ONLINE SCHEDULING APPOINTMENT SYSTEM

A CASE STUDY OF THIKA LEVEL 5 HOSPITAL OUTPATIENT DEPARTMENT

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ADM: BCS-05-0129/2022

A RESEARCH PROPOSAL SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR IN

COMPUTER SCIENCE

NOVEMBER,2025

TABLE OF CONTENTS

[ACKNOWLEDGEMENT 4](#_Toc180696800)

[DECLARATION 5](#_Toc180696801)

[ABSTRACT 6](#_Toc180696802)

[CHAPTER 1: INTRODUCTION 7](#_Toc180696803)

[1.1 Background Information 7](#_Toc180696804)

[1.2 Introduction 7](#_Toc180696805)

[1.3 Statement of the problem 8](#_Toc180696806)

[1.4 Proposed Solution 9](#_Toc180696807)

[1.5 Objectives 9](#_Toc180696808)

[1.5.1 General Objective : 9](#_Toc180696809)

[1.5.2 Specific Objectives : 10](#_Toc180696810)

[1.6 Research Questions 10](#_Toc180696811)

[1.8 Justification 10](#_Toc180696812)

[1.9. Proposed Research and System Methodologies. 11](#_Toc180696813)

[1.10. Scope. 13](#_Toc180696814)

[1.11 Budget 14](#_Toc180696815)

[1.12 Schedule 14](#_Toc180696816)

[1.13 Hardware and Software Requirements 15](#_Toc180696817)

[CHAPTER 2: LITERATURE REVIEW 16](#_Toc180696818)

[2.1 Introduction 16](#_Toc180696819)

[2.2 Theoretical review/Conceptual Framework 16](#_Toc180696820)

[2.3 Empirical Review 17](#_Toc180696821)

[2.4 Global Shift Towards Digital Health Solutions 17](#_Toc180696822)

[2.5 Gaps in Implementation at Thika Level 5 Hospital 18](#_Toc180696823)

[2.6 Conceptual Framework 19](#_Toc180696824)

LIST OF TABLES

[Table 1.1 15](#_Toc180698218)

[Table 2.1 15](#_Toc180698219)

LIST OF FIGURES

[Figure 1.2 22](#_Toc180699297)

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ACKNOWLEDGEMENT

I would like to express my sincere gratitude to everyone who contributed to the successful development of this research proposal. Special thanks to my supervisor Nicholas Muriuki, for their guidance, encouragement, and insightful feedback throughout this process. I am also grateful to my lecturers and colleagues at Zetech University for their support and shared knowledge. Lastly, I am thankful to Mum Ann Wangari for her unwavering support and encouragement throughout my academic journey.

DECLARATION

This research proposal is my original work and has not been presented to

any other institution

…………………. …………………

Signature Date

This research proposal has been submitted for examination with my approval

as college Supervisor

……………… ……………….

Signature Date

ABSTRACT

Healthcare is changing towards a more patient-centered approach. Fundamental to this transformation is how patients play an active role in their care . Medical appointment scheduling acts as the pivot of most non-urgent health care services and it is undergoing major developments to support active involvement of patients. This project focuses on creating a simple and smart online scheduling appointment system for Thika Level 5 that will allow patients to easily schedule doctor appointments. The hospital is currently using a manual system that is time consuming and ineffective resulting to patients opting to get services from other hospitals. By leveraging the internet ,the patients will be able to book for an appointment giving them more flexibility and control over their appointment preferences, improving access and convenience.

CHAPTER 1: INTRODUCTION

1.1 Background Information

Currently, improving effectiveness and efficiency in outpatient services, an important part of health service delivery, has become an essential component of health care reforms. Research on outpatient clinics shows that waiting times are patients’ main dissatisfaction with hospital services (Chen,.et al 2010). Worldwide, the healthcare industry is transforming in an attempt to close the ever changing needs of patients with a major focus on how to improve access to care through technology. Many institutions like National Health Service (NHS), in the UK has implemented online systems that allow patients to book appointments ,communicate with doctors and view medical records from the comfort of their homes. Locally, Kenyan health care systems especially public hospitals like Thika Level 5 Hospital still face a lot of challenges in patient appointment scheduling. Some of the challenges faced include long queues, delayed services, mismanagement of patient records and time wastage. All these leads to overcrowded waiting rooms and patient dissatisfaction and in some reported cases violence arise as patients scramble to get the vital services from the hospital. The lack of automation in these processes creates bottlenecks , which an online scheduling appointment system have the potential to increase access to medical resources while reducing cost, as well as staff and patient dissatisfaction derived from unmet schedule constraints (Akinode & Oloruntoba 2017).

1.2 Introduction

The study in this research area has an aim of creating an online scheduling appointment system for healthcare facilities specifically Thika level 5. In most countries, booking systems have moved into a more urbanized and modernized system that allows patients to register, book appointments for hospital visits and access their medical records literally. This change makes the processes still undertake to be very efficient and aiding the relationship between the hospital and the patient by providing ease and speedy access to hospital services. While this is indeed the ideal situation one would expect, it appears that the majority of Kenyans especially in public hospitals including Thika level 5 hospital which one of the largest referral hospitals in the region, grapples with inefficiencies in managing patient appointments, medical records, and general workflow due to the current manual systems. This proposal therefore seeks to investigate how these inefficiencies can be solved in this level of hospital by means of introducing the online scheduling system.

1.3 Statement of the problem

Efficiency of the outpatient services provided by healthcare facilities has become an integral component in health reforms among developing countries such as Kenya over recent years. The problem of long waiting times in the outpatient department and overcrowding at other places is nothing new, causing a definite discomfort to patients who come for treatment there, hence creating an impression that health facilities are not patient friendly. Together with short consultation times, patients may feel that they are being rushed and not given the attention needed.The needs to meet the demands of these challenges only highlight how appointment scheduling systems is not just important for operational excellence but also a critical element in improving patient satisfaction. With outdated techniques, traditional appointment procedures are proving inefficient to control the time of doctors and eventually increasing Patient waiting hours as well decreasing number of Patients examined in a day leading towards low care standards (Youn, Geismar, & Pinedo, 2022). It is further complicated by the boomed growth of patient populations, which leads to overburdened healthcare providers and inadequate provision of much- needed care.Web based appointment system is a promising solution to relive the listed problems and has certain benefits over queuing system as follows: It also can prevent cross-infection happening during the registration process, improve the speed of patients’ turnover, and reduce specific time periods (Küçük A.,.et al 2021). WAS can also improve the quality of care provided to patients since patients can post medical details before and after consultations. These are, however, issues that many healthcare organizations have not fully implemented in their clinical environments like Thika Level 5 Hospital.. Aging notifications and reminders for the appointments do not offset the said inefficiencies which outweigh the situations that lead to missed appointments and in turn wasted resources.Therefore, the creation of a coherent online scheduling and appointment application for Thika Level 5 Hospital is called for now. This system will also address issues to do with patient registration and appointment to enable enhanced health delivery as well as improved health care satisfaction and consequently improved health.

1.4 Proposed Solution

The purpose of this study is to conceptualize and create a web based appointment system for Thika Level 5 Hospital which will assist in enhancing the registration of patients, scheduling of appointments and keeping medical information. With the system, patients will be able to make appointments online with the added convenience of receiving appointment reminders through SMS. It will, further, enable healthcare employees manage patient records from an integrated interface to eliminate or at least reduce the amount of paperwork and enhance the service delivery efficiency.

Internationally, comparable systems have been executed with a high probability of success thereby making sure that the patient has relatively more control over the process and the operational burden of hospitals is reduced. It would however be worth noting that such a system would help modernize the operations of the Thika Level 5 Hospital thereby optimizing patient outcomes and their service delivery.

1.5 Objectives

1.5.1 General Objective :

To design and implement a web based appointment system for Thika Level 5 Hospital that improves patient registration, scheduling efficiency, and medical record management.

1.5.2 Specific Objectives :

1. To have a convenient web based application for patients and doctors for managing appointments at Thika Level 5 Hospital.

2. To integrate SMS notification capabilities that remind patients of upcoming appointments, thereby reducing no-show rates at Thika Level 5 Hospital.

3. To create a centralized database that enables healthcare staff to efficiently manage patient records and appointment schedules at Thika Level 5 Hospital.

4. To evaluate the impact of the web appointment system on patient wait times and overall satisfaction with healthcare services at Thika Level 5 Hospital.

1.6 Research Questions

1. How will the implementation of the web based appointment system affect patient wait times at Thika Level 5 Hospital?

2. What is the impact of SMS notifications on patient attendance rates for scheduled appointments?

3. How do healthcare staff perceive the effectiveness of the electronic appointment system in managing patient records and appointments?

4. What challenges do patients encounter when using the web appointment system for scheduling their appointments?

1.8 Justification

What makes this research meaningful is that there is a high demand for the improvement of patient care within the outpatient department at Thika Level 5 Hospital. In order to deal with main difficulties that are experienced by both patients and healthcare providers in the setting, this research deals with the development of the web-based appointment system. As regards to the accomplishment of this system, a few benefits are expected to come out:

Improved Access to Care: The advanced web-based appointment system that is proposed will allow patients to book appointments at their own convenience from any place that has internet access, instead of having to line up physically at the hospital's outpatient department. The collaboration is a must-have one in the circumstances of a public hospital where overcrowding could easily create a situation where dissatisfaction is heightened and there is a possibility of conflict between patients.

Enhanced Efficiency in Service Delivery: Instead of going through the manual process of scheduling an appointment with a health worker, a patient can use his web interface to do the same. As a result, patient registration and record management in the outpatient department will be done more rapidly, which implies that health professionals will be more focused on provision of quality care and less occupied with administrative work. This change will probably bring to the overall healthcare delivery system effectiveness.

Increased Patient Satisfaction: With shorter waiting times and alert services such as SMS and email, the web app will ensure the user experience is improved. Satisfied users will naturally tend to maintain good health and be more compliant with their treatment plans as they feel their dignity and respect are nurtured and thus are more satisfied with the healthcare organization.

1.9. Proposed Research and System Methodologies.

The investigation will apply a methodical approach to design and implement a web based appointment scheduling system for the outpatient unit at Thika Level 5. Hospital. The suggested plan will incorporate multiple significant steps, resulting in an all-encompassing and successful outcome.

First, a thorough review of the current patient appointment scheduling processes at Thika Level 5 Hospital will be required. Identifying stakeholders will be necessary, while conducting interviews and surveys with healthcare staff and patients to gather requirements, and understanding current challenges and bottlenecks in the system.

The process of system design will involve gathering requirements and developing a detailed blueprint for the proposed online appointment system. The system's user interface (UI), database schema, and architecture will be allotted to meet the needs of patients and healthcare professionals.

The system's front-end will use Next.js, TypeScript will provide type safety and robustness to the system, while Appwrite will handle backend services such as user authentication and database management. The integration of Twilio with SMS notifications will aid in enhancing patient engagement and communication.

In-depth testing: The system will be tested to ensure its proper functioning.. Unit testing, integration testing and user acceptance testing (UAT) will gather feedback from real users including patients and hospital staff before deployment. What changes are needed to make? and Why?

After undergoing testing, the system will be implemented in the outpatient department. At this stage, healthcare staff will receive training on how to use the new system efficiently and patients can log in to the online appointment bookmaking site.

Review of Performance and Continuous Monitoring: After a system is implemented, users will provide feedback on its performance through continuous evaluation. The system will be able to identify areas that require improvement and ensure it meets its goals of decreasing waiting times, improving patient satisfaction, and utilizing resources more effectively.

The creation of detailed documentation throughout the project will involve gathering information on system requirements, design specifications, user manuals and technical documentation. The system's future updates and maintenance will be facilitated by this.

The methodology employed will be in line with the software development life cycle (SDLC) and aims to ensure that the web-based appointment scheduling system is developed efficiently, systematically, and effectively to address the challenges faced by the outpatient department at Thika Level 5. Hospital.

1.10. Scope.

Only a web-based appointment scheduling system for the outpatient department at Thika Level 5 Hospital will be researched, which is its primary focus. This system will concentrate on the following primary concerns:

New and returning patients can now register and update their personal information online, reducing the need for manual paperwork.

Online appointment scheduling will be the primary feature of the system, enabling patients to schedule appointments with healthcare professionals. Patients will have more options for scheduling appointments, resulting in a decrease in waiting times and fewer queues.

Using the system's SMS notifications through Twilio, patients will receive reminders and confirmations for appointments, which will help to decrease the likelihood of missed appointments and improve communication between the hospital.

Healthcare providers can use the system to securely store crucial medical data and update patient records during consultations. Outpatient services will require only the essential information for detailed medical records, not advanced diagnostics or procedures.

The system will solely concentrate on the outpatient department of Thika Level 5. Hospital. This will not include inpatient services, emergency room scheduling or special treatment areas.

Users, healthcare providers, and administrative staff will have varying levels of user access. The system will allow patients to keep track of their appointments and provide staff with additional features like schedule management and reporting.

Specification: The system will be tailored to Thika Level 5 Hospital. This project is not designed to scale with other hospitals.

The scope clearly defines the functional boundaries of the system, with a focus on managing outpatient appointments and patient registration processes while omitting additional features related to inpatient care, specialized treatments, or integration with external health information systems.

1.11 Budget

|  |  |
| --- | --- |
| Item | Cost (KSH) |
|  |  |
| Development Software | 15,000 |
| Hosting and Domain | 10,000 |
| SMS Gateway (Twilio) | 5,000 |
| Hardware for Testing | 20,000 |
| Miscellaneous (Documentation, etc.) | 5,000 |
| Total Cost | 55,000 |

Table 1.1

1.12 Schedule

|  |  |
| --- | --- |
| Task | Timeline |
|  |  |
| Research and Requirement Analysis | 2 Weeks |
| System Design and Architecture | 3 Weeks |
| Development of Core Features | 5 Weeks |
| Testing and Feedback | 3 Weeks |
| Final Deployment | 2 Weeks |
| Total Time | 15 Weeks |
|  |  |

Table 2.1

1.13 Hardware and Software Requirements

Hardware Requirements:

- Computer with at least Intel Core i5 Processor

- 8GB RAM or more

- Internet access for online hosting and SMS gateway integration

Software Requirements:

- Operating System: Windows 10, macOS, or Linux

- Development Environment: Visual Studio Code (IDE)

- Next.js (Framework), Node.js (Backend)

- Appwrite for database and backend services

- Twilio for SMS notifications

- GitHub for version control and code management

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In the healthcare industry, technology has become an integral part of both global and local life, with innovations driving patient management and appointment scheduling. This chapter reviews the literature on online appointment scheduling systems and outlines its potential for improving outpatient services. Additionally, In this chapter, I will examine the global shift towards digital health solutions and how these innovations have impacted healthcare settings, drawing on existing studies and systems (Vu et al.,2024). The assessment will likewise examine the pros and cons of such systems, as well its potential in filling gaps in their implementation within Kenya's public hospitals, especially at Thika Level 5 Hospital(Thuku,2020).

2.2 Theoretical review/Conceptual Framework

Online scheduling systems in healthcare are part of a broader digital transformation aimed at improving operational efficiency and patient satisfaction. Several theories support the adoption of such technologies, including:

Technology Acceptance Model (TAM)-Developed by Fred Davis, TAM posits that perceived ease of use and perceived usefulness determine users' acceptance of technology. In the context of a web-based appointment system, the easier and more useful the system is, the more likely patients and staff will adopt it (Davis 1989). At Thika Level 5, TAM can help understand the factors driving the acceptance of this system by both healthcare staff and patients.

Diffusion of Innovations (DOI)-This theory, proposed by Everett Rogers, explains how new ideas and technologies spread within a community. According to DOI, early adopters—healthcare providers and patients who recognize the value of online scheduling—will influence others, thus facilitating the system's integration into the hospital (Rogers, Singhal, & Quinlan, 2014). Understanding these adoption patterns is key to successful implementation.

2.3 Empirical Review

Several studies have explored the effectiveness of online scheduling systems across various countries and healthcare settings. Globally, healthcare institutions have embraced web-based appointment systems to improve accessibility, reduce wait times, and enhance service delivery.

International Examples- In the UK, the National Health Service (NHS) has implemented a web-based appointment system that allows patients to schedule appointments, communicate with doctors, and access medical records online. Research by Chen et al. (2010) shows that this system significantly reduced patient wait times and improved overall satisfaction.

Similarly, in Turkey, a study by Küçük et al. (2021) found that online scheduling systems enhanced operational efficiency in hospitals by reducing bottlenecks and improving patient flow. The integration of SMS notifications further increased appointment adherence.

Local Context (Kenya)-Despite the international success, According to Mwihia (2020), Kenya's public hospitals, particularly Thika Level 5, continue to rely on manual appointment systems. Research by Akinode et al. (2017) highlights the inefficiencies of manual scheduling systems, including long queues, delayed services, and mismanagement of patient records. These challenges underscore the need for a digital solution tailored to local healthcare systems.

2.4 Global Shift Towards Digital Health Solutions

Globally, healthcare systems are shifting towards digital health solutions to meet increasing demand and enhance patient-centered care(Oleribe et al.,2019). Countries like the United States and Germany have embraced digital platforms for health management, including telemedicine and online scheduling.

Advantages of Digital Health Solutions

a) Improved Access to Care-Patients can book appointments from the comfort of their homes, which is especially crucial for those with mobility issues or those living in remote areas.

b) Increased Efficiency-Digital solutions reduce the administrative burden on healthcare workers, allowing them to focus more on patient care.

c)Patient Engagement- SMS and email reminders improve patient adherence to scheduled appointments, reducing no-shows and optimizing resource allocation.

In Kenya, public health institutions have yet to fully embrace digital health technologies. The introduction of a web-based scheduling system at Thika Level 5 Hospital would align the hospital with global healthcare trends and significantly improve the quality of care provided to patients (Muriuki, 2020).

2.5 Gaps in Implementation at Thika Level 5 Hospital

Although research supports the benefits of online scheduling systems, challenges remain, particularly in low-resource settings like Kenya. A study by Akinode et al. (2017) emphasizes the lack of infrastructure, digital literacy, and financial resources as major barriers to implementing such systems in public hospitals.

At Thika Level 5 Hospital, the absence of an online scheduling system leads to several issues, including;

a) Long Wait Times-Manual scheduling causes delays, leading to patient dissatisfaction and overcrowding in waiting rooms.

b) Missed Appointments-Without automated reminders, patients are more likely to forget appointments, further straining hospital resources.

c)Inefficient Record Management-The current system relies heavily on paperwork, which is prone to errors and mismanagement.

Addressing these challenges will require not only the introduction of technology but also staff training and patient education to ensure smooth adoption.

2.6 Conceptual Framework

Based on the theoretical and empirical review, the conceptual framework for this study is built on the idea that implementing a web-based appointment system will improve patient care at Thika Level 5 Hospital. Key variables include system usability, patient engagement through SMS notifications, and efficient management of patient records.

Independent Variables-

1.Web-based scheduling system

2.SMS reminders

3.Digital record management

Dependent Variables

1.Patient satisfaction

2.Reduced wait times

3.Improved appointment adherence

Figure 1.2

By enhancing operational efficiency, the online system will provide both patients and healthcare staff with greater control over appointment scheduling, ultimately improving the overall healthcare experience at the hospital.

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