




# kakembo yahaya

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**MAKERERE UNIVERSITY**

**DEVELOPING A HOSPITAL MANAGEMENT SYSTEM FOR KCCA**

**HOSPITAL NAMUWONGO, KAMPALA DISTRICT**

**By**

| <b>Name</b>      | <b>Registration Number</b> | <b>Phone Number</b> |
|------------------|----------------------------|---------------------|
| Yahaya Kakembo   | 23/U/08713/PS              | +256 - 701748606    |
| Edigar Muwangala | 23/U/12367/EVE             | +256-772291879      |
| Doreen Basuuta   | 23/U/07466/EVE             | +256-771156134      |
| Faith Nakato     | 23/U/13547/PS              | +256-708601412      |
| Andrew Ndugga    | 23/U/15786/EVE             | +256-726176154      |
| Asha Mugisha     | 23/U/11590/EVE             | +256-757916198      |

**Supervised by**

Mr. Mukuuma Kassim

Department of Information Systems

**A Project proposal Submitted to the faculty of Computing & Informatics of Makerere**  
**University Business School in partial fulfillment for the Award of the Degree of**  
**Bachelor of Business Computing of Makerere University**

## DECLARATION

We, the undersigned, declare that to the best of our knowledge, this proposal is our original piece work, and has never been published and/or submitted for any award in any other University or Higher Institution of Learning

| Name             | Registration Number | Signature |
|------------------|---------------------|-----------|
| Yahaya Kakembo   | 23/U/08713/PS       |           |
| Edigar Muwangala | 23/U/12367/EVE      |           |
| Doreen Basuuta   | 23/U/07466/EVE      |           |
| Nakato Faith     | 23/U/13547/PS       |           |
| Ndugga Andrew    | 23/U/15786/EVE      |           |
| Mugisha Asha     | 23/U/11590/EVE      |           |

Date: .....

## APPROVAL

This project Proposal has been submitted with my approval as a supervisor and my signature is here appended:

Signed:  Date: 22/11/2025

Mr. Mukuuma Kassim

Makerere University Business School

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## SECTION 1: INTRODUCTION

### 1.1 Project Background

Healthcare services management has become a significant international issue in the 21<sup>st</sup> Century. Hospitals, pharmacies and health centers all over the globe have embraced digital systems to facilitate the medical service delivery processes, dealing with patient records and making their services delivery more efficient. Hospital management systems (HMS) are also becoming an important asset to the current health care institutions, as they offer a centralized platform to manage patient data, medical history and appointments, queue Management and billing. The World Health Organization ((WHO),2021) says that digitization of health systems is the key to universal health coverage and timely access to the correct health information to make better decisions and this contributes to the sustainable goal of Many developed nations have thus moved away with paper-based processes to electronic hospital management systems, which have led to improved patient satisfaction, errors reduced and accountability became better in health facilities. In Uganda the ministry of Health (Ministry of health Uganda,2020) highlighted the need to have a digital health solution as one of the elements within its e-health policy framework. The increasing population and the increasing demand of the healthcare services in cities such as Kampala that is infested with expanding slums have heightened the burden on the social hospitals to provide the quality services at an efficient rate. In spite of this challenge, most health facilities continue to use manual and paper-based systems in registering patients, keeping records and managing queues. The inefficiencies that have resulted due to this are misplaced patient files, repetition of records, late service delivery and inability to produce precise reports. These issues can be seen as the necessity to have computerized systems capable of minimizing the workload of the administration and enhancing the quality of health services with limited resources and increasing numbers of patients. Effective implementation of hospital management systems in Uganda can thus contribute greatly to the enhancement of the healthcare System in the country which is in tandem with the national agenda of enhancing health outcomes through the digital transformation (Uganda National eHealth Policy,2017). KCCA Namuwongo Hospital is situated in Kisugu Parish Namuwongo, Makindye East division, Kampala district, and it is one of the busy publicly owned health facilities that attend to a large number of people in the city. The health center has the mandate of offering primary healthcare services, maternal and child services, treatment of common diseases. Yet, as in most governmental hospitals, it still experiences major problems with the effective management of



the operations. Scheduling of patient appointments and billing is out of order because they are done manually. As more patients are coming to the facility in search of healthcare services, employees have faced the challenge of long waiting lines, time wastage in accessing medical histories as well as data recording mistakes. These unnecessary inefficiencies weaken the patient care and administrative decision-making which demonstrates the weaknesses of the existing management strategy. To overcome these issues, there is immense need to come up with a hospital management system that is designed in respect of the KCCA Namuwongo hospital. This system would provide automation of key processes such as registration of the patient, management of medical records, scheduling of appointments, billing and queuing. The system would enhance better service delivery through a centralized and secure place of operations that would decrease waiting times, reduce errors in the data, and provide better patient experience. In brief, the implementation of a hospital management system will not just resolve the current problems in the running of the KCCA Namuwongo hospital but also play a role in the overall objective of empowering the systems of healthcare in Uganda by digital innovation.

## **1.2 Statement of the Problem**

Hospital management systems not only offer efficiency, speed, and accuracy in managing internal processes but also improve patient record-keeping, streamline the appointment process, and offer secure data storage of medical data and enhance the decision-making process of the administrators (World Health Organization,2012; Ministry of Health Uganda2020). At the moment, KCCA Namuwongo Health center has an almost non-automated paper-based patient Information and hospital management system (Nakiyingi 2021). The physical files have patient records that are handled manually and traditional registers that are used to manage appointments. This brings about several internal management problems, which include, delays in getting patient history, duplication of patient records, loss of data, excessive waiting times of patients and reporting inefficiency. Unless KCCA Hospital Namuwongo changed its course to operate in a fragmented and computerized way, the hospital would still face the risk of delays in service delivery, loss of patient records, inaccurate reporting, and low patient satisfaction. The automated Hospital Management System could offer efficiency, enhanced internal controls, enhanced data accuracy, and helped the facility to achieve its service delivery goals as well as improving patient care and administrative decision-making.

### 1.3 Project Goal

The project aims at coming up with a Hospital Management System which is to simplify the process of registering patients, managing records, scheduling appointments and manage a queue of Patients in KCCA Hospital Namuwongo.

### 1.4 Project Objectives

- a) To examine and investigate the current processes at KCCA Hospital Namuwongo
- b) To determine both functional and non-functional requirements of developing and designing a Hospital Management system.
- c) To develop a prototype Hospital Management System at KCCA hospital Namuwongo.

### 1.5 Project Scope

The scope of this study includes: the design and development of a hospital management system of KCCA Hospital Namuwongo. The project will be implemented during the period of the academic semester and will guarantee the presentation of the operational prototype to resolve the determined segregations in the handling of patient data, reporting, and healthcare service Management

**The most important activities will be:**

**Requirements Gathering.** This will be in terms of gathering the functional and non functional requirements by engaging the stakeholders and the analysis of the existing manual health management processes.

**System Design.** Architecture of systems, data flow diagrams and database schemas to facilitate effective management and reporting of patient records.

**System Development.** The application of the health management system on Laravel, SQL, JavaScript and bootstrap and user-friendly interfaces and secure data management strategies.

**System Testing and Acceptance.** These will involve unit, integration and user acceptance testing to make sure the system is ready to carry out its functions in the desired environment as required.

### 1.6 The project deliverables will consist of:

- A requirements specification document.
- A diagram and architecture system design document.
- An operative digital healthcare system prototype.

- Results of tests and validation report
- A project report of the whole process and result.

### **1.7 Anticipated Significance of the Project**

The proposed Hospital management system at KCCA Hospital Namuwongo is expected to be of great benefit to the organization as well as the stakeholders. The ineffectiveness of the current paper-based and semi-manual operation will be countered by automating the management of patient records and enhancing accuracy of the data and real-time reporting on the health.

**In the case of the Organization (KCCA Hospital Namuwongo), the project will:**

- a) Increase efficiency and accuracy in patient records, appointments and reports management by replacing manual process with secure and automated process.
- b) Enhance service delivery by minimizing the delays in obtaining patient information, improving the number of errors, and making the medical personnel more dependable and swifter in offering healthcare services.
- c) Enhance accountability and transparency by digital record-keeping which minimizes the chances of data loss, duplication, or mismanagement.
- d) Scalability and sustainability: It should be able to offer the modular system to be expanded to other health facilities in the future under KCCA.

**As a project team, the learning outcomes that are expected will be:**

- a. Hands-on experience in requirements gathering, system design and development to the real-life healthcare problems.
- b. Learning to integrate systems using APIs in a real-world environment, which is necessary in contemporary healthcare information system.
- c. Developing the Ability to develop scalable, safe, and user-friendly systems that can be extended to the larger organizational aspect.
- d. Building the Capacity to design scalable, secure, and user-centered systems that can be applied to the broader organizational contexts.

Overall, it can be stated that the project will equip the KCCA Hospital Namuwongo with a credible Hospital management system that will streamline operations besides providing the

project team with advanced technical and professional skills that can be used in the broader ICT and health systems environments.

### 1.8 Project Assumptions

The following are the assumptions made by the project team in order to guarantee the successful development and implementation of the proposed Hospital Management system to KCCA Hospital Namuwongo. **Availability of Resources:** The team believes that the necessary resources such as computers, software development tools, consistent and stable internet connectivity and sufficient hardware facilities will be available and operational all through the project period.

**Stake Holder Participation:** It is presumed that important stakeholders such as the hospital administrators, health care employees and project supervisors would be present to volunteer their input, feedback and authorizations at the right time during the project. The members of the project team will be dedicated and accessible to play their roles and responsibilities.

**Technology Compatibility and Functionality:** the selected technology stack will be compatible with each other and be operable as anticipated. It is also presumed that the current infrastructure of the hospital (computers and network system) will help in the implementation of the proposed system.

**Stability of project scope:** The scope and objectives of the project will be maintained during the whole course of development and there will be no significant changes implemented after the project has been approved initially. The changes that will be done are minor and will be contained within the negotiated timeframe and budget.

**Access to Data and Information:** The project team anticipates that KCCA Hospital Namuwongo would provide access to the required data to enable the project team to gather relevant requirements, test and verify the system, which would include sample patient records, hospital processes, and reporting templates.

**Mentoring and Guidance:** The project team presumes the support of the project supervisor and mentors, who would be involved in regular academic and technical guidance to ensure the completion of the project is a success.

## **SECTION 2: REVIEW OF THE LITERATURE**

### **2.1 INTRODUCTION**

The purpose of this literature review is to establish the theoretical and empirical basis for the design and development of a hospital management system (HMS) for KCCA Namuwongo, Kampala District. It examines recent research and reports from Uganda, focusing on themes aligned with the project's objectives which include: the current hospital management process and challenges; identification of system requirements; design and implementation of digital hospital management systems and evaluation/testing issues. By drawing on up-to-date studies, the review seeks to highlight successful practices, common pitfalls, and aspects that any new system must consider such as usability, stakeholder engagement and sustainability. This Foundation informs the requirements and design decisions for the proposed HMS, ensuring relevance and feasibility in Namuwongo

### **2.2 Current Hospital Management & Digital Health Processes in Uganda**

Uganda has been actively shifting from wholly paper-based hospital workflows toward more integrated Health Information systems (HIS) in response to the persistent problems of lost files, duplicated records and slow reporting. The ministry of health's Health information and Digital Health strategic plan (2020/21-2024/25) sets out the national direction for strengthening infrastructure, data governance and interoperable digital platforms that support clinical and administrative reporting functions. This policy aims to create and enable the adoption of HIS at facility level. Recent ministry reporting shows substantial scale-up of EMR/HIS platforms in referral and general hospitals, adoption of multi-platform approaches e.g., clinic Master designed to work in low-connectivity settings, and deployment of supporting infrastructures such regional servers and solar power backup in higher-volume facilities. These rollouts demonstrate both government commitment and the practical realities facilities face when moving to digital operation.

### **2.3 Hospital Information Systems (HIS) and their Management**

Hospital information systems (HIS) are designed to manage administrative, financial, and clinical information within healthcare facilities. Research shows that HIS adoption significantly improves operational efficiency by integrating patient records, billing, laboratory, and pharmacy functions (Nguyen, Tran, & Pham, 2022). Effective management of HIS requires strong governance, staff training, and sustained investment in infrastructure. Studies from Kenya and Tanzania reveal that hospitals that adopt HIS report reduced patient waiting times,

better coordination of services and improved record retrieval (Mwangi, Otieno, & Kamau, 2021). These findings demonstrate the critical role HIS plays in strengthening hospital service delivery.

## **2.4 Hospital Information Systems in Uganda**

Uganda has made significant strides towards digitization in healthcare. Many regional and general hospitals have introduced HIS to replace manual systems prone to inefficiencies such as lost patient files and reporting delays (Namubiru, Nankunda, & Ssewanyana, 2023). Kampala-based hospitals, including those under KCCA, face challenges such as limited ICT infrastructure, inadequate staff training, and budget constraints. However, pilot projects in urban centers show that HIS adoption improves the timeliness of reporting, reduces duplicate records, and enhances coordination between departments (Mukasa, Katongole, & Muwanguzi, 2024). This underscores the importance of extending well-designed HIS solutions to facilities such as KCCA hospital Namuwongo.

## **2.5 Mobile Health Management Applications and Systems**

The rise of mobile health (mHealth) applications has expanded access to hospital services and improved patient engagement. These systems support functions such as appointment scheduling, medication reminders, and digital access to medical records. A study in Rwanda found that mobile hospital systems enhanced patient satisfaction by providing timely information and reducing administrative bottlenecks (Uwizeyimana, Niyibizi, & Habimana, 2022). In Uganda, mobile-based HIS modules are increasingly being integrated into larger hospital systems to extend functionality and address infrastructural gaps such as limited computer availability. (Atwine & Tumusiime, 2023).

## **2.6 Applications of Hospital Management Systems in Healthcare Facilities**

Applications of HMS range from patient registration and billing to laboratory management and reporting. Recent research shows that integration of HMS leads to better administration in hospitals, pharmacies and improved tracking of laboratory results, and reduced administrative errors (Mensah, Ofori, & Boateng, 2021). In Ugandan hospitals, HMS applications have improved operational efficiency by enabling automatic generation of routine reports for district health offices (Namubiru et al., 2023). These applications not only support service delivery but also strengthen accountability and transparency in hospital operations.

## 2.7 Designing Hospital Management Systems

The design of an effective HMS must be user-centered, modular, and flexible. Studies emphasize the need for participatory design approaches where hospital staff are actively involved in requirements identification to ensure systems align with existing workflows (Nguyen et al.,2022). In low-resource settings, important design features include offline functionality, simple interfaces, and robust data security (Mukasa et al.,2024). Furthermore, integration with national health policies and regulatory frameworks ensures sustainability and scalability of the system.

## 2.8 Implementation of Hospital Management Systems

Implementation of HMS involves pilot testing, staff training, and phased deployment. Research from East Africa indicates that gradual rollouts supported by capacity-building initiatives yield higher adoption rates compared to abrupt, large-scale deployments (Mwangi, Otieno, & Kamau, 2021). Training and mentorship are critical to equip staff with both technical and operational skills required for effective use of HMS. Sustainability also depends on clear institutional ownership and budget allocation for ongoing maintenance.

## 2.9 Importance of Hospital Management Systems

Hospital Management Systems contribute directly to improved patient care, operational efficiency, and accountability. They reduce administrative costs, improve information accuracy, and enable evidence-based decision-making (Mensah et al.,2021). For hospitals in Kampala District, HMS adoption supports decongesting patient queues, improving communication between departments, and enhancing the timeliness of reporting to the ministry of Health (Namubiru et al.,2023).

## 2.10 Challenges in Designing and Implementing Hospital Information Systems

Despite their benefits, HIS face challenges such as inadequate funding, unreliable internet connectivity, and limited ICT literacy among healthcare workers (Atwine & Tumusiime, 2023). Usability concerns where systems do not match actual hospital workflows also lead to low adoption rates. Moreover, sustainability remains a critical issue as many projects rely on donor funding without long-term maintenance strategies (Uwizeyimana et al.,2022).

### 2.10.1 Overcoming the challenges

Literature suggests that overcoming these challenges requires a multifaceted approach: investing in infrastructure, involving end users in design, providing continuous training, and establishing clear governance frameworks (Kiberu, Lwasa, & Nsubuga,2023). Additionally,

phased implementation and strong leadership commitment are essential for ensuring long-term sustainability of HMS in Ugandan Hospitals (Mukasa et al.,2024).

## **2.11 Conclusion**

The literature reviewed highlights the transformative potential of Hospital Management systems in improving service delivery, operational efficiency, and data-driven decision-making in Ugandan Hospitals. Successful design and implementation depend on addressing infrastructural limitations, building user capacity, and aligning with national digital health strategies. For KCCA Namuwongo Hospital, the insights gathered here provide a roadmap for developing an HMS that is sustainable, and capable of addressing existing challenges in hospital management.



## SECTION 3: RESEARCH METHODS

### 3.1 Project methods

In this section, the research design, target population, sampling techniques, project development process, requirements elicitation, project constraints, as well as ethical issues that were considered to build the hospital Management System (HMS) at KCCA Namuwongo will be presented

### 3.2 Research Design / Research Approach

The project will use the Design Science Approach, which focuses on the development and testing of new IT artifacts to address the problems in an organization (Hevner, March, Park, and Ram, 2010). The artifact in this instance is a hospital management System (HMS) to overcome the issue of inefficiency, loss of records, and delays in KCCA Hospital Namuwongo. Sumarsono, Sakkinah, Permanasari, and Pranggono (2023) stress that DSR is a process that starts with problem identification, continues with artifact designing, demonstration, evaluation, and communication. This qualifies it to be used in the development of health information systems, where the solutions should be easy to implement and at the same time practical to the organization.

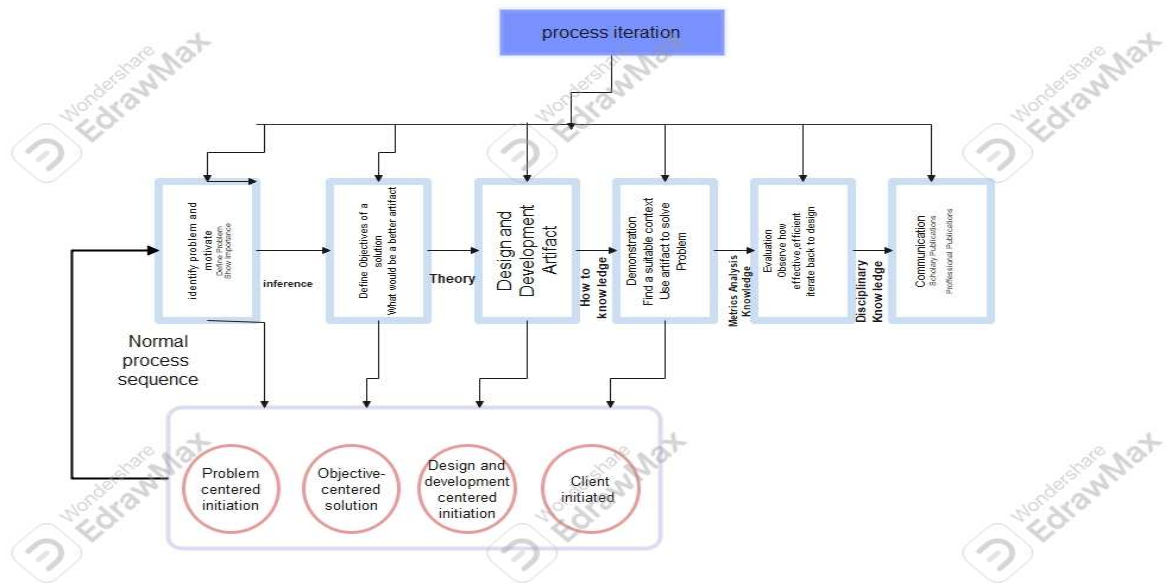
The project team selected DSR as it was selected because:

- It enables a systematic identification of the requirements of the hospital management.
- It focuses on design and development of a working prototype.
- It involves feedback and assessment, which makes the artifact solve actual hospital dilemmas. It is in line with the project goal of enhancing the work of a hospital on the basis of sustainable digital solution.

DSR is a process that consists of six stages (modified after Hevner et al., 2004; Sumarsono et al., 2023):

- Identify problem & motivate
- State solution goals.
- Design & development
- Demonstration
- Evaluation
- Communication

### 3.2.1 Illustration of DSR Process:



**Stage 1: Problem Identification:** This stage will involve the identification and definition of the current issues that KCCA Hospital Namuwongo is experiencing in its management processes. The inefficiencies in the form of misplaced patient records, long queues, no timely reporting of them, and resource management challenges will be understood with the methods like semi-structured interview with the hospital staff, consultations with the administrators, and observing the current working process. Based on this analysis, the research team will support the necessity of the powerful Hospital Management System (HMS) capable of solving these challenges and enhancing service delivery as well as supporting decision-making.

**Stage 2: Take Objectives of a solution:** during this stage, the team will formulate clear objectives that the HMS ought to attain. Such purposes are to analyze the current manual and semi-digital processes of hospital management, specify a need of a digital HMS that will be specific to the Namuwongo hospital setting, formulate and prototype the system, and test it in terms of usability and functionality. The objectives are also focused on the management of patient records leading to improved efficiency in hospital operations, proper reporting and increased staff and patient satisfaction.

Stage 3: Design and Development: At this phase a hospital management system will be created based on the larval, SQL, JavaScript and Bootstrap, emphasizing on patient registration, appointments and reporting.

**Stage 4: Demonstration:** The designed HMS prototype will be tested in the researching hospital setting under a controlled environment in KCCA Namuwongo at this stage. Individual applications will be put to test, including new patient registration, patient history, appointment booking, and report creation. This step will be a demonstration that the offered solution can be applied to overcome the revealed issues and will enable the hospital staff to be engaged with the system to determine its relevance and applicability.

**Stage 5: Evaluation:** The results of the HMS will be compared to the project goals. This will involve usability testing to end-users (hospital personnel), measuring the efficiency gains like less waiting time and quicker retrieval of patient information and checking the accuracy of the data used in reporting. The feedback will be in questionnaires, interviews and direct observation.

**Stage 6: Communication:** The results of the system development and research will then be communicated to the involved parties. It will include a compilation of a project report, presentation of findings to the supervisors and hospital administrators and discussion of lessons learned with other students and academic community. The communication will make sure that the developed HMS will not only help to address the local issues at Namuwongo but also serve as a value addition to the discussions on the digital health systems development in Uganda.

### 3.3 Organization of the project (Client)

The project that is proposed will be carried out on KCCA Hospital Namuwongo in Kampala District. It is a government health hospital that caters to diverse patients in the Namuwongo and environs. It has outpatient and inpatient services and special departments as pediatrics, maternity, general medicine, laboratory and pharmacy.

The owners of the project will be the hospital management team at Kampala capital city authority (KCCA). Actual system users will consist of:

Nurses and doctors (Who will use the system to record, retrieve and update patient information).

Senior personnel (appointments, billing and reporting).

Laboratory technologists and pharmacist.

Patients (indirect beneficiaries of the better service delivery and record-keeping).

Presently, the hospital has an approximate of 1000 patients that it deals with every year and approximately 50 employees who handle them directly on patient care and administration. These stakeholders would be the most important population of the project.

### **3.2 Study population**

The study population for this project will consist of individuals who are directly involved in the day-to-day management and service delivery at KCCA Hospital Namuwongo. This includes hospital administrators, doctors, nurses, pharmacists, laboratory technicians, and records officers, all together they make a total of 50 medical staff. These categories of staff are chosen because they are directly engaged in hospital operations such as patient registration, diagnosis, treatment, billing, and record management. Their input will provide valuable insights into the weaknesses of the current system and the requirements for the proposed Hospital Management System.

### **3.3 Sample size**

The sample size refers to the number of participants selected from the total study population to represent the views of the entire group. Using Krejcie and Morgan's (1970) table for determining sample size, a population of 50 corresponds to sample size of 44 respondents. This number is considered adequate to ensure representativeness and reliability of the collected data, while also remaining manageable for the scope of this research.

### **3.4 Sampling technique**

The study will employ a stratified random sampling technique. This approach is suitable because the hospital staff are divided into different categories (strata) based on their roles and responsibilities such as administrators, doctors, nurses, pharmacists, laboratory technicians, and records officers. Each group will be proportionally represented in the study sample to ensure that all departments involved in hospital management are fairly included.

After dividing the population into strata, a simple random sampling method will be used within each group to select the respondents. This will minimize bias and ensure that every staff member within each category has an equal chance of being chosen.

### 3.5 Sources of Project Data

The project team will gather primary and secondary information to get knowledge of current issues in the management of the hospital at KCCA Hospital Namuwongo. This will be aimed at determining the holes in the existing processes, their underlying causes, and a digital solution, which will enhance efficiency, accuracy, and service delivery. The requirements that will be used in developing the proposed Hospital Management System will be informed by the data collected.

**Primary Data:** This will be acquired directly in the hospital through interviews, observation, and questionnaires to be given to the main stake holders including the Hospital administrator, doctors, nurses, pharmacists, laboratory technicians, and records officers. Moreover, the pertinent hospital records including the registers of patients, appointments and billing reports will be examined. These will give an insight into the inefficiencies of the current system including the slowness of accessing patient records and billing mistakes.

**Secondary Data:** This will be obtained in terms of existing literature, such as, online academic journals, published reports, hospital management case studies, Ministry of Health (MoH) guidelines, and publications of the World Health Organization (WHO). These will assist the research team in being aware of the best practices in the field of hospital management, adoption of technology in the hospital management systems, as well as the lessons learned by other hospitals that have successfully implemented such systems.

### 3.6 Requirements Elicitation (Data Collection) Techniques

The project team will use both the participatory and traditional methods of data collection to define both functional and non-functional requirements of the proposed Hospital Management System. The techniques include:

**Observation:** First hand observation on the current hospital processes (e.g. patient registration, appointment booking, billing, and records retrieval) will be made to identify workflow bottlenecks, duplication of efforts and manual errors.

**Interviews:** The interviews will be organized on a structured and semi-structured level with the Hospital Administrator, doctors, nurses, and the support staff. These will assist in collecting qualitative information on what is challenging in the day-to-day operations, expectations of the new system, and areas of improvement.

**Focus Group Discussions (FGDs):** The representatives of various departments of the hospital (nursing, pharmacy, laboratory, records office) will be organized in group discussions. The sessions will foster teamwork and explain how to address cross-departmental concerns as well as include everyone in the process of gathering requirements.

### Questionnaire

**Participatory Tools:** The visualization and organization of the user needs of various departments will be done through Mind Mapping.

**Problem tree Analysis** will assist in determining the source of the inefficiencies, e.g., the reason why some records are not reported on time or lost.

The combination of these techniques will guarantee the research team that the system requirements are holistic, user-driven, and related to the workflows of the hospital as well as the national health standards.

### 3.7 System Analysis and Design Approaches

The team of the project has selected the method of developing the Hospital Management System (HMS) by Object-Oriented Design (OOD). This method was chosen since it enables the system to be modelled in real-life terms of entities in the real world as patients, doctors, nurses, appointments, and pharmacy items. All these entities will be represented as objects with attributes and behaviours that will enhance the system modularity, reusability and maintainability. Further, the software development life cycle (SDLC) based prototyping technique will be implemented. This is an iterative process whereby the initial versions of the system (prototypes) are developed, shown to the stakeholders at the hospital and improved as per the feedback. This will guarantee that the end system satisfies the expectations of the users and decrease the chances of risk rejection. The Object-Oriented Design and prototyping are appropriate since health management systems need flexibility, scalability, and accuracy. Using modular objects, it is possible to add new features (like a module of insurance) or deepen the connection with the country health databases without the complete redesign of the system.

### 3.8 Design Techniques

The design techniques that will be used to make the implementation systematic are as follows:

**Use Case Diagrams:** To describe system interactions between system actors (Patients, doctors,

nurses, administrators) and system functions (registration, consultation, billing, pharmacy, etc.).

**Class diagrams:** To describe the structure of the system by displaying the classes, their attributes, methods (operations), and relationships (associations, and dependencies) between them.

**Activity diagram:** will provide the flow of actions between each other. Such design methods will help to give a clear picture of the system operation, the requirements of the users are not missed, and this will assist the developers develop a stable HMS.

### 3.9 Anticipated Project Constraints

The project team believes that the following constraints are likely to be observed:

**Restricted Finding Data and Literature.** Intrusion into hospital internal data and confidential patient information could be limited. To deal with this, the team will be relying on academic materials online.

**Resource Limitations.** Insufficiency of sophisticated proprietary software tools may affect the project. To address this, the team will make use of the open-source technologies like MySQL databases, PHP on the back end and Bootstrap on the front end. Technical Skills Gaps. The team might be deficient in terms of sophisticated programming or database optimization. This expectation will be curbed through enrolling in online tutorials and also through working with supervisors in providing technical advice.

**User Resistance to change.** Resistance to change can occur among some of the staff who are used to the manual processes and can be reluctant to change to digital. This will be addressed by the team, which will engage the stakeholders in the requirement elicitation process and the user training and sensitization workshops before the deployment.

### 3.10 Project Development Process

The Hospital Management System creation will be performed according to the Design Science Research (DSR) cycle with the help of the prototyping approach. The stages include: Problem Identification. Creating unproductiveness in hospital processes. Objective Definition. Establishing objectives of the project like the enhancement of patient records and billing. Design and Development. Developing prototypes, database designs and user interface. Demonstration. Reviewing the prototype with hospital employees and modifying according to

the feedback. Evaluation. Measuring the system with regard to usability, reliability and accuracy. Communication. Reporting to stakeholders and writing documentation.

### **3.11 Ethical Considerations**

The system will be ethically observed since the information can be of sensitive health information. The team will: Patient confidentiality should be ensured by making data anonymous with which the system is developed. Use security controls like encryption, access control and login. Get knowledgeable consent of hospital employees and administration prior to interviews or observations. Uphold professional standards by ensuring that one does not plagiarize and acknowledges all the secondary sources of data.

### **3.12 Timeline and Milestones**

The project will be implemented during 12 weeks, and milestones will be as the following:

Week 1-2 problem identification, requirements elicitation, literature review.

Week 3-4: system analysis and design (use cases, ER Diagrams, Wireframes).

Week 5-6: Prototyping (fundamental registration, patient management).

Week 7-8: Database Integration and automation of workflow.

Week 9-10: Pilot project testing and evaluation with hospital personnel.

Week 11: The user training and feedback collection.

Week 12: Final system presentation, report and turn-in



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