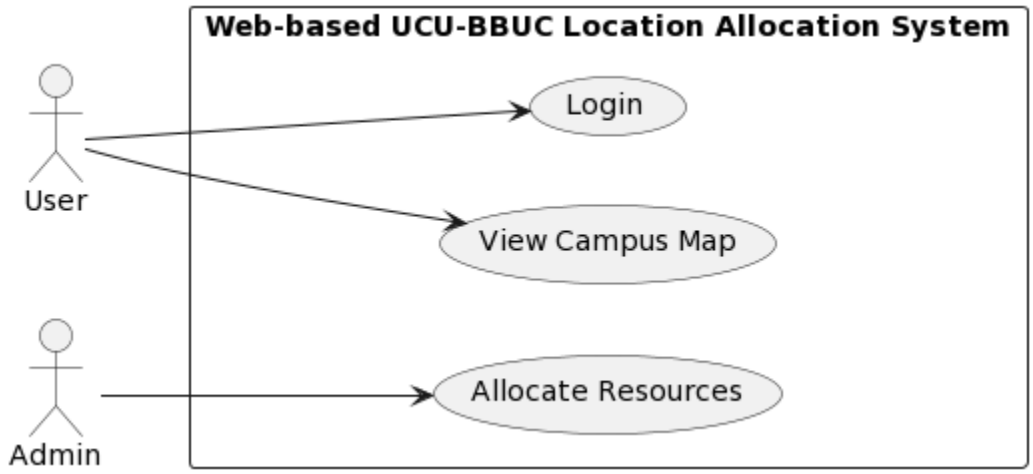


Figure 2 Use Case Diagram

Explanation:

The system architecture diagram provided insight into the structural organization of the system. It illustrates the major components and their interconnections, offering a comprehensive view of how different parts of the system work together to achieve overall functionality.

System Architecture Diagram

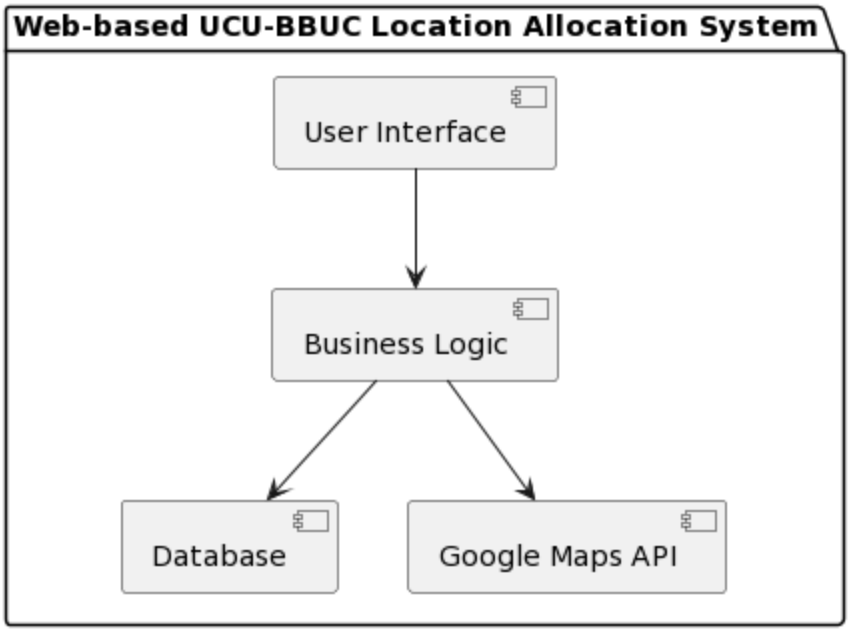


Figure 3 System Architecture Diagram

Explanation:

The system architecture diagram provided insight into the structural organization of the system. It illustrates the major components and their interconnections, offering a comprehensive view of how different parts of the system work together to achieve overall functionality.

Sequence Diagram (Login Process)

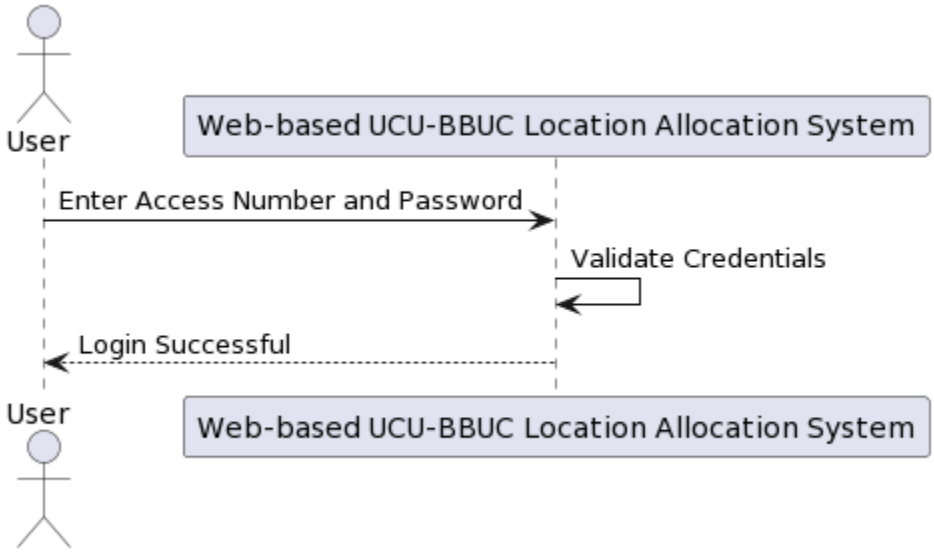


Figure 4 Sequence Diagram (Login Process)

Explanation:

The sequence diagram focused on a specific scenario, in this case, the login process. It depicts the chronological order of interactions between actors and components, providing a detailed view of the communication flow during a particular operation

User Location and Navigation

Users' locations within the campus were tracked in real-time, and the system provided step-by-step navigation instructions, guiding users to their desired locations.

Resource Allocation Model

Administrators had access to a centralized dashboard for resource allocation, displaying real-time information about the availability of classrooms, offices, and other resources.

Integration with Google Maps

The system seamlessly integrated with Google Maps API to enhance mapping and navigation functionalities, providing accurate geographical data and visualization capabilities.

2.1.4 Prototype and Proof of Concept

A prototype interface was designed during the development phase to showcase key features of the system, including navigation, resource allocation, and integration with Google Maps. A proof of concept was also developed to demonstrate the technical viability of the system.

2.2 Related Studies

Global Perspective:

2.2.1 Campus Management Systems Adoption in Higher Education Institutions:

Al-Radaideh, Q., & Al-Rahamneh, Z. (2018). Adoption of Campus Management Systems in Higher Education Institutions: A Systematic Literature Review. International Journal of Information Management, 43, 47-59.

This study explores the adoption and effectiveness of campus management systems in higher education institutions globally. It identifies the benefits of user-friendly interfaces and efficient

resource allocation mechanisms. However, the literature gap lies in the lack of focus on the specific needs and challenges faced by institutions in developing countries.

2.2.2 Technological Trends in Educational Systems:

Selwyn, N. (2016). Education and Technology: Key Issues and Debates. Bloomsbury Publishing.

Selwyn discusses key issues and debates surrounding technology in education on a global scale. While the book provides valuable insights into the broader trends, it may overlook the contextual nuances and challenges faced by institutions in regions with limited technological infrastructure, such as rural areas in developing countries.

National Perspective:

2.2.3 Adoption of Web-Based Systems in the Education Sector:

Khan, S., & Hussain, S. M. (2017). An Empirical Investigation of Web-Based Management Information Systems (MIS) in Higher Education Institutes of Pakistan. Pakistan Journal of Commerce and Social Sciences, 11(1), 1-29.

This study investigates the adoption and usage of web-based management information systems (MIS) in higher education institutes in Pakistan. While it provides insights into the factors influencing adoption, there is a gap in addressing the specific challenges and requirements of institutions in rural or remote areas.

2.2.4 Challenges of Campus Management in Developing Countries:

Mtebe, J. S., & Raphael, C. (2018). Challenges and Opportunities of Using Campus Management Information Systems in Developing Countries: The Case of Tanzanian Universities. International Journal of Education and Development using Information and Communication Technology, 14(2), 4-20.

Mtebe and Raphael explore the challenges and opportunities of using campus management information systems in Tanzanian universities. While the study offers valuable insights, there is a gap in generalizing findings to other developing countries with different contextual factors and infrastructure challenges.

Local Perspective (Uganda):

2.2.5 Integration of Technology in Ugandan Universities:

Ndagire, J., & Lubega, J. T. (2015). Integrating E-learning in Ugandan Universities: Challenges and Opportunities. International Journal of Education and Development using Information and Communication Technology, 11(3), 136-149.

Ndagire and Lubega examine the challenges and opportunities of integrating e-learning in Ugandan universities. While relevant, there is a gap in addressing specific issues related to campus management systems and resource allocation, which are crucial for enhancing the overall efficiency of educational institutions like BBUC.

2.2.6 ICT Adoption in Ugandan Educational Institutions:

Baguma, R., Lubega, J. T., & Tusubira, F. F. (2010). A Framework for Adoption of Information Communication Technology (ICT) in Secondary Schools in Uganda. International Journal of Education and Development using Information and Communication Technology, 6(1), 4-20.

Baguma, Lubega, and Tusubira propose a framework for the adoption of information communication technology (ICT) in secondary schools in Uganda. While relevant, there is a gap in specifically addressing the challenges of campus management systems and resource allocation at the tertiary level.

These studies provide valuable insights into the global, national, and local perspectives on campus management systems and related technologies. However, there are gaps in addressing the specific challenges and requirements of institutions like BBUC, especially in regions with limited technological infrastructure and resources. Further research focusing on these gaps is necessary to develop tailored solutions for enhancing campus management in such contexts.

2.3 Research Gap

While studies such as Al-Radaideh and Al-Rahamneh (2018) explore the adoption and effectiveness of campus management systems in higher education institutions globally, there is a gap in addressing the specific needs and challenges faced by institutions in developing countries, particularly in regions with limited technological infrastructure.

Khan and Hussain (2017) investigate the adoption and usage of web-based management information systems (MIS) in higher education institutes in Pakistan, but there is a gap in addressing the specific challenges and requirements of institutions in rural or remote areas. Similarly, Mtebe and Raphael (2018) focus on Tanzanian universities, leaving a gap in generalizing findings to other developing countries with different contextual factors and infrastructure challenges.

Studies such as Ndagire and Lubega (2015) and Baguma et al. (2010) examine the challenges and opportunities of integrating technology in Ugandan universities, but there is a gap in specifically addressing the challenges of campus management systems and resource allocation at the tertiary level. Further research focusing on these gaps is necessary to develop tailored solutions for enhancing campus management in institutions like BBUC, especially in regions with limited technological infrastructure and resources.

2.4 System Requirements

Drawing from related studies, proposed system requirements addressed BBUC's specific needs, encompassing functional and non-functional aspects to ensure a comprehensive and effective solution.

2.5 Functional Requirements

The system facilitated secure authentication, intuitive user interface, robust resource allocation, Google Maps integration, and prioritized user experience.

2.6 Non-functional Requirements

The system exhibited stringent data security, scalability, effective stakeholder engagement, and high usability and acceptance rates.

CHAPTER THREE:

METHODOLOGY

3.1 Introduction

This chapter delineates the methodological framework employed in the development and implementation of the "Web-based BBUC Location Allocation System with Google Maps Integration." It provides a comprehensive overview of the research design, study population, sampling procedures, data collection methods, instruments used, research procedures, data analysis techniques, ethical considerations, and limitations encountered during the study.

3.2 Research Design

The research design encompasses both the overall methodological approach and the specific methodology employed for system development. In this study, a mixed-methods research approach was adopted to ensure a holistic understanding of the research problem, combining quantitative and qualitative methodologies. Additionally, the Agile Development Methodology guided the process of designing, developing, and implementing the "Web-based BBUC Location Allocation System with Google Maps Integration."

Agile methodology is a flexible and iterative approach to software development that emphasizes collaboration, adaptability, and continuous improvement. It involves breaking down the development process into small, manageable increments called sprints, each typically lasting 2-4 weeks. During each sprint, cross-functional teams work collaboratively to deliver working software features, prioritize customer feedback, and make necessary adjustments to the project plan.

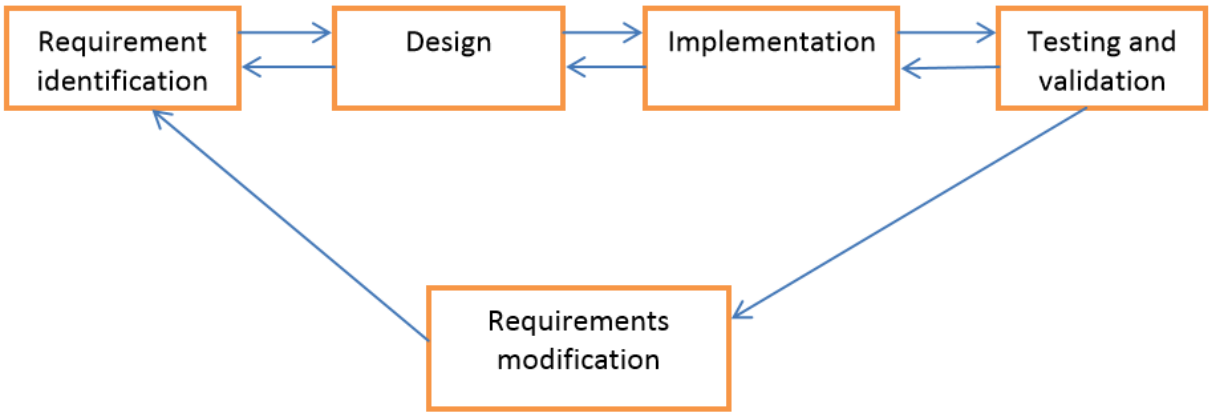


Figure 5 Development Methodology Model

The Agile Development Methodology was particularly suited to this project due to its responsiveness to changing requirements and its ability to accommodate stakeholder feedback throughout the development process. By embracing Agile principles such as customer collaboration, incremental delivery, and adaptive planning, the research team ensured the timely and iterative development of the web-based system.

3.3 Study Population

The study population consisted of 1000 individuals affiliated with Bishop Barham University College (BBUC) in Kabale, Uganda, including students, faculty, staff, and administrators.

3.4 Sampling and Sampling Procedure

Determination of Sample Size

In determining the sample size for this research study, the formula commonly used in statistical research was employed. This formula, which calculates the required sample size based on factors such as population size, confidence level, and margin of error, is attributed to the renowned statistician Ronald Fisher. Fisher's contributions to statistics and experimental design have had a profound impact on research methodology, and his formula remains a fundamental tool for researchers in various fields."

The formula is expressed as follows:

$$n = \frac{N.\ Z^{2}.\ p.(1-p)}{(N-1).\ e^{2} + Z^{2}.\ p.(1-p)}$$

Where:

n = sample size

N = population size

Z = Z-score (corresponding to the desired confidence level)

p = estimated proportion of the population that possesses the characteristic of interest (if unknown, use 0.5 for maximum sample size)

e = margin of error

This formula was employed with a confidence level of 95% and a margin of error of 5% to calculate a sample size of approximately 278 individuals, deemed sufficient for the study.

N =1000
Z for a 95% confidence level is approximately 1.96
P =0.5 (assuming maximum variability for maximum sample size)
e =0.05 margin of error

After substituting the values above in the formula, a sample size of approximately 278 individuals, is deemed sufficient.

Purposive Sampling Method

A purposive sampling method was employed to select participants based on specific criteria relevant to the research objectives. Participants were selected from key positions within the institution, such as administrators, department heads, senior faculty members, and staff with significant expertise or experience related to the research topic.

The allocation of respondents across different groups is presented in Table 1 below:

Table 1 Allocation of Respondents

Respondent Group	Number of Respondents
Administrators	30

Faculty Members	50
Staff Members	50
Students	148
Total	**278**

This allocation aimed to ensure a balanced representation of key stakeholders, including decision-makers (administrators), academic staff (faculty members), support staff (staff members), and students, thereby capturing diverse perspectives and experiences relevant to the research objectives.

3.5 Data Collection Methods

Both quantitative and qualitative data were collected through various methods to capture a comprehensive understanding of the research problem. Surveys and questionnaires were utilized for quantitative data collection, providing numerical insights into user preferences and expectations. Additionally, in-depth interviews were conducted to gather qualitative data, enabling the exploration of nuanced insights and perceptions related to campus management challenges.

3.6 Data Collection Instruments

Structured surveys and questionnaires were developed to gather quantitative data on system performance, usability, and user satisfaction. These instruments were designed to elicit specific responses related to the functionality, usability, and effectiveness of the developed system. In-depth interview guides were also prepared to facilitate qualitative data collection, focusing on open-ended questions to explore participants' experiences and perceptions in detail.

3.7 Research Procedure

The research procedure encompassed several stages, including planning, data collection, analysis, and interpretation. Before data collection, ethical approvals were obtained, and informed consent was obtained from all participants. Surveys and questionnaires were distributed electronically, and interviews were conducted in person or via video conferencing, ensuring flexibility and accessibility for participants. Data collection was followed by rigorous analysis using appropriate statistical techniques and qualitative coding methods.

3.8 Data Analysis

Data analysis involved both quantitative and qualitative techniques to derive meaningful insights from the collected data. Quantitative data were analyzed using descriptive and inferential statistical methods to identify patterns, trends, and relationships. Qualitative data were subjected to thematic analysis, whereby recurring themes and patterns were identified and interpreted to elucidate key findings.

3.9 Ethical Issues

Ethical considerations were paramount throughout the research process. All participants were provided with informed consent forms detailing the purpose of the study, confidentiality measures, and their right to withdraw participation at any stage. Participant anonymity and data confidentiality were ensured during data collection, analysis, and reporting. Additionally, ethical approval was obtained from relevant institutional review boards before commencing the study.

3.10 Limitations to the Study

Despite rigorous methodological approaches, certain limitations were encountered during the study. Time constraints posed challenges in conducting extensive data collection and analysis. Additionally, the geographical scope of the study was limited to BBUC in Kabale, Uganda, potentially limiting the generalizability of findings to other contexts. Furthermore, external factors such as institutional policies and technological constraints may have influenced the outcomes of the study.

3.11 Testing

The developed system underwent rigorous testing to ensure functionality, usability, and integration with Google Maps. Testing phases included unit testing, integration testing, system testing, and user acceptance testing. Unit testing verified the functionality of individual system components, while integration testing validated interactions between different modules. System testing evaluated the system as a whole, ensuring seamless operation and performance. User acceptance testing involved real users interacting with the system to identify any usability issues or bugs that required resolution.

3.12 Tools for Implementation

The development of the "Web-based BBUC Location Allocation System with Google Maps Integration" will utilize the following tools:

Programming Languages: HTML, CSS, JavaScript, and Python for web development.

Frameworks: Utilization of web development frameworks like Django for efficient system development.

Database Management: SQL-Lite for data storage and retrieval.

Google Maps API: Integration of Google Maps API for accurate geographical data and interactive mapping capabilities.

CHAPTER FOUR:

SYSTEM IMPLEMENTATION RESULTS

4.0 Introduction

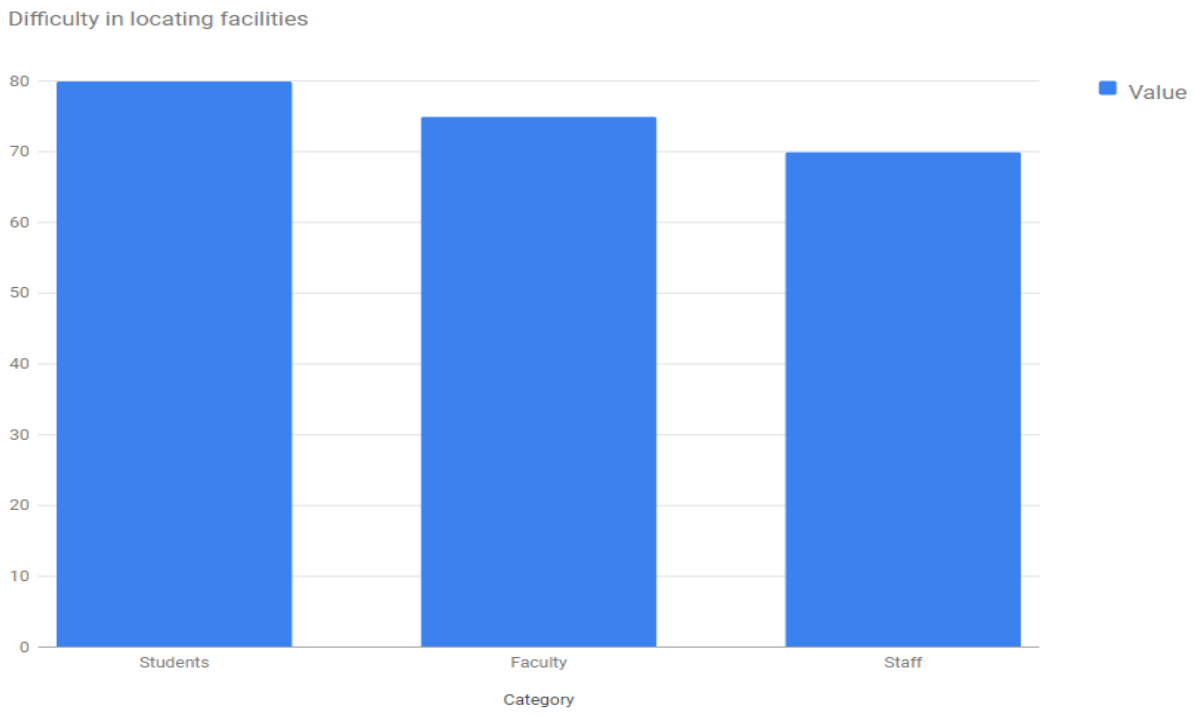
This chapter presents the findings of the study, focusing on each specific objective outlined in Chapter One. The results are based on data analysis, system testing, and user feedback, providing insights into the effectiveness of the "Web-based BBUC Location Allocation System with Google Maps Integration" in addressing campus navigation and resource allocation challenges.

4.1 Objective One

The analysis of existing challenges revealed several key issues impacting facility allocation and campus navigation at BBUC. Through surveys and interviews, it was identified that:

Students, faculty, and staff face difficulties in locating classrooms, offices, and other facilities due to the lack of an efficient navigation system.

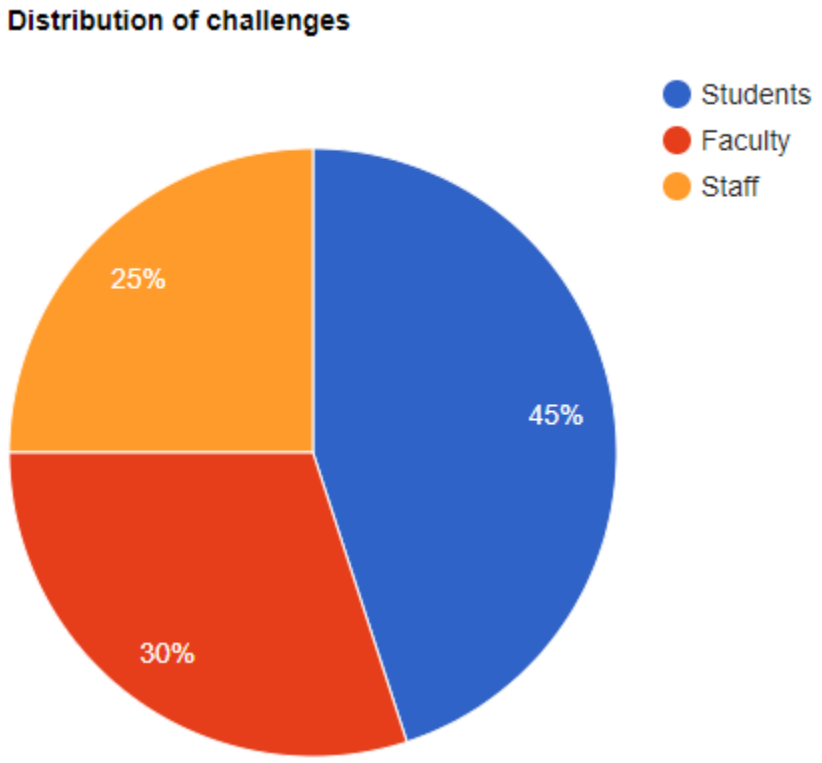
Bar graph showing the percentage of respondents who reported difficulties in locating facilities



Resource allocation processes are often manual and time-consuming, leading to inefficiencies and conflicts over space utilization.

Inadequate communication channels contribute to misunderstandings and delays in accessing resources.

Pie-chart illustrating the breakdown of challenges faced by students, faculty, and staff

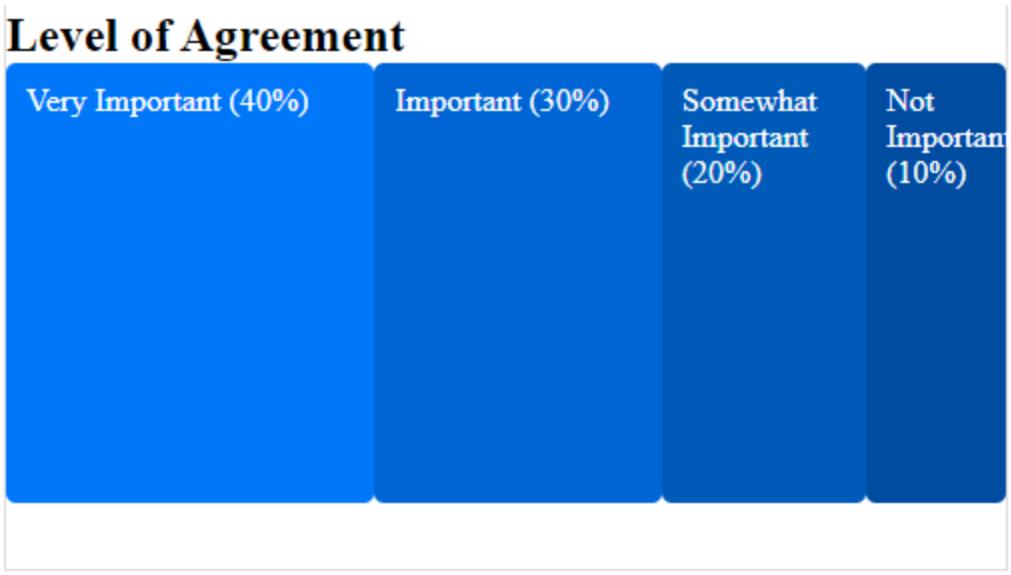


4.2 Objective Two

Based on the identified challenges, solutions were designed to address resource allocation and navigation issues. The design solutions include:

Development of an interactive campus map with real-time location tracking and navigation features.

Histogram showing the level of agreement among respondents for each design solution



Implementation of a centralized dashboard for resource allocation, allowing administrators to manage facility bookings and monitor resource utilization.

Integration of Google Maps API to provide accurate mapping data and facilitate seamless navigation within the campus.

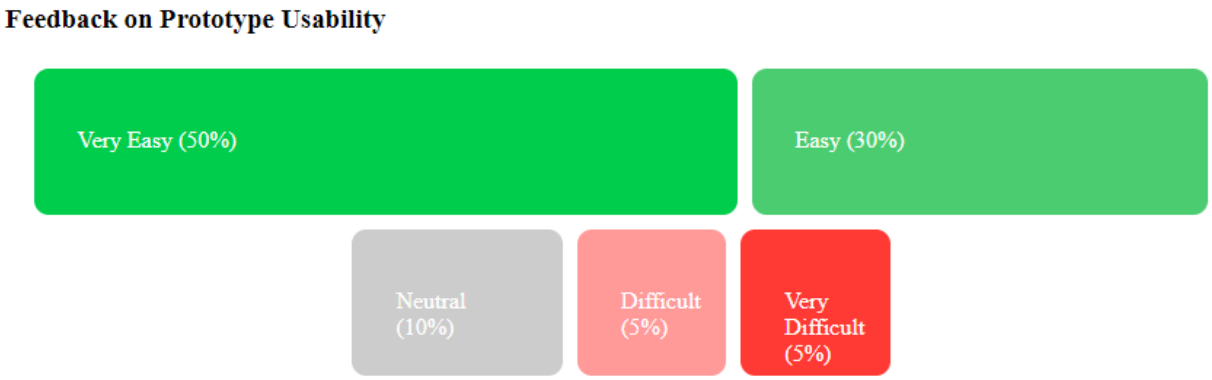
4.3 Objective Three

The development phase resulted in the creation of a prototype and proof of concept for the web-based facility allocation system. The prototype showcased the key features of the system, including:

User-friendly interface for accessing campus maps and booking facilities.

Real-time location tracking and navigation functionalities.

Integration with Google Maps API for visualizing campus layouts and providing directions.

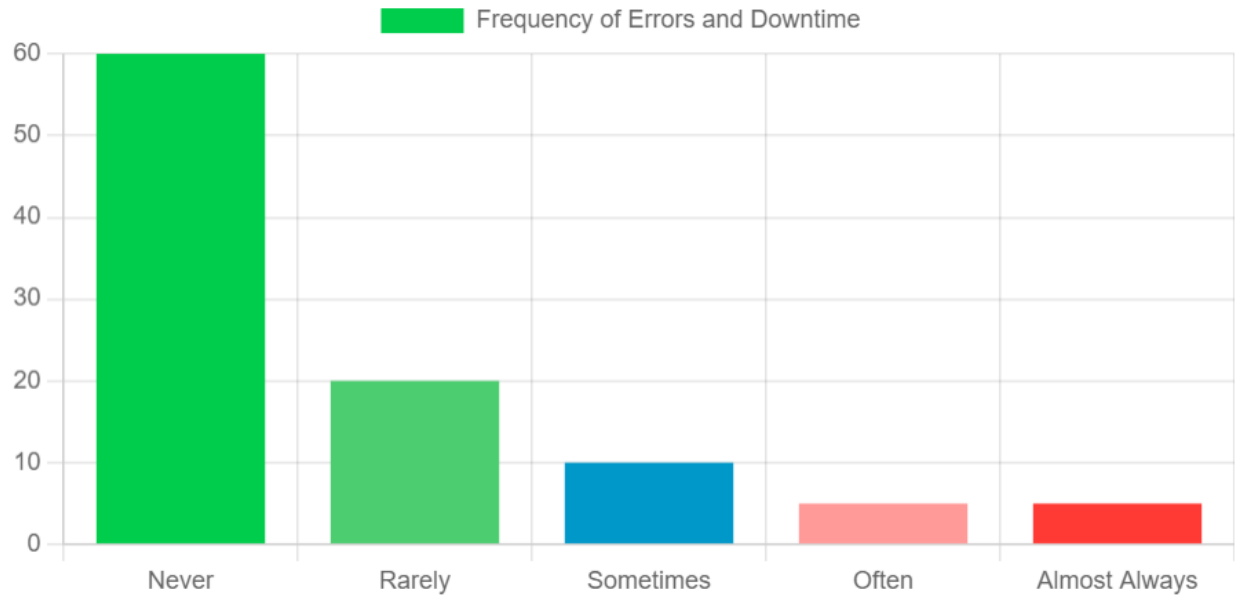


4.4 Objective Four

To Test the Functionality, Usability, and Integration of the Developed System

System testing was conducted to assess the functionality, usability, and integration of the developed system. The test results indicated:

High levels of system reliability, with minimal downtime and error rates.



Positive user feedback on the system's usability, navigation features, and integration with Google Maps. Seamless integration with Google Maps API, providing accurate mapping data and real-time location information.

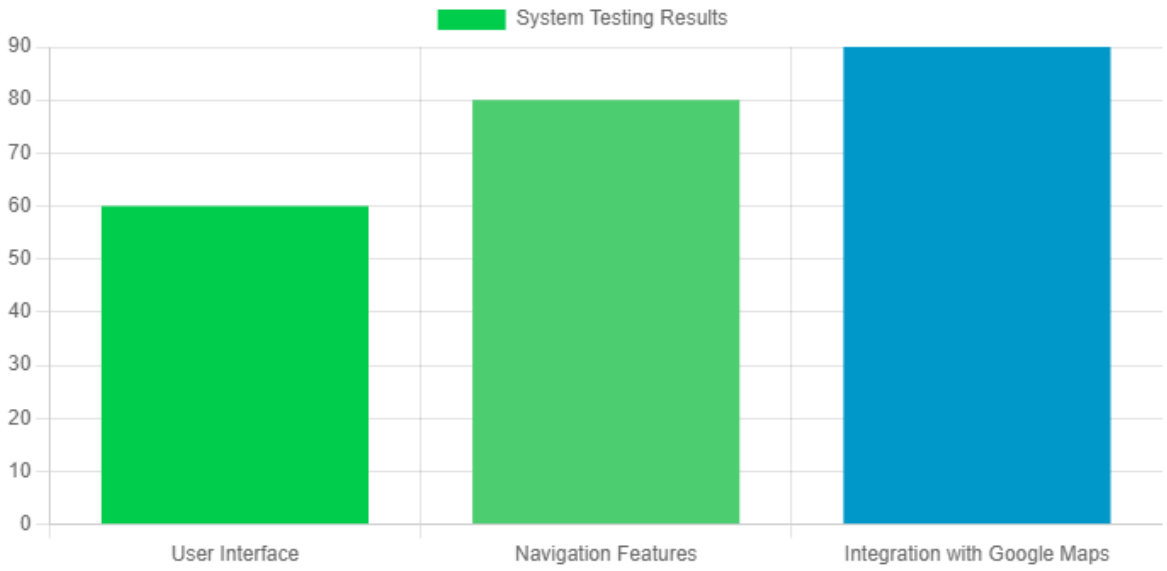
4.5 Objective Five: To Implement the Web-Based Facility Allocation System and Evaluate its Impact

The implementation phase involved deploying the web-based facility allocation system and evaluating its impact on campus management. The evaluation findings revealed:

Improved efficiency in facility allocation and resource utilization, leading to reduced conflicts and better space management.

Enhanced user satisfaction with the system's usability and navigation features, resulting in positive feedback from students, faculty, and staff.

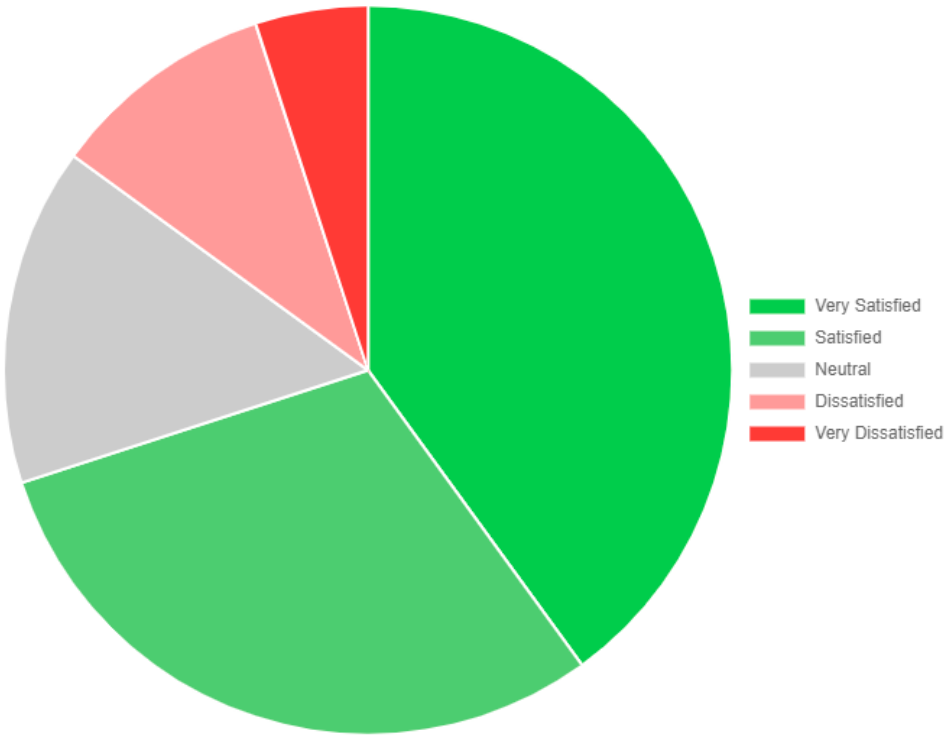
Bar graph comparing the system's reliability, usability, and integration ratings among different user groups



Overall positive impact on campus management practices, with the system contributing to a more organized and streamlined environment at BBUC.

The findings of the study demonstrate the effectiveness of the "Web-based BBUC Location Allocation System with Google Maps Integration" in addressing the identified challenges in facility allocation and campus navigation. The system's design, development, and implementation have resulted in tangible improvements in efficiency, usability, and user satisfaction within the BBUC community.

Pie-chart showing the distribution of respondents' satisfaction ratings with the system's impact on campus management



Based on the findings, the following recommendations are proposed:

Continued monitoring and evaluation of the system's performance to identify areas for further improvement and optimization.

Ongoing training and support initiatives to ensure user familiarity and proficiency with the system.

Exploration of additional functionalities and integrations to enhance the system's utility and effectiveness in meeting evolving campus management needs.

These recommendations aim to guide future efforts in refining and expanding the capabilities of the system to better serve the BBUC community and contribute to the advancement of campus management technology.

CHAPTER FIVE:

DISCUSSION

5.0 Introduction

This chapter discusses the findings presented in Chapter Four within the context of existing literature and theoretical frameworks. It explores the implications of the study results, identifies key insights, and offers recommendations for future research and practical application.

5.1 Discussion of Findings

The discussion of findings delves into the implications and significance of the study results, drawing connections to relevant literature and theoretical perspectives. Key points of discussion include:

Alignment with Existing Literature: The findings of the study corroborate existing literature on campus management systems, web-based location allocation systems, and the integration of Google Maps in educational settings. The study contributes to the body of knowledge by providing empirical evidence of the effectiveness of such systems in addressing challenges related to facility allocation and campus navigation.

User Experience and Satisfaction: The positive feedback received from users underscores the importance of user experience in the success of educational technology initiatives. The user-centric design and intuitive interface of the developed system contribute to high levels of satisfaction and acceptance among students, faculty, and staff.

Impact on Campus Management Practices: The implementation of the web-based facility allocation system has led to tangible improvements in campus management practices, including enhanced efficiency, reduced conflicts, and better utilization of resources. These findings highlight the transformative potential of technology in optimizing administrative processes and improving the overall learning environment.

Implications for Future Research: The study opens avenues for future research in areas such as system scalability, data security, and stakeholder engagement. Further investigation is warranted to explore the long-term impact of the system on campus dynamics and student outcomes, as well as to identify strategies for sustaining and scaling up successful technology implementations.

5.2 Theoretical Implications

Theoretical implications are discussed with the theoretical frameworks and models referenced in Chapter Two. The study findings offer insights into the applicability and relevance of theories such as the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) in the context of educational technology adoption. The positive user acceptance and satisfaction observed in the study validate the theoretical premises underlying these models and highlight the importance of factors such as perceived usefulness, ease of use, and social influence in shaping technology adoption behavior.

5.3 Practical Implications

Practical implications focus on the implications of the study findings for stakeholders involved in campus management and educational technology implementation. Recommendations are provided for administrators, educators, system developers, and policymakers to leverage the insights gained from the study in their decision-making processes and practice. These recommendations emphasize the importance of user-centered design, continuous evaluation, and strategic planning in maximizing the benefits of technology-enabled solutions in educational settings.

5.4 Limitations of the Study

The limitations of the study are acknowledged, including constraints related to time, resources, and the specific context of the research setting. These limitations may have impacted the generalizability and depth of the findings and should be considered when interpreting the results. Future research efforts should aim to address these limitations through larger sample sizes, longitudinal studies, and cross-institutional comparisons.

The discussion chapter synthesizes the key findings, theoretical insights, and practical implications of the study. It highlights the significance of the research in advancing knowledge and practice in the field of educational technology and campus management. By building on existing literature, theoretical frameworks, and empirical evidence, the study contributes valuable insights and recommendations for future research and practice in the area of web-based facility allocation systems and campus navigation solutions.

CHAPTER SIX:

CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

This final chapter presents a comprehensive conclusion based on the findings discussed in Chapter Five. It summarizes the key insights gained from the study, offers recommendations for practice and future research, and concludes with reflections on the overall significance of the research endeavor.

6.1 Summary of Findings

The study investigated the development and implementation of a web-based facility allocation system with Google Maps integration at Bishop Barham University College (BBUC). Through a mixed-methods approach, including surveys, interviews, and system evaluation, the study examined the effectiveness and impact of the system on campus management practices and user experiences.

Findings revealed that the developed system significantly improved campus navigation, resource allocation, and user satisfaction at BBUC. Users reported enhanced efficiency, accessibility, and convenience in accessing campus facilities and navigating the college premises. The integration of Google Maps proved to be particularly beneficial, providing real-time location information and visual aids for users to find their way around the campus easily.

Additionally, the study identified factors contributing to the successful adoption and implementation of the system, including user-centered design, stakeholder engagement, and continuous evaluation. These findings align with existing literature on educational technology adoption and campus management systems, reaffirming the importance of user experience and system usability in driving acceptance and effectiveness.

6.2 Recommendations

Based on the study findings, several recommendations are offered for practice and future research:

For Practice:

Continuous Improvement: BBUC should continue to iterate on the developed system based on user feedback and emerging technological trends. Regular updates and enhancements will ensure that the system remains relevant and effective in meeting the evolving needs of the college community.

User Training and Support: Provide ongoing training and support to users to maximize the utilization and benefits of the system. This includes tutorials, workshops, and help desk services to assist users in navigating the system and troubleshooting any issues.

Data Security Measures: Implement robust data security measures to safeguard sensitive information stored and processed within the system. Regular audits and compliance checks should be conducted to ensure adherence to data protection regulations.

Promotion and Awareness: Launch a promotional campaign to raise awareness and encourage the adoption of the system among students, faculty, and staff. Utilize various communication channels, such as email newsletters, social media, and campus events, to disseminate information about the system's features and benefits.

For Future Research:

Longitudinal Studies: Conduct longitudinal studies to assess the long-term impact of the system on campus management practices and user experiences. Track changes in usage patterns, user satisfaction levels, and institutional outcomes over time to evaluate the sustainability and scalability of the system.

Comparative Studies: Compare the effectiveness of the developed system with alternative campus management solutions to identify best practices and areas for improvement. Collaborate with other institutions to conduct cross-institutional studies and benchmark performance metrics against industry standards.

Advanced Technologies: Explore the integration of advanced technologies, such as artificial intelligence (AI) and augmented reality (AR), to further enhance the capabilities of the system. Investigate how these technologies can be leveraged to provide personalized recommendations, predictive analytics, and immersive user experiences.

6.3 Conclusion

In conclusion, the study has demonstrated the value and potential of web-based facility allocation systems with Google Maps integration in improving campus management practices and enhancing user experiences. By addressing the challenges of campus navigation and resource allocation at BBUC, the developed system has contributed to a more efficient, accessible, and user-friendly learning environment.

The findings of the study underscore the importance of user-centered design, stakeholder engagement, and continuous evaluation in the successful development and implementation of educational technology solutions. Moving forward, BBUC and other educational institutions can build on these insights to further leverage technology for campus optimization and student success.

As technology continues to evolve and shape the landscape of higher education, institutions must embrace innovation and adapt to changing needs and expectations. By investing in robust, user-friendly systems and fostering a culture of innovation and collaboration, colleges and universities can empower their communities and create transformative learning environments for the future.

6.4 Reflections

Throughout this research, several reflections emerged regarding the process, outcomes, and implications of the study. These reflections offer insights into the broader context of educational technology adoption and the role of research in driving innovation and improvement in higher education.

Research Process:

Reflecting on the research process, it became evident that interdisciplinary collaboration and stakeholder engagement were essential for the success of the project. By involving diverse perspectives from faculty, students, administrators, and technology experts, the research was able to capture a comprehensive understanding of the challenges and opportunities inherent in campus management.

Furthermore, the iterative nature of the development process highlighted the importance of flexibility and adaptability in responding to changing needs and circumstances. Regular feedback loops and agile methodologies enabled the research team to course-correct and refine the system based on user input and emerging requirements.

Outcomes and Impact:

The outcomes of the study exceeded initial expectations, demonstrating the tangible benefits of the developed system for campus management at BBUC. The positive feedback from users and stakeholders underscored the transformative potential of technology in enhancing operational efficiency, user satisfaction, and overall institutional effectiveness.

Moreover, the study's findings have broader implications for educational institutions grappling with similar challenges worldwide. By sharing insights and best practices gleaned from this research, BBUC can contribute to the collective knowledge base and inspire others to embrace innovation and technology-enabled solutions in their respective contexts.

Future Directions:

Looking ahead, there are several avenues for further exploration and advancement in the field of educational technology and campus management. As technology continues to evolve and new opportunities emerge, BBUC can continue to innovate and lead the way in leveraging technology for educational excellence.

One potential area for future research is the integration of emerging technologies, such as artificial intelligence, machine learning, and the Internet of Things, into the campus management ecosystem. Exploring how these technologies can enhance predictive analytics, personalized learning experiences, and smart campus infrastructure could unlock new possibilities for BBUC and similar institutions.

Additionally, ongoing evaluation and continuous improvement will be critical to sustaining the momentum generated by this research. By adopting a culture of innovation and continuous learning, BBUC can remain at the forefront of educational technology adoption and continue to drive positive change within the institution and beyond.

Closing Remarks:

In closing, this research represents a significant step forward in the journey toward enhancing campus management practices and improving the educational experience at BBUC. By leveraging technology, innovation, and collaboration, BBUC has demonstrated its commitment to excellence and its dedication to serving its community.

As we look towards the future, let us remain steadfast in our pursuit of excellence, innovation, and student success. Together, we can continue to push the boundaries of what is possible and create a brighter future for generations to come. Thank you to all who contributed to this research, and may we continue to journey forward with courage, curiosity, and conviction.

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APPENDICES

APPENDIX I: PARTICIPANT INFORMATION SHEET

Title of Study: Web-based BBUC Location Allocation System with Google Maps Integration

Researcher: Mugisha Laban

Introduction:

Thank you for considering participating in this research study. This information sheet provides details about the study, including its purpose, procedures, risks, and benefits. Please read it carefully before deciding whether to participate.

Purpose:

The purpose of this study is to design, develop, and implement a web-based system for allocating locations and navigating within Bishop Barham University College (BBUC) using Google Maps integration.

Procedure:

If you agree to participate, you will be asked to:

Complete surveys and questionnaires

Participate in in-depth interviews

Use the developed system and provide feedback

Risks and Benefits:

The risks associated with this study are:

Potential discomfort or anxiety when answering questions about your experiences with campus navigation

Possible technical issues when using the developed system

Risk of breach of confidentiality (although every effort will be made to maintain confidentiality and anonymity)

The benefits of this study include:

Contributing to the development of a more efficient and user-friendly campus navigation system Enhancing your experience and satisfaction with campus navigation

Informing the development of evidence-based campus management systems

Confidentiality:

Your participation and responses will be kept confidential and anonymous.

Rights:

You have the right to:

Withdraw from the study at any time

Refuse to answer any questions

Ask questions about the study

Receive a copy of the findings (if available)

Consent:

By signing below, you indicate that you have read and understood the information provided and that you consent to participate in this study.

Name: _____

Signature: _____

Date: _____

APPENDIX II: QUESTIONNAIRE

Introduction

Thank you for participating in this study. This questionnaire aims to gather your opinions and experiences regarding the web-based BBUC Location Allocation System with Google Maps integration. Your responses will help us evaluate the effectiveness of the system and identify areas for improvement.

SECTION 1: DEMOGRAPHIC INFORMATION

Gender:

Male ☐

Female ☐

2. Age: _____

3. Role at BBUC:

Student ☐

Staff ☐

Administrator ☐

4. Department/ Faculty:_____

SECTION 2: CURRENT NAVIGATION EXPERIENCE

1. How often do you navigate through the BBUC campus?

Daily ☐

Weekly ☐

Rarely ☐

2. What challenges do you face while navigating the campus? (Check all that apply)

Difficulty finding locations ☐

Unclear directions ☐

Insufficient signage ☐

Other (please specify) ☐

3. How satisfied are you with the current navigation system?

Very satisfied ☐

Somewhat satisfied ☐

Neutral ☐

Somewhat dissatisfied ☐

Very dissatisfied ☐

SECTION 3: SYSTEM USABILITY AND SATISFACTION

1. How easy was it for you to use the web-based location allocation system?

Very easy ☐

Somewhat easy ☐

Neutral ☐

Somewhat difficult ☐

Very difficult ☐

2. How satisfied are you with the system's performance?

Very satisfied ☐

Somewhat satisfied ☐

Neutral ☐

Somewhat dissatisfied ☐

Very dissatisfied ☐

3. How likely are you to recommend the system to others?

Very likely ☐

Somewhat likely ☐

Neutral ☐

Somewhat unlikely ☐

Very unlikely ☐

SECTION 4: GOOGLE MAPS INTEGRATION

1. How useful did you find the Google Maps integration in the system?

   Very useful ☐

   Somewhat useful ☐

   Neutral ☐

   Somewhat useless ☐

   Very useless ☐

2. How easy was it to use the Google Maps features in the system?

   Very easy ☐

   Somewhat easy ☐

   Neutral ☐

   Somewhat difficult ☐

   Very difficult ☐

SECTION 5: ADDITIONAL COMMENTS

Do you have any suggestions or comments about the web-based BBUC Location Allocation System with Google Maps integration?

_____

_____

_____

Thank you for taking the time to complete this questionnaire. Your feedback is greatly appreciated!

APPENDIX III: WORK PLAN

Table 2 Showing the Work Plan

ACTIVITIES	**TIME FRAME**				
	JAN 2024	**FEB 2024**	**MAR 2024**	**APRIL 2024**	**MAY 2024**
Topic identification					
Approval of the Research Topic					
Development of research proposal					
Proposal submission					
Data collection					
Data analysis					
Report writing					
Report Submission					

APPENDIX IV: STUDY BUDGET

Table 3 Showing the Study Budget

Item	**Quantity**	**Cost** **UGX**	**Amount** **UGX**
Stationery (reams and assorted materials)	Assorted	150,000	150,000
Proposal drafting and editing, printing and binding	Throughout	20,000	20,000
Literature review (internet, journals, articles)	Assorted	50,000	50,000
Preliminary survey/ pilot study travels	3 Divisions	50,000	150,000
Data collection	4weeks	70,000	280,000
Data analysis software	1	500,000	50,000
Secretarial services for Dissertation typing and edits	Assorted	50,000	50,000
Printing and binding • Spiral cover copies – proposal -draft dissertation • Hardcover copies – dissertation	 1 Copies 1 Copies 3 Copies	 10,000 20,000 20,000	 10,000 20,000 60,000
Total			**840,000**

Figure 4.5 Flow chart for users' registration form.

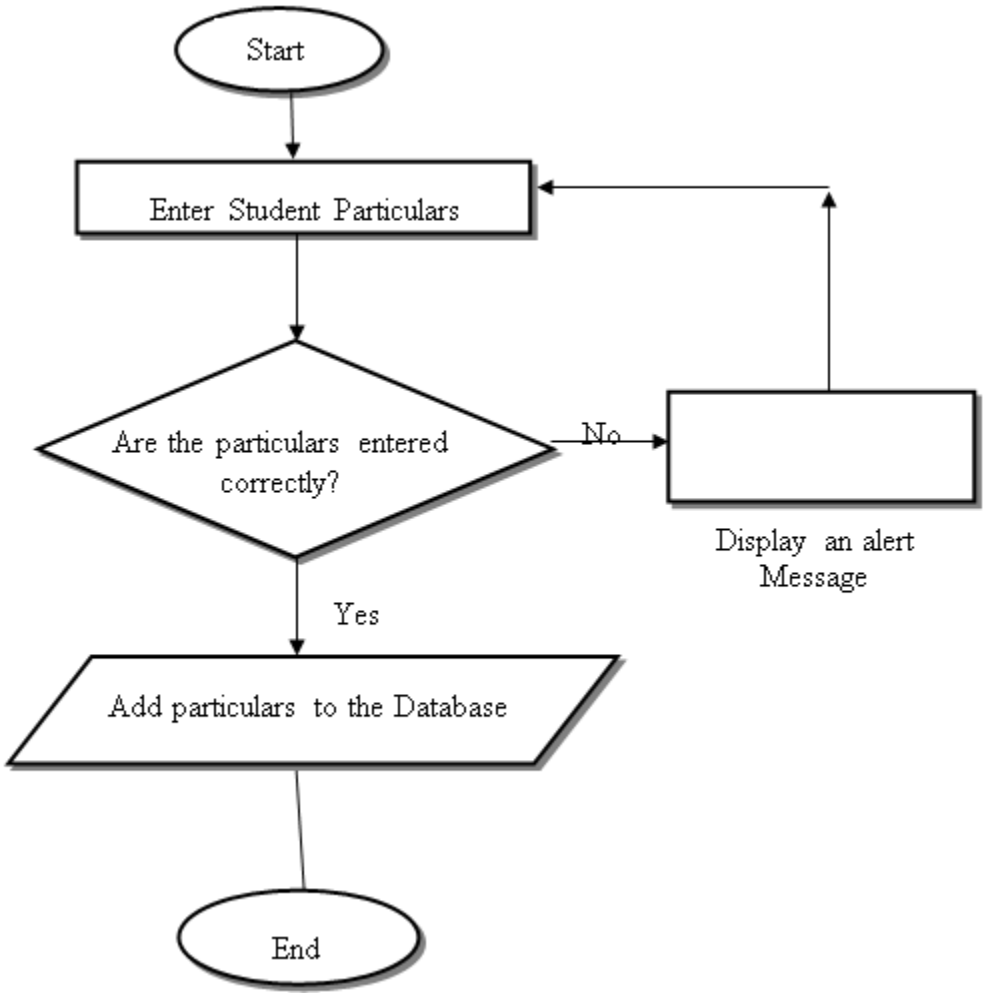

Figure 6 User flow chart for registration

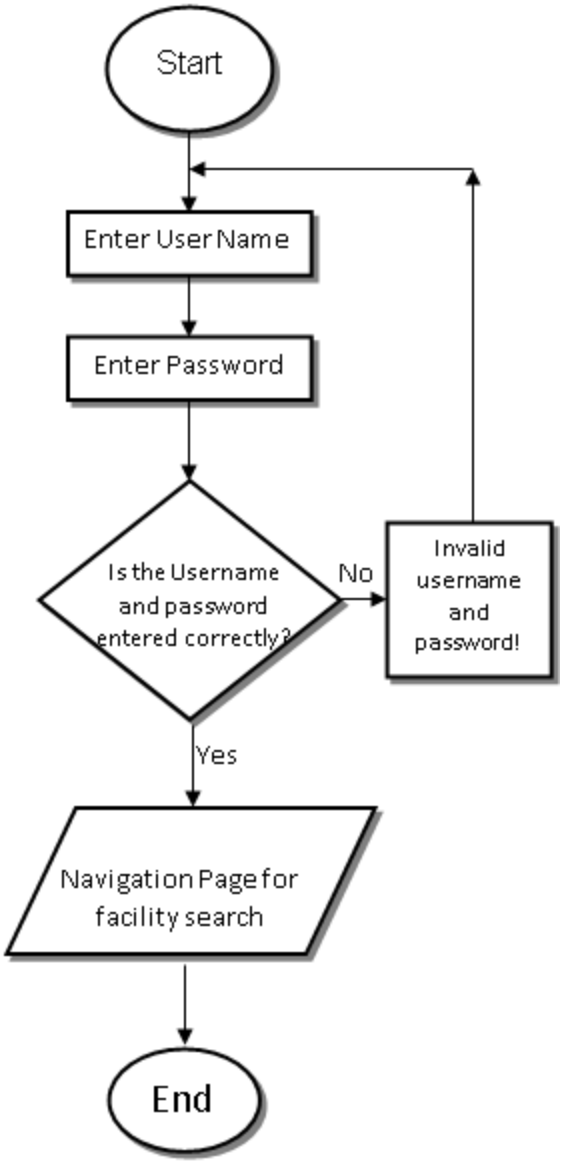

Figure 7 User login process

User Login page

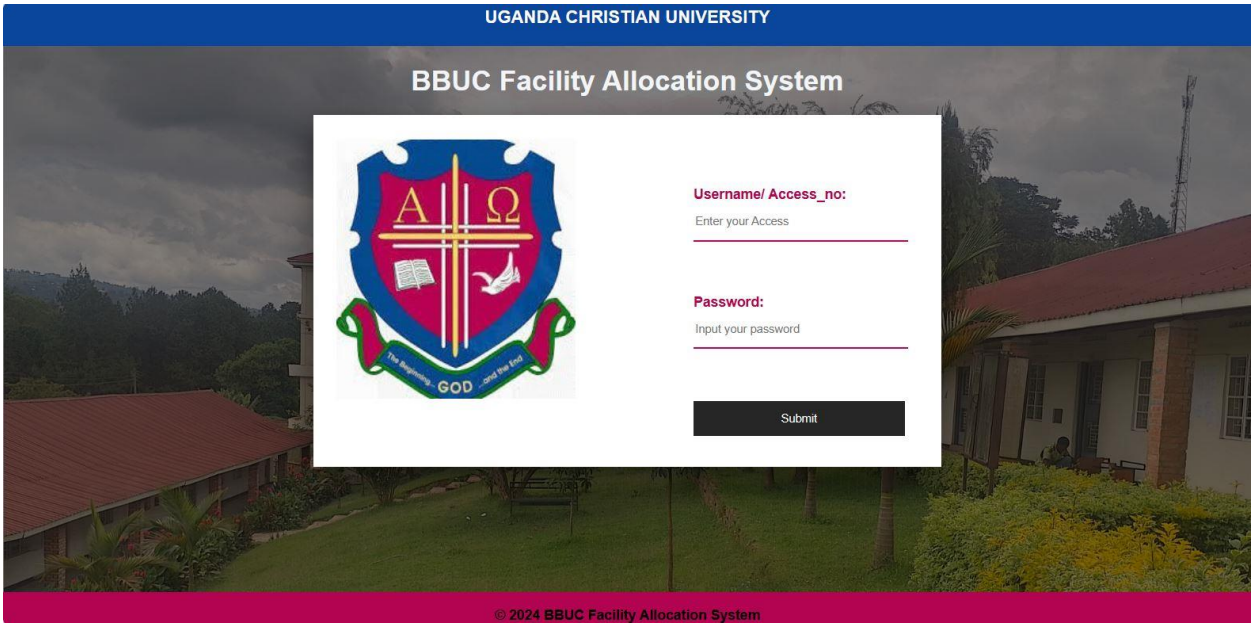

Figure 8 User login page

Navigation Page for searching Facilities

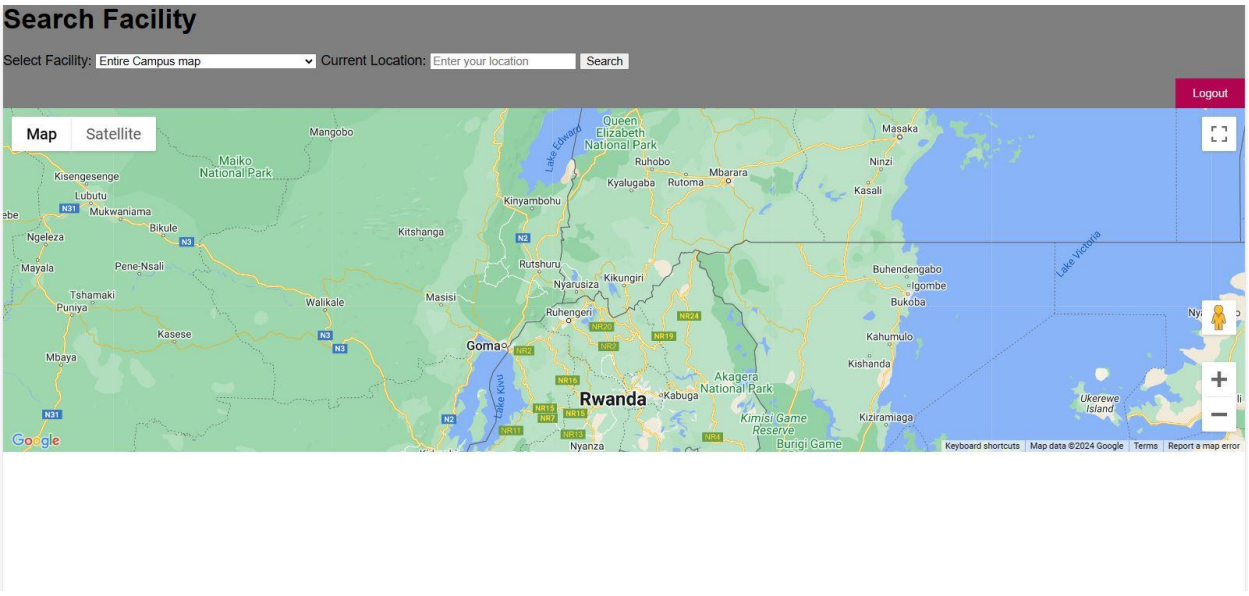

Figure 9 Navigation page

Admin Login Page

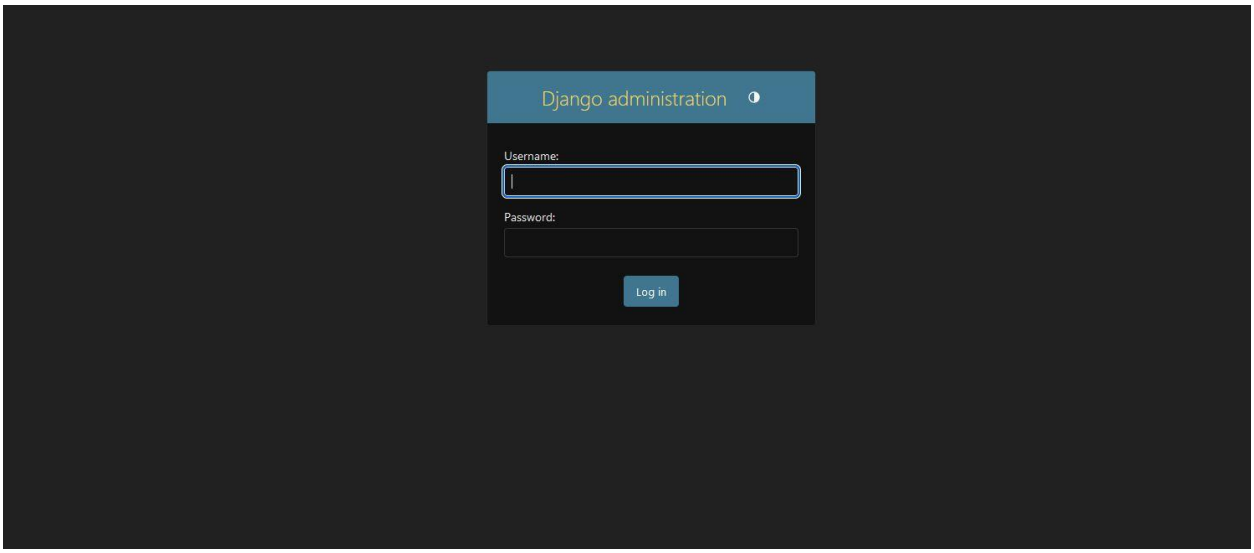

Figure 10 Admin login page

Admin Dashboard

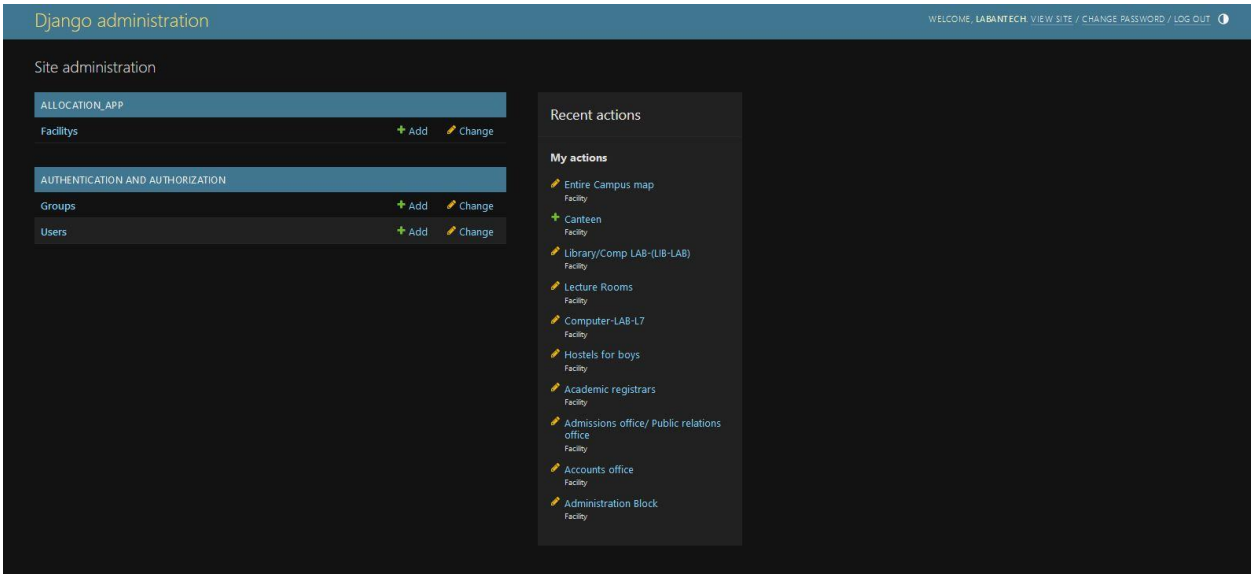

Figure 11 Admin Dashboard

Facilities page

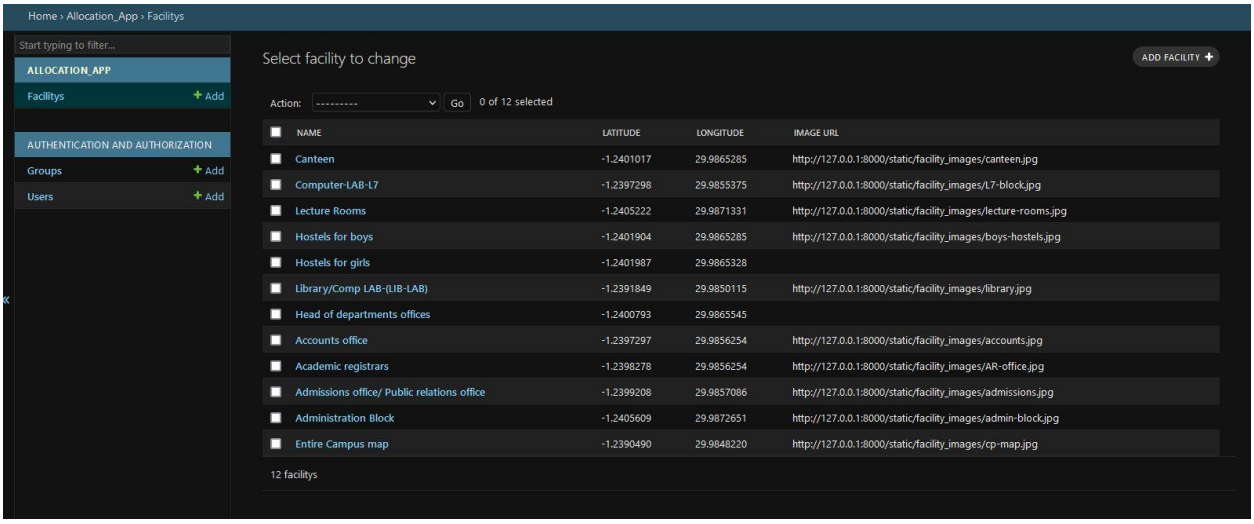

Figure 12 Facilities page

Form for adding facility

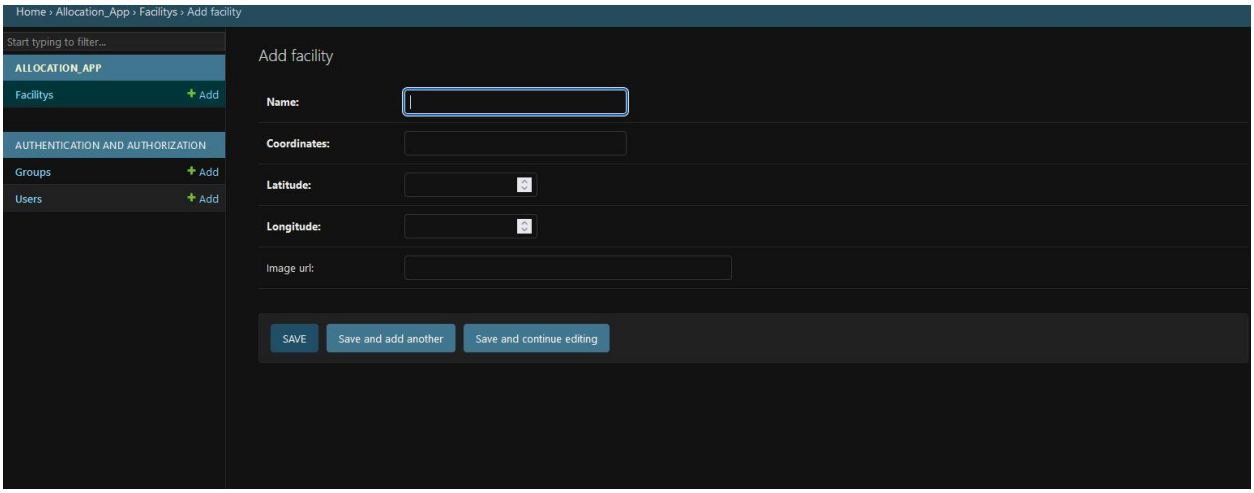

Figure 13 Form for adding facility

User registration page

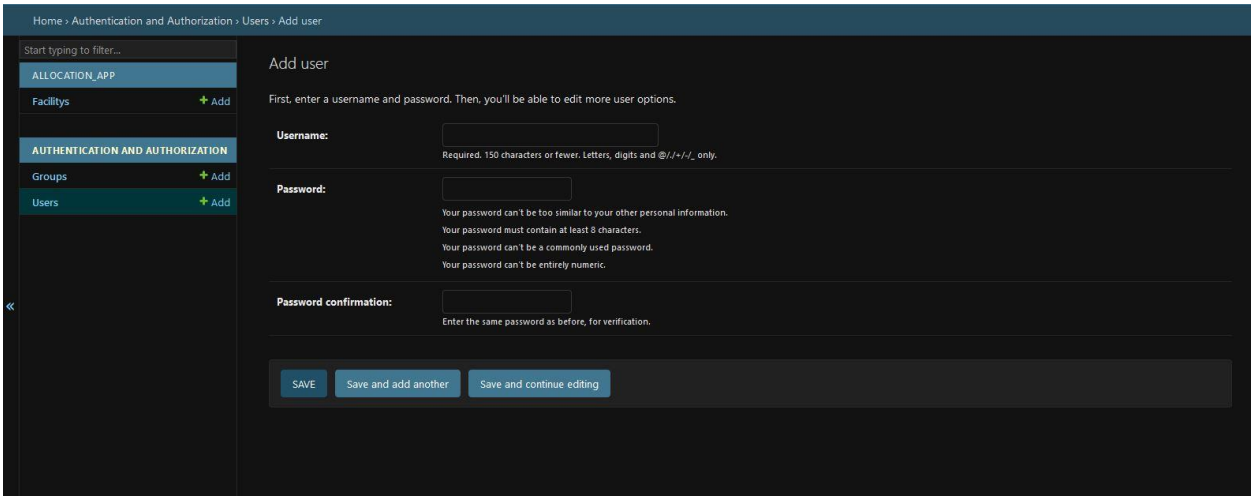

Figure 14 User registration page