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A DIGITAL TRACKING SYSTEM FOR KAMPALA CITY COUNCIL AUTHORITY

BY

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DECLARATION

We, Kajimu William, Tumukunde Winner Faith, Namuwonge Flavia, Kawerere Nicholas John and Nakigudde Ruth, hereby declare that the research project "A Digital tracking system for Kampala City Council Authority" is our own original work, the various sources of which have been listed and acknowledged using references.

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APPROVAL

The project, entitled "A Digital tracking system for Kampala City Council Authority" has been approved by the university supervisor and is being submitted for review.



31st July 2026

……..... …….

MR. CHRISTINE KICONCO
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DEDICATION

We dedicate this work to our parents, who have been our pillars of support and inspiration to work harder in our studies. We also dedicate this work to our EASLIS lecturers, particularly our supervisor, who has constantly guided and accompanied us throughout our project until it is finished. Finally, we dedicate our outputs to our friends, who have generously supported and collaborated with us to complete this on time. May the Almighty God bless you all.

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LIST OF ACRONYMS

AIIM	Association for Intelligent Information Management
ARMA	ARMA International (formerly Association of Records Managers and Administrators)
CSS	Cascading Style Sheets
DFD	Data Flow Diagram
ERD	Entity Relationship Diagram
EASLIS	East African School of Library and Information Science
FRTMS	File Records Tracking Management System
GS1	Global Standards One
HTML	Hypertext Markup Language
ICT	Information and Communication Technology
ISO	International Organization for Standardization
IEC	International Electro technical Commission
JavaScript (JS)	JavaScript (programming language)
KCCA	Kampala Capital City Authority
MySQL	My Structured Query Language
NIST	National Institute of Standards and Technology
OECD	Organization for Economic Co-operation and Development
PHP	Hypertext Preprocessor
RFID	Radio Frequency Identification
SDLC	System Development Life Cycle
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
UN DESA	United Nations Department of Economic and Social Affairs
UN-Habitat	United Nations Human Settlements Programme

ABSTRACT

Effective records management is essential for improving efficiency, accountability, and service delivery in public institutions. However, the Kampala Capital City Authority (KCCA) continues to face challenges associated with manual file-tracking systems, including file misplacement, retrieval delays, poor monitoring of file movement, and reduced accountability. This project therefore aimed to design and develop a barcode-based digital file tracking system to improve the management and monitoring of registry files at KCCA. Specifically, the study examined existing file-tracking practices, identified challenges associated with the current manual system, determined user and system requirements, and developed a digital solution tailored to the registry's operational needs.

The study adopted a mixed-methods research design, employing questionnaires, interviews, observations, and document review to collect data from registry personnel, records officers, administrative staff, and ICT personnel. Quantitative data were analyzed using descriptive statistics, while qualitative data were analyzed thematically.

The findings informed the design and development of a web-based, barcode-enabled file-tracking system using HTML, CSS, JavaScript, PHP, and MySQL. The system incorporates key features such as user authentication, file registration, barcode generation, barcode scanning, real-time file movement tracking, file search and retrieval, reporting, and user management. The proposed system is expected to enhance file visibility, reduce retrieval time, minimize file loss, improve accountability, and strengthen records management practices at KCCA. Furthermore, the project contributes to the adoption of digital technologies in public sector records management. It provides a scalable model that can be implemented in other government institutions facing similar file-tracking challenges. It is recommended that KCCA adopt the system, provide adequate user training, and continuously maintain and upgrade the system to ensure sustainable and efficient registry operations.

Keywords: Digital file tracking system, barcode technology, records management, registry files, Kampala Capital City Authority (KCCA), file retrieval, information systems.

CHAPTER ONE: INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This project addresses the design and development of a digital tracking system intended to improve the management of registry files within the Kampala Capital City Authority (KCCA). The study investigates how the application of information and communication technologies enhances efficiency, transparency, and accountability in records management.

1.2 Background of the Study

Effective records management is critical to organizational performance, especially in public institutions where transparency, accountability, and efficient service delivery are essential. Proper handling of registry files ensures that information is accurately stored, easily retrieved, and properly tracked throughout its lifecycle, supporting informed decision-making and administrative efficiency. Urbanization remains one of the most significant global trends, particularly in developing countries, where cities are experiencing rapid population growth and rising demand for public services (UN-Habitat, 2020). In Uganda, Kampala has witnessed substantial urban expansion driven by population growth, rural-urban migration, and economic development (World Bank, 2021). This growth has increased pressure on public institutions to improve service delivery, administrative efficiency, and information management systems.

The Kampala Capital City Authority (KCCA) is responsible for the planning, administration, and management of Kampala City. To perform its functions effectively, KCCA depends on records and information resources that support decision-making, accountability, and service delivery (OECD, 2019). Registry records are particularly important because they facilitate the creation, storage, circulation, retrieval, and preservation of official information used in the Authority's day-to-day operations. Studies on records management show that many public-sector institutions continue to face challenges in managing and tracking physical records. Ashaba (2019) noted that organizations relying on manual file-tracking methods often experience file misplacement, retrieval delays, weak accountability, and inefficiencies. Obotu (2020) observed that paper-based records systems limit organizations' ability to monitor file movement and maintain accurate transaction records. Kumar et al. (2020) further noted that manual systems are often marked by delays in locating records, duplication of effort, and difficulty determining file location. These

challenges may negatively affect operational efficiency and service delivery, particularly in organizations managing large volumes of records.

Recent advancements in Information and Communication Technology (ICT) have created opportunities for improving records management through digital solutions. Li et al. (2018) noted that digital technologies such as centralized databases, cloud computing, and automated identification systems enhance organizations' ability to manage information efficiently. Digital file tracking systems enable organizations to monitor file movement, maintain accurate transaction records, and provide real-time information on file location and status. Barcode technology has gained prominence in records management. Piloton et al. (2023) noted that barcode systems provide unique identifiers for physical records, allowing organizations to track file movement accurately and efficiently. Barcode-enabled systems reduce manual data-entry errors, improve accountability, and enable faster record retrieval. Kumar et al. (2020) similarly reported that digital tracking technologies improve transparency and operational efficiency by providing reliable information on file movement and utilization.

In Uganda, efforts to modernize records management have increasingly emphasized the adoption of digital technologies. Sentongo and Itraru (2025), in a study conducted at Kawala Hospital, developed a barcode-powered file tracking system to address challenges associated with manual file movement and retrieval. The study found that the system improved file visibility, reduced retrieval time, and enhanced accountability in records management.

Although the study was conducted in a healthcare setting, its findings demonstrate the potential of barcode-based tracking systems in organizations that continue to manage physical records. Despite increasing recognition of digital records management technologies, limited evidence exists regarding the application of barcode-based file-tracking systems in local government registry environments in Uganda. Therefore, it is necessary to explore how these technologies can improve file tracking, accountability, and the efficiency of records management at the Kampala Capital City Authority (KCCA). This study aims to design and develop a barcode-based digital file tracking system for KCCA to enhance the management and monitoring of registry records.

1.3 Statement of the Problem

In institutions that rely on physical records, file tracking remains a significant challenge for ensuring efficient administrative operations, accountability, and timely service delivery. In registry environments managing large volumes of paper-based files, difficulties in monitoring file movement and retrieving documents continue to undermine workflow efficiency and decision-making. Studies have shown that manual systems are often characterized by file misplacement, retrieval delays, difficulty monitoring file movement, weak accountability, and inefficient use of staff time. Kumar et al. (2020) noted that manual tracking systems frequently limit an organization's ability to maintain accurate information regarding file location and circulation. Records management studies also report that paper-based tracking methods make it difficult to establish responsibility for file handling and increase the likelihood of operational inefficiencies.

In Uganda, the adoption of digital file tracking technologies remains relatively limited, particularly within institutions that continue to manage large volumes of physical records. Sentongo and Itraru (2025), in their study conducted at Kawala Hospital, observed that reliance on manual file-tracking methods led to frequent file misplacement, retrieval delays, and inefficiencies in service delivery. The study found that staff spent between five and fifteen minutes searching for individual files, affecting workflow efficiency and accountability. Following the development and implementation of a barcode-powered file-tracking system, average retrieval time was reduced to less than 1 minute, incidents of misplaced files decreased significantly, and user satisfaction improved. These findings demonstrate the potential benefits of barcode-enabled file-tracking systems for organizations that rely heavily on physical records.

Although previous studies have demonstrated the effectiveness of digital file-tracking systems in improving records management, most of the available evidence comes from healthcare institutions, academic environments, and private-sector organizations. Limited attention has been paid to barcode-based file-tracking technologies in local government registry environments in Uganda. Consequently, there is insufficient empirical evidence on how to design and use such systems to improve the management, tracking, and retrieval of administrative records in local government institutions, such as the Kampala Capital City Authority (KCCA). The absence of effective digital file-tracking mechanisms increases the risk of file misplacement, retrieval delays, difficulties in monitoring file movement, and reduced accountability in record handling. These challenges

negatively affect organizational efficiency, administrative coordination, and service delivery. Accordingly, it is necessary to design and develop a barcode-based digital file-tracking system to facilitate real-time monitoring of file movement, improve accountability, enhance retrieval efficiency, and strengthen records management practices at KCCA. This study addresses this need by developing a digital solution tailored to the operational requirements of KCCA's registry environment.

1.4 Aim of the Study

To design and develop a barcode-based digital file tracking system to improve the monitoring and management of registry files at KCCA.

1.4.1 Objectives of the study

1. To examine the existing file tracking practices used in Kampala Capital City Authority (KCCA) registry.
2. To identify the challenges associated with the current file tracking and records management processes at KCCA.
3. To determine the user and system requirements for a barcode-based digital file tracking system.
4. To design and develop a barcode-based digital file tracking system for managing registry records at KCCA.

1.4.2 Research Questions

1. What file tracking systems are currently used in the KCCA registry?
2. What are the limitations of the existing manual tracking systems?
3. How can barcode-enabled digital tracking improve registry efficiency?
4. What features should be included in the proposed system?

1.5 Significance of the Study

This study is anticipated to benefit multiple stakeholders, including the following:

- KCCA: The system will improve file tracking, enhance accountability, and support faster decision-making (Kumar et al., 2020).

- Government: It will promote transparency and efficiency in public administration (OECD, 2019).
- Citizens: Improved registry services will lead to faster response times and better service delivery (World Bank, 2021).
- Researchers: The study will contribute to knowledge in ICT, records management, and digital transformation in public institutions (Obotu, 2020).

1.6 Scope of the Project

The scope of this study is limited to the digital tracking of registry files using barcode technology to improve records management within KCCA (Piloton et al., 2023), focusing on key registry activities such as:

- File registration
- Barcode generation and attachment
- File movement tracking
- File retrieval and reporting

The study was conducted at the Kampala Capital City Authority (KCCA) and is scheduled to take place from April to June 2026.

1.7 Definition of Key Terms

Digital Tracking System

A computer-based system designed to monitor, record, and trace the movement and status of registry files electronically to improve efficiency and accountability.

Registry File

An official file used to store and manage organizational records, correspondence, and documents for reference and administrative purposes.

Barcode

A machine-readable code consisting of bars and spaces that stores information and is used to identify and track registry files uniquely.

Records Management

The systematic control of the creation, receipt, maintenance, use, storage, and disposal of records throughout their life cycle.

File Tracking

The process of monitoring the movement, location, and status of files to ensure they are easily located and protected from loss or unauthorized access.

Kampala Capital City Authority (KCCA)

The government institution responsible for the administration and management of Kampala City, serving as the case study for this research.

File Retrieval

File retrieval is the process of quickly and accurately locating and accessing a specific file from a registry or records management system when needed for reference, decision-making, or administrative purposes.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of the literature on digital file tracking systems, barcode technology, records management, and registry operations (ISO 15489-1:2016; AIIM, 2018). The purpose of the review is to establish the theoretical, conceptual, and empirical foundation upon which the study is based. The chapter examines existing knowledge on the use of digital technologies for tracking physical records, particularly in public-sector organizations. The chapter is organized into the following sections: theoretical framework, conceptual review, empirical review, challenges of digital tracking systems in registries, conceptual framework, research gap, and summary. The literature review helps identify existing knowledge, highlight gaps in prior studies, and justify the need to develop a barcode-based digital file-tracking system for the Kampala Capital City Authority (KCCA) (World Bank, 2021; UN DESA, 2022).

2.2 Theoretical Framework

A theoretical framework provides the foundation upon which a study is built by explaining theories that support the research problem and guide the interpretation of findings (Saunders et al., 2019). This study is informed by the Technology Acceptance Model (TAM), Systems Theory, and the DeLone and McLean Information Systems Success Model (DeLone & McLean, 2016).

2.2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Davis (1989) to explain and predict user acceptance of information technology. The model proposes that users' intentions to adopt a system are influenced primarily by perceived usefulness and perceived ease of use. Perceived usefulness refers to the degree to which an individual believes that using a system will improve job performance. Perceived ease of use refers to the degree to which an individual believes that using the system will require minimal effort. Studies have shown that users are more likely to adopt technologies they perceive as useful, efficient, and easy to operate (Davis, 1989; Venkatesh et al., 2016). In records management environments, employees are more likely to embrace digital tracking systems when they believe that the systems improve file retrieval, reduce workload, and enhance operational efficiency. The proposed barcode-based digital file tracking system is therefore expected to gain acceptance among registry staff if it simplifies file management

processes and improves service delivery. The Technology Acceptance Model is relevant to this study because the success of the proposed system will largely depend on user acceptance and continued use by registry staff at KCCA.

2.2.2 Systems Theory

Systems Theory was developed by Ludwig von Bertalanffy in the 1940s (Tramonti et al., 2019) and views an organization as a collection of interconnected and interdependent components that work together to achieve common objectives. According to the theory, changes in one component of a system affect the performance of other components. Organizations rely on coordinated interactions among departments, personnel, technologies, and processes. Within records management environments, files move between different offices and departments as part of organizational workflows. Effective management therefore requires systems that support coordination and information sharing. The proposed barcode-based digital file-tracking system will serve as an integrated platform that facilitates communication and coordination among registry users. By providing real-time information on file movement and location, the system is expected to improve accountability and operational efficiency within KCCA.

2.2.3 DeLone and McLean Information Systems Success Model

The DeLone and McLean Information Systems Success Model was developed to evaluate the effectiveness of information systems (DeLone & McLean, 2016). The model identifies six dimensions of information system success: system quality, information quality, service quality, system use, user satisfaction, and net benefits. System quality refers to characteristics such as reliability, usability, and performance. Information quality focuses on the accuracy, completeness, and relevance of information generated by the system. User satisfaction and system usage indicate the extent to which users perceive the system as beneficial and continue to use it. The model is relevant to this study because it provides criteria for evaluating the effectiveness of the proposed barcode-based digital file tracking system. It will guide the assessment of system functionality, usability, tracking accuracy, user satisfaction, and overall contribution to the efficiency of records management.

2.3 Conceptual Review

2.3.1 Records Management

Records management refers to the systematic control of records throughout their lifecycle, from creation and receipt to storage, use, retrieval, and disposal (ISO 15489-1:2016; ARMA International, 2017). Effective records management ensures that records remain accessible, reliable, and usable whenever required. Proper records management supports accountability, transparency, decision-making, and service delivery. Public institutions depend on records to document activities, support policy implementation, and maintain institutional memory (International Council on Archives, 2021; World Bank, 2021). Poor records management may result in file loss, retrieval delays, duplication of work, and reduced organizational efficiency.

2.3.2 File Tracking Systems

A file tracking system is a mechanism for monitoring and managing the movement and location of files within an organization. It enables organizations to determine where a file is located, who is responsible for it, and when it was last accessed or transferred. Traditional file tracking systems often rely on manual methods such as registers, movement books, and transit forms (Kumar et al., 2020; Obotu, 2020). However, these methods are prone to human error and may not provide real-time visibility of file movement. Digital file tracking systems address these limitations by automating file monitoring and maintaining accurate movement records.

2.3.3 Barcode Technology in File Tracking

Barcode technology is an automatic identification technology used to assign unique identifiers to physical items (GS1, 2020; ISO/IEC 15416:2016). In records management, barcode labels can be attached to files and scanned whenever files are issued, transferred, received, or returned. Barcode systems improve tracking accuracy, reduce manual data entry errors, and enhance accountability by maintaining an audit trail of file movements (Kumar et al., 2020; AIIM, 2018). Compared with advanced technologies such as RFID, barcode technology is relatively affordable and easier to implement, making it suitable for public-sector organizations operating under budget constraints.

2.3.4 Digital File Tracking Systems

Digital file tracking systems are computerized solutions for monitoring, managing, and recording the movement of files within organizations (World Bank, 2021; UN DESA, 2022). These systems typically combine databases, user interfaces, identification technologies, and reporting tools to provide real-time information about file status and location. Digital tracking systems improve file accessibility, support faster retrieval, strengthen accountability, and reduce file loss. They also facilitate reporting and analysis, enabling management to make informed decisions regarding records management practices.

2.3.5 Registry Operations

A registry is responsible for receiving, creating, storing, tracking, and retrieving organizational records (International Council on Archives, 2021). Registry operations include file registration, classification, circulation, storage, retrieval, and disposal. Efficient registry operations are essential for ensuring timely access to information and supporting organizational effectiveness. Weak file-tracking mechanisms may undermine administrative efficiency and service delivery.

2.4 Empirical Review

Several studies have examined the role of digital technologies in improving records management and file tracking. Sentongo and Itraru (2025) developed a barcode-powered file tracking system for Kawala Hospital to address challenges associated with manual file management. Using a mixed-methods approach involving interviews, surveys, observations, and scan logs, the study found that the system significantly improved file visibility, reduced retrieval time to less than 1 minute, reduced misplaced-file incidents, and increased user satisfaction. The study demonstrated the practicality of barcode-based tracking systems in organizations managing physical records. Other studies have similarly reported that digital tracking systems improve records management efficiency, reduce file loss, and strengthen accountability (Kumar et al., 2020; World Bank, 2021). Automated tracking systems provide accurate information regarding file movement and facilitate timely retrieval of records. Research further indicates that barcode technology improves tracking accuracy by enabling unique identification of files and maintaining detailed movement histories. Organizations implementing barcode-based systems have reported improvements in operational efficiency, transparency, and service delivery (GS1, 2020; AIIM, 2018). Despite these findings,

much of the available literature focuses on healthcare institutions, educational organizations, and private sector environments. Limited research has examined the use of barcode-based file-tracking systems in local government registry settings in Uganda (UN DESA, 2022).

2.5 Challenges of Digital Tracking Systems in Registries

High Implementation Costs: The acquisition of barcode scanners, barcode printers, software, hardware infrastructure, and maintenance services may require substantial financial investment. Public institutions often face budget limitations that may affect technology adoption (World Bank, 2021; OECD, 2019).

Resistance to Change: Employees accustomed to manual systems may resist the introduction of digital technologies due to fear of change, inadequate training, or concerns regarding increased accountability (Davis, 1989; Venkatesh et al., 2016).

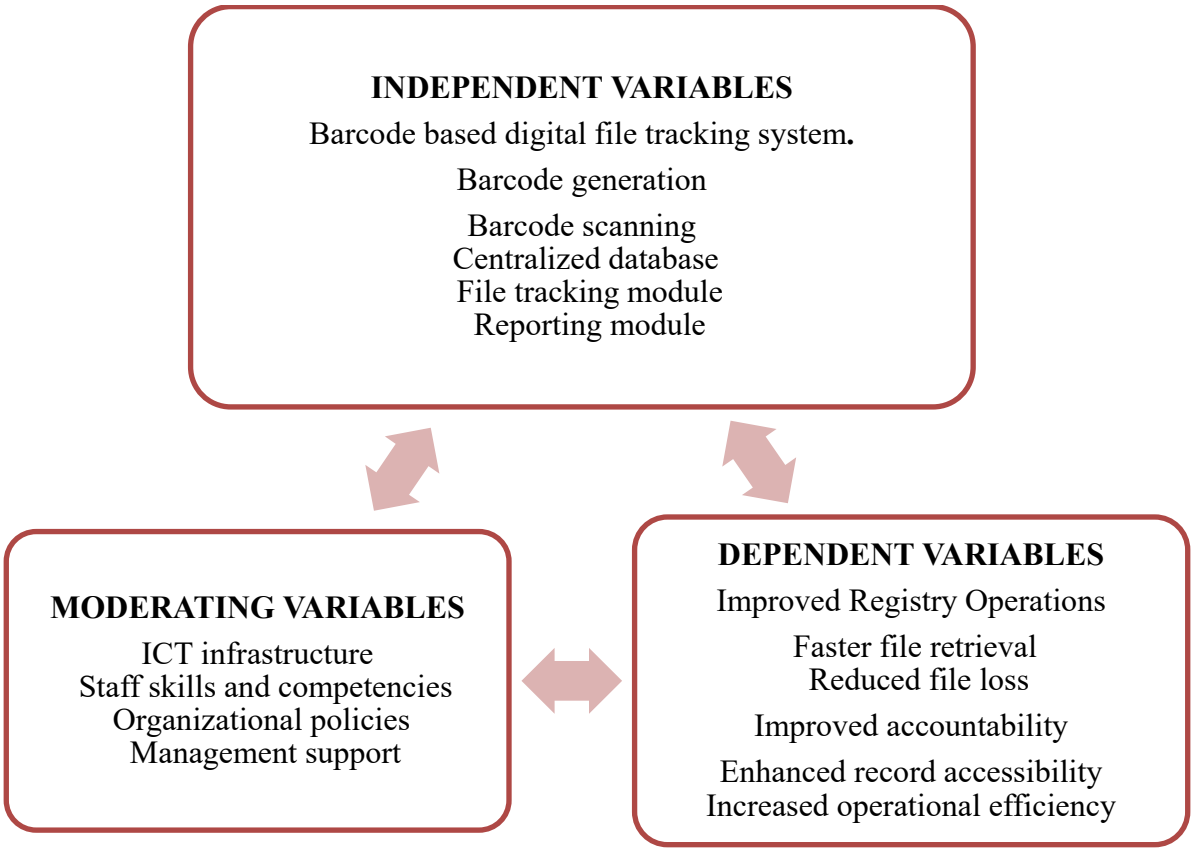
Technical Challenges: Technical challenges such as unreliable internet connectivity, system failures, power interruptions, and inadequate ICT infrastructure may affect system performance and reliability (World Bank, 2021).

Data Security and Privacy Concerns: Digital tracking systems often manage sensitive organizational information. Consequently, measures such as authentication, access controls, encryption, and data backup mechanisms are necessary to protect information from unauthorized access (ISO/IEC 27001:2022; NIST, 2020).

2.6 Conceptual Framework

The study is guided by a conceptual framework consisting of independent, dependent, and moderating variables.

Figure 2.6: Conceptual Framework for the Study



The framework assumes that implementing a barcode-based digital file-tracking system will improve registry operations, provided that the necessary supporting conditions are in place.

2.7 Research Gap

Previous studies have demonstrated the effectiveness of digital file tracking systems in improving records management efficiency, reducing file loss, and enhancing accountability. Sentongo and Itraru (2025) demonstrated the benefits of a barcode-powered file-tracking system in a healthcare environment. Similarly, studies conducted in educational and private sector settings have reported positive outcomes associated with digital tracking technologies. However, limited research has examined the design and development of barcode-based file-tracking systems in local government registry environments in Uganda (UN DESA, 2022; World Bank, 2021). Most existing studies have focused on healthcare institutions and organizations whose operational contexts differ significantly from those of local government authorities. Consequently, there is insufficient evidence on how barcode-enabled digital tracking systems can be designed and used to improve registry operations at the Kampala Capital City Authority (KCCA). This study seeks to address

this gap by designing and developing a barcode-based digital file-tracking system tailored to KCCA's records management needs.

2.8 Summary of Literature Review

This chapter has presented a review of literature on records management, file tracking systems, barcode technology, digital tracking systems, registry operations, and system requirements for information systems development. The review was guided by the Technology Acceptance Model, Systems Theory, and the DeLone and McLean Information Systems Success Model. The literature indicates that digital tracking systems improve accountability, file visibility, retrieval efficiency, and overall records management effectiveness (AIIM, 2018; World Bank, 2021). However, challenges such as implementation costs, technical infrastructure limitations, user acceptance, data security, and system usability requirements remain significant considerations (OECD, 2019; ISO 15489-1:2016). In addition, studies on information systems development emphasize the importance of clearly defining system requirements, including functional, non-functional, user, and technical requirements, to ensure system effectiveness, usability, and sustainability. These requirements guide system design and ensure that solutions align with user needs and organizational processes. The review further identified a gap in the application of barcode-based digital file-tracking systems within local government registry environments in Uganda, particularly the limited emphasis on context-specific system requirements. This gap justifies the need for the present study, which seeks to design and develop a barcode-based digital file-tracking system for KCCA, grounded in clearly defined user and system requirements.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the methodology for a study focused on the design and development of a barcode-based digital file tracking system for the Kampala Capital City Authority (KCCA) (Saunders et al., 2019; ISO 15489-1:2016). The chapter describes the research design, study area, target population, sampling procedures, data collection methods and instruments, data analysis techniques, project development approach, validity and reliability procedures, ethical considerations, and anticipated study limitations. The methodology provides a systematic framework for data collection and analysis to achieve the study objectives (Pressman & Maxim, 2020). Furthermore, it outlines the procedures for designing, developing, testing, and evaluating the proposed barcode-enabled digital file tracking system.

3.2 Research Design

A mixed-methods research design, integrating both qualitative and quantitative approaches, was employed in this study (Creswell & Creswell, 2018; Saunders et al., 2019). This design enabled the collection of comprehensive data on existing file-tracking practices, operational challenges, and user requirements for the proposed system. The quantitative component gathered measurable data on file-tracking efficiency, file-retrieval processes, user experiences, and perceptions of the proposed digital system, primarily through structured questionnaires. The qualitative component provided in-depth insights into current registry operations, challenges associated with manual file tracking, and expectations for the proposed system, utilizing interviews, observations, and document reviews. The combination of these methods facilitated triangulation of findings and contributed to a thorough understanding of the research problem (World Bank, 2021).

3.3 Study Area

The study was conducted at the Kampala Capital City Authority (KCCA), which oversees the administration and management of Kampala City. The research focused on the registry department and other units responsible for the creation, movement, storage, retrieval, and management of official records. KCCA was selected as the study area due to its management of a substantial volume of administrative records and its dependence on effective records management practices to support decision-making and service delivery. The registry department coordinates file

movement across departments, making it an appropriate setting for examining file tracking challenges and developing a digital tracking solution (UN DESA, 2022; World Bank, 2021).

3.4 Target Population

The target population comprised individuals directly involved in records management, file movement, and information management activities at KCCA. These individuals possessed relevant knowledge and experience regarding current registry operations and were able to provide information essential for system development. The target population included registry officers, records assistants, administrative officers, departmental records personnel, ICT staff, and registry supervisors. These respondents were expected to offer insights into existing file-tracking procedures, operational challenges, system requirements, and expectations for the proposed barcode-based digital file-tracking system.

3.5 Sample Size and Sampling Techniques

A purposive and stratified sampling design was adopted to ensure adequate representation of respondents involved in records management and file usage at KCCA. This approach targeted individuals with direct experience in file tracking processes and captured perspectives from both records handlers and users (Saunders et al., 2019). The study population was divided into two primary categories: records management staff and record users from various KCCA departments. Records management staff included registry officers, records assistants, and administrative personnel responsible for file creation, storage, tracking, and retrieval. Record users comprised officers from departments such as finance, planning, engineering, human resources, and legal services, who frequently requested records for decision-making and operational activities. Approximately thirty respondents were selected, distributed as follows: record users (departmental staff): approximately 18 respondents. A higher proportion of record users was included because they represent the largest group interacting with the file-tracking system and are the primary beneficiaries of improved file accessibility and retrieval efficiency. Purposive sampling identified respondents directly involved in records handling, while stratified sampling ensured representation across departments and roles. This approach enhanced the data by capturing both technical and user experience perspectives necessary for designing a barcode-based digital file-tracking system. Both purposive and simple random sampling techniques were used to select respondents from

KCCA. This mixed approach facilitated the collection of expert insights and representative views from system users (Creswell & Creswell, 2018).

Purposive sampling identified key informants with specialized knowledge and direct involvement in records management and ICT systems. This group included registry supervisors, records managers, administrative officers, and ICT personnel responsible for registry operations and system support. Their in-depth understanding of file tracking, system requirements, and operational challenges was essential for identifying gaps and providing recommendations for the proposed barcode-based file-tracking system.

Simple random sampling was applied to select registry staff and records assistants within the registry department. This group consisted of operational staff responsible for daily filing, file movement, and retrieval. Each eligible staff member had an equal opportunity to participate, ensuring fairness and minimizing selection bias. The combination of purposive and simple random sampling enabled the study to capture both expert-driven insights from key informants and general operational experiences from frontline records staff, thereby enhancing the validity and reliability of the findings.

3.6 Data Collection Methods

The study employed multiple data collection methods to obtain comprehensive and reliable information on existing file-tracking practices, challenges, and system requirements at KCCA. These methods were designed to capture both qualitative and quantitative data from different categories of respondents involved in records management and file usage. The use of multiple methods enabled triangulation of data, thereby improving the credibility and validity of the findings (Yin, 2018; Saunders et al., 2019). The data collection methods used in this study included questionnaires, interviews, observation, and document review. Each method was applied to gather the specific information necessary to understand the current file-tracking system and to identify requirements for the proposed barcode-based digital file-tracking system. These methods are described in detail in the subsequent sections.

3.6.1 Questionnaires

Structured questionnaires were administered to registry staff, records assistants, and administrative personnel involved in file management activities. The questionnaires contained both closed-ended and open-ended questions to collect information on current file-tracking procedures, challenges in managing files, user satisfaction with existing practices, and expectations for the proposed barcode-based digital tracking system. Questionnaires were considered appropriate because they enabled the collection of data from a relatively large number of respondents within a short period of time. They also provided standardized responses that facilitated quantitative analysis and comparison of findings (Oates, 2019).

3.6.2 Interviews

Semi-structured interviews were conducted with registry supervisors, departmental administrators, and ICT personnel. The interviews provided an opportunity to obtain detailed information on registry operations, records management practices, file-tracking challenges, and the technical requirements for the proposed system. The interview method was suitable because it allowed respondents to provide in-depth explanations and clarifications that may not have been captured through questionnaires. The flexibility of semi-structured interviews enabled the researcher to explore emerging issues relevant to the study (Kvale & Brinkmann, 2015; Yin, 2018).

3.6.3 Observation

Direct observation was used to examine how files were created, registered, transferred, stored, retrieved, and monitored within the registry. The researcher observed daily registry activities and documented existing workflows, file-movement procedures, and challenges encountered in file handling. Observation was important because it enabled the researcher to collect first-hand information regarding actual practices rather than relying solely on respondents' opinions and perceptions (Oates, 2019). It also helped identify operational inefficiencies that may have required automation.

3.6.4 Document Review

The researcher reviewed relevant organizational documents, including registry manuals, file movement registers, records management policies, standard operating procedures, and other

records management-related documents. Document review provided additional information regarding existing file management practices and organizational requirements. It also helped verify information obtained through interviews, questionnaires, and observations.

3.7 Data Collection Instruments

The study used various instruments to collect relevant and reliable data.

3.7.1 Questionnaire

A structured questionnaire was developed and administered to selected respondents. The questionnaire included sections on demographic information, existing file-tracking practices, challenges in file management, user requirements, and perceptions of the proposed digital tracking system. A questionnaire is indicated in Appendix A.

3.7.2 Interview Guide

A semi-structured interview guide was prepared to facilitate interviews with registry supervisors, administrative officers, and ICT personnel. The guide included key questions on records management processes, operational challenges, system requirements, and recommendations to improve file tracking. An interview guide is indicated in Appendix B.

3.7.3 Observation Checklist

An observation checklist was developed to guide the observation process. The checklist focused on file registration procedures, file movement processes, retrieval practices, storage methods, and existing tracking mechanisms within the registry. An observation checklist is indicated in Appendix C.

3.7.4 Document Review Checklist

A document review checklist was used to identify and analyze relevant documents related to records management and file tracking. The checklist ensured consistency in the review process and facilitated systematic collection of information from organizational records. A document review checklist is indicated in Appendix D.

3.8 Data Analysis Methods

The collected data were analyzed using both quantitative and qualitative techniques in accordance with the study's mixed-methods research design.

3.8.1 Quantitative Data Analysis

Quantitative data obtained from questionnaires were coded, entered, and analyzed using Microsoft Excel and Statistical Package for Social Sciences (SPSS), where applicable. Descriptive statistical techniques such as frequencies, percentages, tables, charts, and graphs were used to summarize and present the findings. The analysis focused on identifying common patterns in file-tracking practices, user-experienced challenges, and requirements for the proposed digital tracking system.

3.8.2 Qualitative Data Analysis

Qualitative data obtained from interviews, observations, and document reviews were analyzed using thematic analysis. The responses were carefully reviewed, categorized, and organized into meaningful themes and sub-themes. The analysis focused on themes including existing file-tracking procedures, file-retrieval challenges, records-management practices, user expectations, accountability issues, and system requirements. The findings were presented narratively and supported with relevant quotations where appropriate.

3.9 Project Design Approach

The study adopted the System Development Life Cycle (SDLC) as the guiding framework for the design, development, implementation, and evaluation of the proposed barcode-based digital file tracking system (Pressman & Maxim, 2020; Sommerville, 2016). The SDLC provided a structured and systematic approach to information system development by dividing the project into distinct phases. This approach was suitable because it ensured that user requirements were properly identified, analyzed, translated into system specifications, and incorporated into the final system. The SDLC model consisted of seven phases, namely planning, system analysis, system design, system development, system testing, implementation, and maintenance.

3.9.1 Planning Phase

The planning phase involved identifying and defining the problem that necessitated the development of the proposed system. During this phase, preliminary investigations were conducted to understand KCCA's current file-tracking practices and determine the need for a digital solution. The objectives, scope, and expected outcomes of the project were clearly defined. Resources required for the project, including hardware, software, personnel, and time requirements, were also identified. Additionally, data collection activities such as interviews, questionnaires, observations, and document reviews were planned to gather user requirements. The planning phase was important because it established the foundation for all subsequent phases of system development.

3.9.2 System Analysis Phase

The system analysis phase focused on examining the existing file-tracking and records-management practices within the KCCA registry. The purpose of this phase was to identify weaknesses, inefficiencies, and challenges in the current system. Information collected through questionnaires, interviews, observations, and document reviews was analyzed to determine user needs and system requirements. Particular attention was given to challenges such as file misplacement, retrieval delays, inadequate monitoring of file movement, and difficulties in establishing accountability for file handling. The analysis phase documented both functional and non-functional requirements for the proposed system. Functional requirements described what the system should do, while non-functional requirements specified performance, security, reliability, and usability.

3.9.3 System Design Phase

The system design phase involved translating user requirements into a detailed blueprint for system development. The architecture of the proposed barcode-based digital file tracking system was designed to ensure that all identified requirements were adequately addressed. During this phase, various design tools and techniques were used, including Data Flow Diagrams (DFDs), Entity-Relationship Diagrams (ERDs), system flowcharts, use case diagrams, and database schemas. These tools provided a graphical representation of system processes, data flows, user interactions, and database structures. The barcode component of the system was also designed during this phase.

Unique barcode identifiers were generated for individual files to facilitate file registration, tracking, and monitoring throughout their lifecycle. The design also specified how barcode scanning updated file movement records and provided real-time information on file location. User interface designs were developed to ensure that the system was user-friendly, efficient, and easy to navigate.

3.9.4 System Development Phase

The development phase entailed constructing the proposed system according to the specifications established during the design phase. Appropriate web-based technologies were utilized. The front-end interface was created using HTML, CSS, and JavaScript to ensure an interactive and user-friendly environment. Back-end functionality was implemented in PHP, and MySQL was employed for database management and storage of file-tracking information. The following key functionalities were developed:

1. User authentication and access control
2. File registration and barcode generation
3. Barcode scanning and file movement tracking
4. Real-time file location updates
5. File search and retrieval functions
6. Reporting and analytics features
7. User management and administration functions

This phase emphasized the integration of all system components to support efficient file tracking and records management.

3.9.5 System Testing Phase

Following development, the system underwent rigorous testing to verify compliance with specified requirements. Testing aimed to identify and correct errors, defects, and performance issues prior to deployment. Multiple forms of testing were conducted, including unit, integration, system, and user acceptance testing. Particular emphasis was placed on evaluating:

1. Accuracy of barcode generation
2. Accuracy of barcode scanning
3. File tracking functionality

4. Database performance
5. System security
6. User interface usability
7. Report generation capabilities

The testing process ensured that the system was reliable, efficient, and capable of meeting user expectations.

3.9.6 Implementation Phase

During the implementation phase, the completed system was deployed within the KCCA registry environment. The system was installed and configured to support operational registry activities. Registry personnel and authorized users received training in system use, including file registration procedures, barcode scanning, file tracking, report generation, and system administration. User manuals and system documentation were prepared to facilitate effective system utilization. Feedback collected during implementation informed necessary adjustments and improvements.

3.9.7 Maintenance Phase

The maintenance phase began after system implementation and involved monitoring system performance to ensure continued effective operation. Maintenance activities encompassed correcting software errors, updating system features, enhancing security mechanisms, improving performance, and responding to user feedback. Periodic reviews ensured that the system continued to meet organizational requirements and adapted to evolving records management practices. The maintenance phase was essential for ensuring the long-term sustainability, reliability, and effectiveness of the barcode-based digital file tracking system (Somerville, 2016).

3.10 Validity and Reliability

Validity and reliability are critical for ensuring the quality and credibility of research findings.

3.10.1 Validity

Validity refers to the extent to which a research instrument accurately measured its intended construct. To ensure validity, data-collection instruments were developed based on the study objectives, research questions, and relevant literature on records management and digital file-

tracking systems. These instruments, including questionnaires, interview guides, observation checklists, and document review checklists, underwent expert review by supervisors and professionals in Information Systems, Records Management, and Information Science. Recommendations from these experts informed improvements in clarity, relevance, and comprehensiveness prior to data collection. Additionally, a pilot study was conducted with a small group of respondents possessing characteristics similar to the target population. Feedback from the pilot study was used to revise ambiguous questions and enhance instrument effectiveness.

3.10.2 Reliability

Reliability refers to the consistency and dependability of research instruments in producing similar results under comparable conditions. To ensure reliability, a pilot test of the questionnaires and interview guides was conducted prior to the main study. The pilot exercise identified inconsistencies, ambiguities, and weaknesses within the instruments, and necessary revisions were made to improve consistency and accuracy. Standardized procedures were followed during data collection to ensure uniform instructions and information collection for all respondents. Consistent administration of research instruments enhanced the reliability of the findings.

3.11 Ethical Considerations

The study adhered to established ethical principles throughout the research process. Ethical considerations were essential for protecting the rights, privacy, dignity, and welfare of research participants. Prior to data collection, permission to conduct the study was obtained from the relevant authorities at Kampala Capital City Authority (KCCA) and Makerere University. Participants were informed of the study's purpose and their role in the research process. Informed consent was obtained from all participants prior to data collection. Participants were assured that participation was voluntary and that they could withdraw from the study at any stage without negative consequences. Confidentiality was maintained by using information obtained from respondents strictly for academic purposes. Personal identifiers, such as names and contact information, were not disclosed in the final report without participants' consent. Anonymity was ensured where necessary by presenting findings in aggregate form. Data collected during the study was stored securely and accessed only by authorized research personnel. Proper citation and referencing of all sources were observed to avoid plagiarism and maintain academic integrity.

3.12 Limitations of the Study

Several limitations may affect the research process.

Limited time was available for data collection and system development. Since the study was conducted within a specified academic period, time constraints affected the depth of data collection and system testing. To address this challenge, the researcher developed a detailed work plan and adhered strictly to the project schedule.

Another limitation was restricted access to certain organizational records and information due to confidentiality policies within KCCA. Some documents and operational procedures were not accessible. This challenge was minimized by obtaining necessary permissions and collaborating with authorized personnel.

Reluctance among some respondents to provide information arose due to concerns about privacy, confidentiality, or workload. To mitigate this challenge, participants were assured of confidentiality and informed that the information collected would be used solely for academic purposes.

Technical challenges, such as limited access to ICT infrastructure, software tools, or testing environments, also affected system development and evaluation. Alternative resources were sought and open-source technologies were employed where possible to reduce the impact of these challenges.

Despite these limitations, appropriate measures were implemented to ensure that the study achieves its objectives and produces reliable, useful findings.

CHAPTER FOUR:DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents, analyzes, and interprets the findings regarding the **design and development of a barcode-based digital file-tracking system for Kampala Capital City Authority (KCCA)**. The research examined existing file-tracking practices, identified challenges associated with the current system, and established requirements for the proposed barcode-based digital file-tracking system. A mixed-methods approach was employed in this study. Quantitative data were collected through structured questionnaires administered to respondents involved in records management and file use. Qualitative data were gathered through interviews, observation, and document review. Quantitative data analysis utilized frequencies and percentages, whereas qualitative data were analyzed thematically.

4.1.1 Response rate

The study targeted approximately 30 respondents, comprising registry and records management staff as well as record users from selected KCCA departments.

Table 1: Response Rate

Category	targeted	responded	Response rate
Registry/Records Management Staff	12	12	100.0%
Record Users from Departments	18	17	94.4%
Total	30	29	96.7%

Field data 2026

A response rate of 96.7% was achieved, with 29 out of 30 targeted respondents participating. This response rate was deemed sufficient, as the participants were directly involved in file management, movement, retrieval, or records use within their departments. The high response rate ensured adequate data for analyzing the existing file-tracking system and identifying requirements for the proposed barcode-based digital file-tracking system.

4.1.2 Distribution of Respondents by Department or Work Category

Records management personnel and users of records from selected KCCA departments were included in the study.

Table 2: Distribution of Respondents According to Department or Work Category

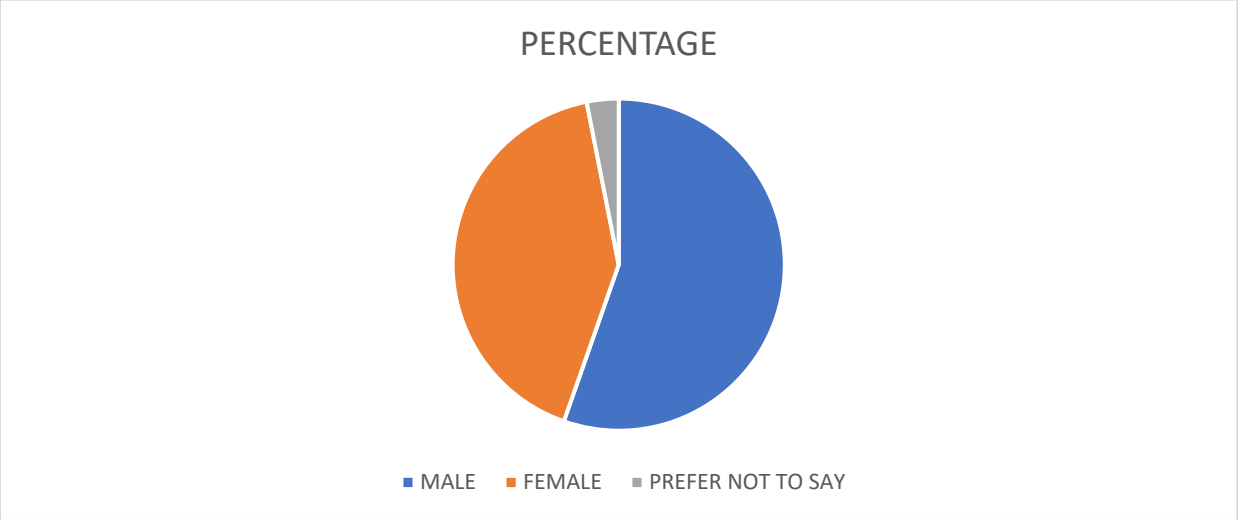
Department/Work Category	Frequency	Percentage
Registry/Records Management	12	41.4%
Finance	4	13.8%
Planning	4	13.8%
Engineering	3	10.3%
Human Resources	3	10.3%
Legal Services	3	10.3%
Total	29	100%

Source: Field data

Registry and records management personnel constituted the largest proportion of respondents, representing 41.4% of the total. This representation was appropriate, *as* registry staff are directly involved in the creation, registration, movement, storage, tracking, and retrieval of files. The remaining respondents were record users from the Finance, Planning, Engineering, Human Resources, and Legal Services departments. Including these participants allowed the study to capture the experiences of staff who regularly request and use files from the registry.

4.1.3 Gender of Respondents

Figure 1: A pie chart illustrating distribution of respondents by gender.



Source: Field data 2026

The data presented indicate that 16 respondents (55.2%) were male, 12 respondents (41.4%) were female, and one respondent (3.4%) preferred not to disclose their gender. This distribution demonstrates representation of both male and female participants in the study.

4.1.4 Age Group of Respondents

Table 3: A Table Showing the Age Distribution of the Respondents

Age Group	Frequency	Percentage
20–29 years	6	20.7%
30–39 years	11	37.9%
40–49 years	8	27.6%
50 years and above	4	13.8%
Total	29	100%

Source: Field data 2026

The largest proportion of respondents was aged between 30 and 39 years (37.9%), followed by those aged 40–49 years (27.6%). This age distribution suggests that participants possessed diverse

levels of work experience and exposure to records management practices (Richard & Moses, 2026).

4.1.5 Position of Respondents

Table 4: A Table Showing the Distribution of Respondents According to Their Position at KCCA

Position	Frequency	Percentage
Registry Officer	7	24.1%
Records Assistant	5	17.2%
Administrative Officer	7	24.1%
ICT Staff	3	10.3%
Supervisor	7	24.1%
Total	29	100%

Source: Field data 2026

Respondents held positions in records management, administration, supervision, and ICT. This diversity enabled the study to gather information from both operational staff and individuals with supervisory or technical expertise relevant to the proposed system.

4.1.6 Length of Service at KCCA

Table 5: Distribution of Respondents According to Their Length of Service at KCCA

Length of Service	Frequency	Percentage
Less than 1 year	3	10.3%
1–5 years	10	34.5%
6–10 years	9	31.0%
More than 10 years	7	24.1%
Total	29	100%

Source: Field data 2026

The findings indicate that most respondents had worked at KCCA for more than one year, suggesting that the majority had substantial exposure to the organization's file management and tracking practices (Raquepo et al., 2026, pp. 1256-1269).

4.2 Types of Files Commonly Tracked

Data from respondents, interviews, and observations indicated that multiple categories of official files are regularly created, transferred, stored, and retrieved within the organization.

Table 6: A Table Showing the Categories of Files Commonly Tracked at KCCA

File Category	Frequency	Percentage
Administrative files	22	75.9%
Human resource/personnel files	20	69.0%
Financial files	19	65.5%
Procurement files	18	62.1%
Legal files	16	55.2%
Planning and development files	15	51.7%
Engineering/project files	14	48.3%

Source: Field data 2026: Note: Respondents could identify more than one category; therefore, percentages do not add up to 100%.

The findings indicate that KCCA handles several categories of official files requiring regular movement and monitoring. Administrative files were the most commonly identified category, followed by human resource, financial, procurement, legal, planning, and engineering-related files. The movement of these files between the registry and user departments creates a need for an effective system capable of recording file movement and identifying the current location of a file (Nakibondwe et al., 2021).

4.3 Examination of the Existing File-Tracking System at KCCA

Respondents provided information regarding the methods currently employed to track files.

Table 7: A Table Showing the Current Methods Used for Tracking Files at KCCA

File-Tracking Method	Frequency	Percentage
Manual registers	22	75.9%
Movement books	19	65.5%
File transit forms	15	51.7%
Electronic records/system	7	24.1%
Other methods	3	10.3%

Field data 2026: Note: Respondents could select more than one method.

The findings indicate that the current file-tracking process relies primarily on manual methods. Manual registers were most frequently reported, followed by movement books and file transit forms. While a minority of respondents reported using electronic systems, the findings suggest that electronic file tracking is not the primary method for monitoring physical file movement. Reliance on manual tracking presents challenges in obtaining real-time information about file location and movement (Rogers & Patrick, 2025).

4.3.1Frequency of Use of the Current File-Tracking System

Table 8: Frequency of Use

Frequency of Use	Frequency	Percentage
Daily	20	69.0%
Weekly	6	20.7%
Monthly	2	6.9%
Rarely	1	3.4%
Total	29	100%

Source: Field data 2026

The majority of respondents, 20 (69.0%), reported daily use of the file-tracking system. This finding demonstrates that file-tracking activities constitute a significant component of daily operations at KCCA. The frequent use of the current system underscores the need to improve its

efficiency, especially since manual processes can result in delays and inaccurate information (Ssentongo & Itraru, 2025).

4.3.2 Ease of Locating Files Using the Current System

Table 9: Respondents' Opinions on Difficulties in Locating Files using the current system at KCCA

Response	Frequency	Percentage
Very Easy	1	3.4%
Easy	5	17.2%
Neutral	5	17.2%
Difficult	13	44.8%
Very Difficult	5	17.2%
Total	29	100%

Source: Field data 2026

The findings indicate that 18 respondents (62.0%) considered locating files to be difficult or very difficult, while only six respondents found it easy or very easy. These results suggest that the current file-tracking system does not consistently provide an efficient means of locating files. The proposed barcode-based system could address this challenge by offering a searchable record of file movement and location (Rogers & Patrick, 2025).

4.3.3 Time Taken to Retrieve Files

Table 10: Average File-Retrieval Time

Retrieval Time	Frequency	Percentage
Less than 1 minute	2	6.9%
1–5 minutes	7	24.1%
6–10 minutes	10	34.5%
More than 10 minutes	10	34.5%
Total	**29**	**100%**

Source: Field data 2026

The findings indicate that 20 respondents (69.0%) reported that retrieving a file typically requires between six and more than ten minutes. This suggests that file retrieval can consume considerable

staff time, especially when the precise location of a file is unknown. (Fitchett & Cockburn, 2014, pp. 1-19) Implementing a digital tracking system may address this issue by enabling authorized users to search for both the movement history and the current recorded location of a file. This finding highlights inefficiencies in the current file management process, where significant staff hours are lost due to time-consuming manual searches. The data implies that without an effective system, there is a risk of further productivity losses and potential delays in service delivery. Introducing a digital tracking system could streamline retrieval, reduce wasted effort, and improve overall operational efficiency.

4.3.4 Experience with Misplaced or Missing Files

Table 11: Experience with Misplaced or Missing Files

Response	Frequency	Percentage
Yes	25	86.2%
No	4	13.8%
Total	29	100%

Source: Field data 2026

A majority of respondents, 25 (86.2%), reported experiencing a misplaced or missing file. This finding demonstrates that file misplacement constitutes a significant problem within the current file-tracking environment.

Table 12: Frequency of File Misplacement

Frequency	Frequency	Percentage
Very frequently	4	13.8%
Frequently	10	34.5%
Sometimes	11	37.9%
Rarely	4	13.8%
Total	29	100%

Source: Field data 2026

Fourteen respondents (48.3%) reported that file misplacement occurred frequently or very frequently, while an additional 37.9% stated that it occurred occasionally. The high percentage of staff who have encountered misplaced or missing files points to systemic weaknesses in the management and tracking of records. Such frequent misplacement can lead to loss of critical information, hinder workflow, and erode user confidence in the system (Fitchett & Cockburn, 2014, pp. 1-19). The frequency with which files are misplaced underscores a persistent challenge in maintaining record order. Frequent misplacement disrupts daily operations, increases frustration among staff, and can compromise service quality. (Staats et al., 2026) This pattern signals an urgent need for stronger controls, such as regular audits and automated tracking, to mitigate the recurrence of these issues. These findings highlight the necessity for enhanced monitoring of file movement and increased accountability within the file management system.

4.4 Challenges Associated with the Current File-Tracking System: Views from Questionnaire and Interviews

The study identified multiple challenges associated with the current file-tracking system at KCCA. Respondent feedback highlighted the following key issues:

4.4.1 Theme 1: Dependence on Manual File-Tracking Procedures and Associated Inefficiencies

Interviews revealed that the heavy reliance on manual processes perpetuates the aforementioned issues. Manual registers and movement books lack real-time or easily accessible information, resulting in a slow and error-prone system. Staff acknowledged this limitation and identified it as a primary contributor to file-tracking challenges. File movement is predominantly monitored through manual procedures, such as registers, movement books, and file transit documentation. The use of manual records hinders the ability to obtain immediate information regarding the current location of a file.

4.4.2 Theme 2: Delays in File Retrieval

A significant challenge identified was the excessive time required to retrieve files. Twenty-two respondents agreed or strongly agreed that file retrieval is time-consuming, while only four disagreed and three remained neutral. These findings indicate that the current file-tracking process does not facilitate rapid file location. When a file's location is unclear, staff must search manual

registers, consult various departments, or physically track the file, resulting in delays to administrative activities and decision-making. The prevalence of retrieval delays underscores systemic inefficiencies, as manual consultation of registers or departments wastes staff time and slows administrative processes. Such delays can impede timely decision-making and negatively affect service delivery to clients and stakeholders. This issue is systemic, stemming from inadequate real-time tracking and reliance on physical file movement.

Interviewees corroborated survey findings that delays in file retrieval frequently occur, particularly when files are not returned promptly or when their movement is not clearly documented. The alignment between interview and questionnaire data underscores the systemic nature of these delays. Both sources indicated that incomplete documentation and late returns require staff to conduct time-consuming searches, which impedes workflow and reduces efficiency. Delays may necessitate contacting multiple offices or physically searching for files when movement records do not clearly indicate a file's current location.

4.4.3 Theme 3: Limited Accountability for File Movement

The findings also highlighted concerns about accountability. Twenty respondents agreed or strongly agreed that the current system lacks adequate accountability. Inconsistent recording of file movement makes it difficult to determine who received a file, when it was received, and whether it was returned. This challenge complicates monitoring the responsibility of individuals and departments handling official records. Limited accountability increases the risk of files being lost or mishandled and may foster a culture of carelessness regarding official records, further exacerbating file management challenges.

Interviews further emphasized that poor or inconsistent recording of file movements hinders the assignment of responsibility for files. Respondents suggested that implementing a digital tracking system, which automatically logs the user or department receiving or returning a file, could strengthen accountability.

4.4.4 Theme 4: Frequent Misplacement of Files

The findings indicated that file misplacement is a significant challenge. Twenty-two respondents agreed or strongly agreed that files are frequently misplaced, while four disagreed and three were neutral. Misplaced files are difficult to locate, especially when their movement has not been properly recorded. This results in delays, unnecessary duplication of files, and additional time spent searching for records. Frequent misplacement highlights deficiencies in current tracking mechanisms and underscores the need for more robust procedures, potentially including a shift to digital tracking.

4.4.5 Theme 5: Difficulty Determining the Current Location or Holder of a File

The findings showed that 20 respondents agreed or strongly agreed that it is difficult to know who currently has a particular file. This indicates a weakness in monitoring file movement. The findings showed that 20 respondents agreed or strongly agreed that it is difficult to determine who currently possesses a particular file, indicating a weakness in monitoring file movement. When files are transferred from the registry to departments or individuals, the current tracking process often fails to provide immediate and accurate location information. This lack of clarity complicates the assignment of responsibility and the recovery of unreturned files. The inability to precisely identify file holders reflects a lack of accountability and transparency, which can result in files being retained by individuals or departments and create bottlenecks in organizational workflows. Incomplete entries, illegible handwriting, incorrect file numbers, failure to record file movement, or inaccurate dates. Such errors can compromise the reliability of tracking information and make it difficult to determine the actual movement history of a file. Manual systems are inherently prone to human error, including incomplete or incorrect entries, illegible handwriting, and failure to record file movements. These errors undermine the reliability of the file-tracking process and make it hard to reconstruct the movement history of files when needed. Over time, this can lead to distrust in the system and increased workload as staff are forced to double-check or re-create records.

4.4.6 Theme 6: Effects of File-Tracking Problems on Service Delivery

The findings further indicated that 21 respondents agreed or strongly agreed that the current file-tracking system negatively affects service delivery. Delays in retrieving files slow administrative

processes, particularly when records are needed for decision-making, responding to requests, processing transactions, or fulfilling official responsibilities. These challenges demonstrate that file tracking directly influences organizational efficiency and service quality. Inefficient file tracking leads to slower administrative responses, which can frustrate both staff and external stakeholders, highlighting its central role in organizational effectiveness and public service delivery.

4.4.7 Theme 7: Need for Improved Search and Monitoring

Interview participants emphasized the need for a system that enables authorized users to search for files and view their movement histories. Stakeholders expressed a clear preference for efficient searching and monitoring capabilities, which would facilitate faster retrieval and improved oversight, thereby reducing file loss and misplacement.

4.4.8 Theme 8: Need for User-Friendly Technology

Interviews indicated that any proposed system should be simple to use and supported by adequate training. Participants emphasized that an intuitive, user-friendly digital solution is more likely to be adopted and used correctly, thereby ensuring improvements in tracking and accountability.

4.5 Findings from Observation and Document Review

4.5.1 Findings from Observation

Observation focused on file registration, movement, storage, retrieval, and tracking procedures. The observation revealed that:

1. Files are registered before being issued to users.
2. File movement information is recorded manually.
3. Staff may need to consult movement records when locating a file.
4. Locating a file may require physical or telephone follow-up.
5. The current process does not provide an immediate automated notification when a file is overdue.
6. The process depends significantly on the accuracy and completeness of manual records.

These observations indicate that the current system contains opportunities for automation.

4.5.2 Findings from Document Review

The document review focused on relevant records management documents, including file movement registers, registry procedures, records management guidelines, and related documentation. The review indicated that existing documentation provides a basis for recording and controlling file movement. However, the process remains heavily dependent on manual recording. The documents reviewed also demonstrated the importance of maintaining information about:

- File identification
- File movement
- The department receiving a file
- The responsible user
- Date of issue
- Date of return

These information requirements are important in designing the proposed digital file-tracking system.

The combined findings from both observation and document review highlight several critical shortcomings in the current system. Manual processes dominate file registration, movement tracking, and records management, leading to inefficiencies and increased risk of errors or misplacement (Boyd et al., 2025). The lack of automated notifications for overdue files and reliance on physical follow-ups further hamper timely file retrieval and accountability. Documentation does provide a foundation for managing information, but its effectiveness is limited by the absence of digital tools. These insights underscore the need for a more automated, integrated digital system, which could significantly enhance accuracy, efficiency, and overall file management within the organization.

4.6 Requirements for the Proposed Barcode-Based Digital File-Tracking System

Respondents were asked about features they considered important in the proposed system. Findings revealed the following desired features for a new system.

Table 13: Desired System Features

System Feature	Frequency	Percentage
Barcode identification of files	27	93.1%
Search for files by file number	26	89.7%
Recording file movement	26	89.7%
Recording current file location	25	86.2%
User login and authentication	24	82.8%
Movement history	24	82.8%
Overdue-file notifications	22	75.9%
Reports and monitoring	21	72.4%
Audit trail	20	69.0%

These findings highlight the need for a holistic and robust file-tracking solution that goes beyond basic digitization. By highlighting the importance of features such as barcode identification, file searching, movement recording, and real-time location monitoring, respondents emphasize the value of a system that enhances operational transparency and accountability. Implementing these functionalities will not only streamline file management processes but also address key challenges associated with manual tracking, such as misplaced or lost files. Ultimately, the evidence points to the necessity of designing a comprehensive system that ensures efficient file handling, accurate record-keeping, and improved organizational oversight.

4.7 Considerations for Implementing the Proposed System

Although the proposed barcode-based digital file-tracking system could improve file retrieval, monitoring, and accountability, its successful implementation would depend on several important factors. The findings identified the following barriers and considerations:

4.7.1 Staff Training and Technical Skills

Staff would require training on how to use the proposed system. This would include registering files, assigning and scanning barcodes, and recording file movements, searching for files, updating file locations, and generating reports.

Adequate training would reduce user errors and enable staff to confidently use the system. Continuous technical support may also be necessary whenever users experience difficulties.

4.7.2 User Acceptance and Resistance to Change

The success of the proposed system would depend on the willingness of staff to adopt the new digital tracking procedures. Since some employees may be accustomed to manual registers and movement books, they may initially experience difficulties adapting to the new system. Staff should therefore be informed about the benefits of the system, such as faster file retrieval, reduced file misplacement, and improved accountability. Involving users during the implementation process could also encourage acceptance.

4.7.3 ICT Infrastructure

The proposed system would require appropriate ICT infrastructure, including computers, barcode scanners, barcode labels, and a reliable network environment. Inadequate equipment or frequent network interruptions could affect the performance of the system. Therefore, the existing ICT infrastructure should be assessed before implementation to ensure that the necessary resources are available.

4.7.4 Data Security and Access Control

Since the system would contain information about files and their movement, appropriate security measures would be necessary. The system should use authorized user accounts, passwords, and access controls to prevent unauthorized individuals from accessing or modifying information. An audit trail should also be maintained to record important activities performed within the system.

4.7.5 System Maintenance and Technical Support

The proposed system would require regular maintenance and technical support to remain functional. Technical problems, software errors, hardware failures, and system updates may occur after implementation. Therefore, appropriate technical support should be available to resolve problems and ensure that the system continues to operate effectively.

4.7.6 Financial Requirements

The implementation of the proposed system would require financial resources for software development, computers, barcode scanners, barcode labels, staff training, maintenance, and technical support. Adequate financial planning would therefore be necessary to ensure that the system can be implemented and sustained over time. Where possible, existing organizational resources should be utilized to reduce unnecessary costs.

4.7.7 Accuracy and Consistency of Data Entry

The effectiveness of the system would depend on the accuracy of the information entered by users. If a file is moved without the movement being recorded, the system may display an incorrect location. Users would therefore need to consistently record file movements and follow established procedures whenever files are issued, transferred, or returned.

4.7.8 Sustainability of the System

The system would need continued organizational support after implementation. This would include regular maintenance, technical support, replacement of damaged equipment, availability of barcode labels, and occasional user training. Management support would also be important in ensuring that the system continues to be used and improved as the organization's needs change.

4.8 Perceived Benefits of the Proposed System

Table 14: Expected Benefits of the Proposed System

Expected Benefit	Frequency	Percentage
Faster file retrieval	27	93.1%
Reduced file misplacement	26	89.7%
Improved accountability	25	86.2%
Better monitoring of file movement	25	86.2%
Improved service delivery	24	82.8%
Reduced time spent searching for files	24	82.8%
Improved records security	22	75.9%

This expectation reflects a recognition of the limitations of current manual or paper-based systems, where delays in retrieving files and the risk of misplacement are common. Respondents view the

proposed system as a transformative tool that will introduce greater efficiency by enabling quicker access to files and minimizing errors associated with human handling. Moreover, by strengthening accountability and allowing for detailed monitoring of file movement, the system is anticipated to reduce instances of lost or untraceable files and provide a clear audit trail. These improvements are likely to foster a culture of responsibility and transparency within the organization, ultimately contributing to more reliable and secure records management.

CHAPTER FIVE: SYSTEM DESIGN, IMPLEMENTATION AND TESTING

5.1 Introduction

This chapter presents the design, implementation and testing of the Digital File Tracking System developed for Kampala City Council Authority (KCCA). It describes the overall system architecture, database design and the technologies used during system development. The chapter further explains the implementation of the system modules, including user authentication, file registration, barcode generation, file borrowing and returning, file movement tracking, archive management and audit logging. Finally, the chapter presents the system testing procedures undertaken to verify that the system met the functional requirements and operated as intended.

5.2 System Design

System design is the process of defining the architecture, components, database structure and interfaces of an information system before implementation. It provides a blueprint that guides the development process and ensures that all system requirements are adequately addressed. The Digital File Tracking System was designed using a modular approach, where each functional component performs a specific task while interacting with other modules through a centralized relational database. This approach improves maintainability, scalability and efficient management of organizational records.

5.2.1 System Architecture

The Digital File Tracking System adopts a three-tier architecture consisting of the presentation layer, application layer and database layer.

The presentation layer provides the user interface through which registry staff and system administrators interact with the system using a web browser. This layer enables users to log into the system, register files, search for records, borrow and return files, generate reports and manage archived records.

The application layer contains the business logic implemented using PHP. It processes user requests, validates input, generates unique barcodes for registered files, updates file statuses,

records borrowing transactions, logs file movements and manages user authentication and authorization. This layer acts as an intermediary between the user interface and the database.

The database layer is implemented using MySQL and stores all information relating to users, files, borrowing transactions, tracking logs, archived files and audit logs. The relational database ensures data integrity by maintaining relationships among the different tables through primary and foreign keys. It also supports efficient retrieval, updating and reporting of file information.

The interaction between these three layers enables users to perform file management activities efficiently while ensuring that every file movement is accurately recorded and can be traced throughout its lifecycle within the organization.

5.2.2 Database Design

The Digital File Tracking System uses a relational database implemented in MySQL to store, organize and manage information relating to files, users and file movement activities. The database was designed to ensure data integrity, minimize redundancy and facilitate efficient retrieval and updating of records. It consists of six interrelated tables, namely users, files, borrow records, tracking logs, archives, and audit logs. The relationships among these tables enable the system to maintain complete and accurate information regarding file registration, movement, borrowing, archiving and user activities.

Users Table

The users table stores information about all authorized users of the system. It supports user authentication and role-based access control by maintaining details such as the user's full name, username, encrypted password, assigned role and account creation date. Each user is uniquely identified by the user id, which serves as the primary key. This table ensures that only authenticated users can access the system and perform authorized operations.

Files Table

The files table serves as the central repository of the Digital File Tracking System. It stores essential information about every registered file, including the file number, file name, barcode,

department, description, status and date of registration. The file_id uniquely identifies each record and acts as the primary key. Since all file-related transactions reference this table, it forms the core of the database structure. The inclusion of a barcode field enables quick identification and tracking of physical records within the organization.

Borrow Records Table

The borrow records table stores all borrowing and returning transactions performed within the system. Each transaction is uniquely identified by the borrow id, while the file id serves as a foreign key referencing the corresponding record in the **files** table. The table records the borrower's name, department, borrowing date, expected return date, actual return date and the current borrowing status. This structure enables the system to monitor borrowed files, identify overdue records and maintain an accurate borrowing history.

Tracking Logs Table

The tracking logs table records every movement and activity associated with a file throughout its lifecycle. Each tracking event is uniquely identified by the tracking id, while the file id links each activity to the corresponding file in the files table. The table captures the type of action performed, the sender, receiver, current location, remarks and the exact date and time when the activity occurred. This table forms the backbone of the Digital File Tracking System because it provides a complete audit trail of every file movement. It enables registry staff to determine where a file is located, who last handled it, when it was transferred and the sequence of actions performed on it. Consequently, the table enhances accountability, transparency and efficient retrieval of records.

Archives Table

The archives table stores information about files that have been transferred from active use to archival storage. Each archived record is identified by the archive id, while the file id links the archived record to the corresponding file in the files table. Additional information stored includes the archive date, archive location and the user responsible for archiving the file. This table enables long-term preservation of inactive records while maintaining their accessibility whenever required.

Audit Logs Table

The audit logs table records user activities performed within the system for accountability and security purposes. Each log entry is uniquely identified by the audit id, while the user id references the corresponding user in the users table. The table stores the username, action performed, additional details, IP address and the date and time when the activity occurred.

The audit log provides a historical record of user actions such as logging into the system, registering files, borrowing files and performing administrative tasks. This feature improves system security by enabling administrators to monitor system usage, investigate unauthorized activities and maintain accountability among users.

Overall, the relational database design ensures efficient management of records by maintaining logical relationships between tables through primary and foreign keys. The design minimizes data redundancy, improves data consistency and supports accurate tracking of files throughout their lifecycle within Kampala Capital City Authority.

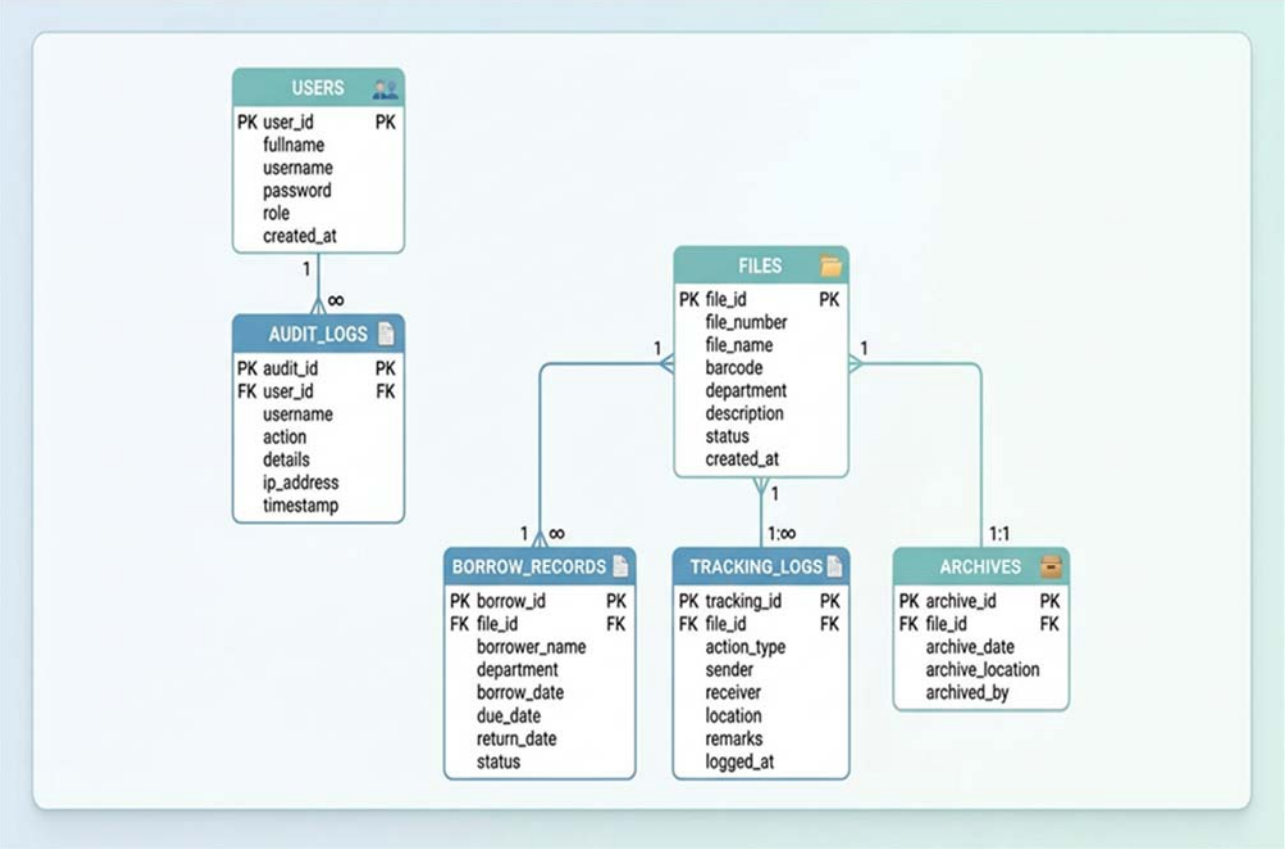
5.2.3 Entity Relationship Diagram (ERD)

An Entity Relationship Diagram (ERD) was developed to illustrate the logical structure of the database and the relationships among the entities in the Digital File Tracking System. The ERD demonstrates how data is stored and shared between different modules of the system while maintaining data integrity through primary and foreign keys.

The database consists of six entities: Users, Files, Borrow Records, Tracking Logs, Archives, and Audit Logs. The Files entity serves as the central entity because most system transactions are performed on registered files. The Borrow Records, Tracking Logs, and Archives tables reference the Files table through the file id foreign key, while the Audit Logs table references the Users table through the user id foreign key. The relationships between the entities are summarized as follows:

- One user can generate many audit log records (One-to-Many).
- One file can have many borrowing records (One-to-Many).
- One file can have many tracking log records (One-to-Many).
- One file can have one archive record when it is transferred to archival storage (One-to-One or One-to-Many depending on organizational policy).

The simplified Entity Relationship Diagram is illustrated below.



The ERD illustrates that the Files table acts as the central repository of the database, with other operational tables referencing it to support borrowing, movement tracking and archiving of records. Similarly, the Users table is linked to the Audit Logs table to ensure accountability by recording user activities performed within the system.

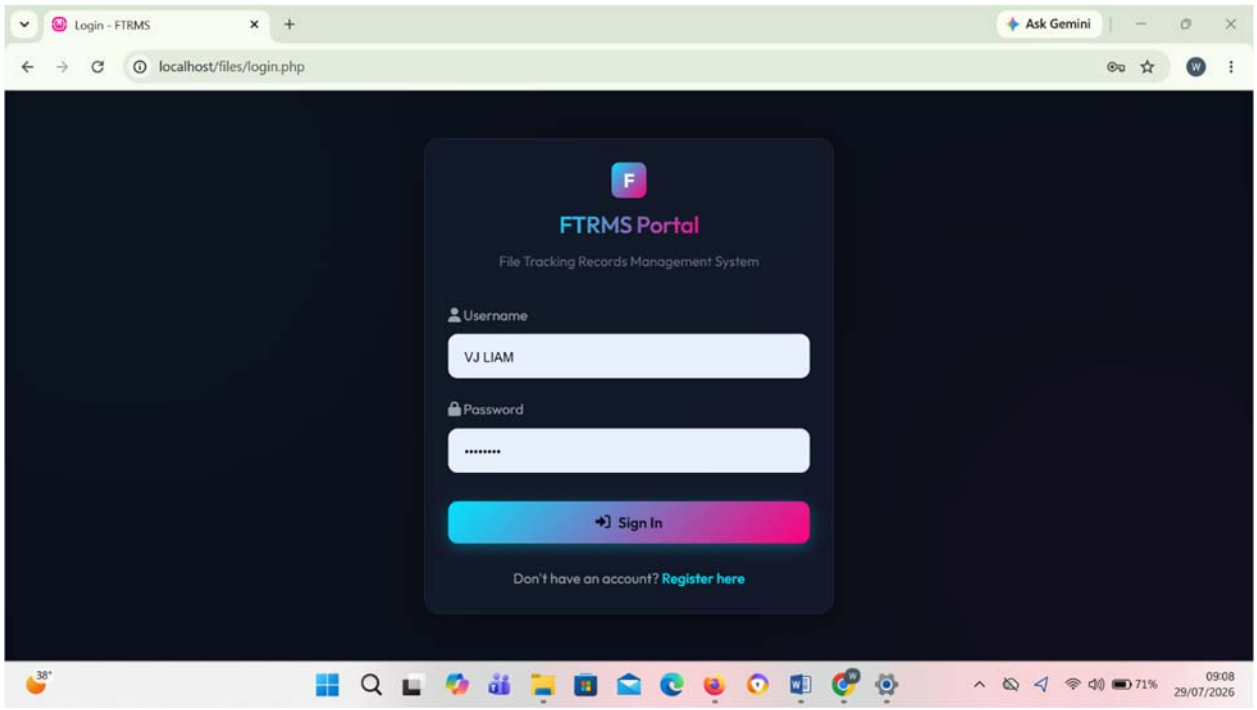
5.3 System Implementation

System implementation involved developing and integrating the various functional modules of the Digital File Tracking System using PHP as the server-side programming language, MySQL as the database management system, HTML and CSS for designing the user interface, and JavaScript to enhance user interaction. The system was implemented as a web-based application to enable authorized registry personnel to efficiently register, track, borrow, return and archive files while maintaining accurate movement records.

5.3.1 Login Module

The login module serves as the entry point to the Digital File Tracking System. It authenticates users by validating the username and password entered against records stored in the **users** table. Upon successful authentication, users are granted access to the system based on their assigned roles. Invalid login credentials result in an error message, thereby preventing unauthorized access. In addition to authentication, the login process records user activities in the **audit logs** table, thereby enhancing accountability and system security.

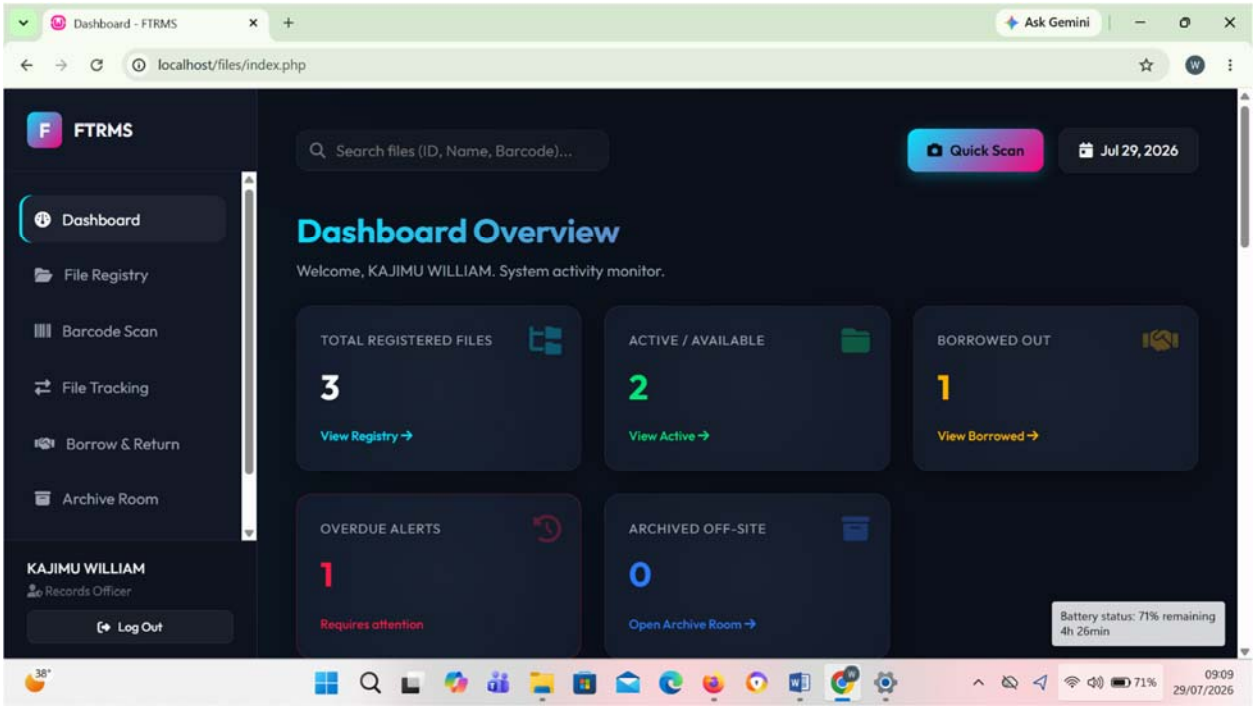
Figure 2: Login Interface of the Digital File Tracking System



5.3.2 Dashboard Module

The dashboard provides users with a summary of the system's operations immediately after successful login. It displays key information required for effective records management, including the total number of registered files, borrowed files, archived files and other important system statistics. The dashboard also provides quick navigation links to different modules, allowing users to access system functions efficiently. The dashboard serves as the central control panel from which users manage all file tracking activities.

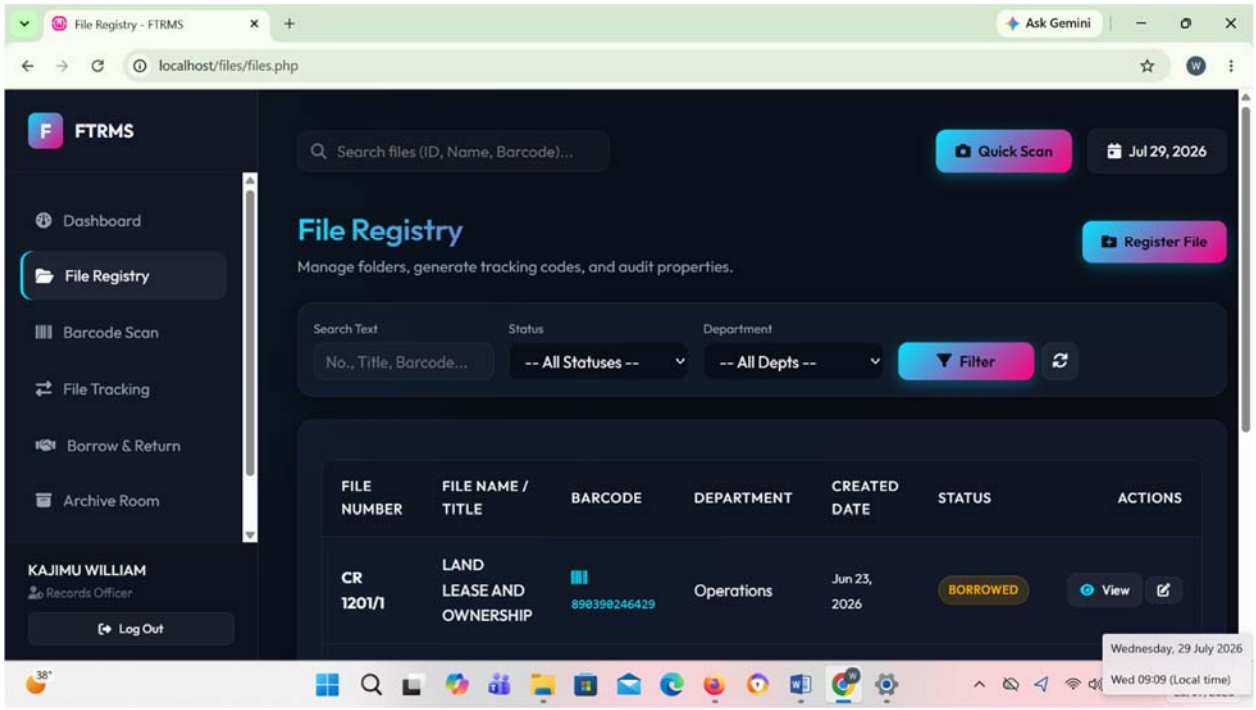
Figure 3: System Dashboard.



5.3.3 File Registry

The File Registry module is responsible for registering all files into the system. During registration, users enter essential file information such as: File Identification number, File Name, Department, Date Created, Current Location, Barcode Number, and File Status. Once saved, the system automatically generates a unique barcode that is associated with the registered file. This barcode serves as the file's unique identifier throughout its lifecycle. The module eliminates duplicate registrations and ensures that every file has a unique identity.

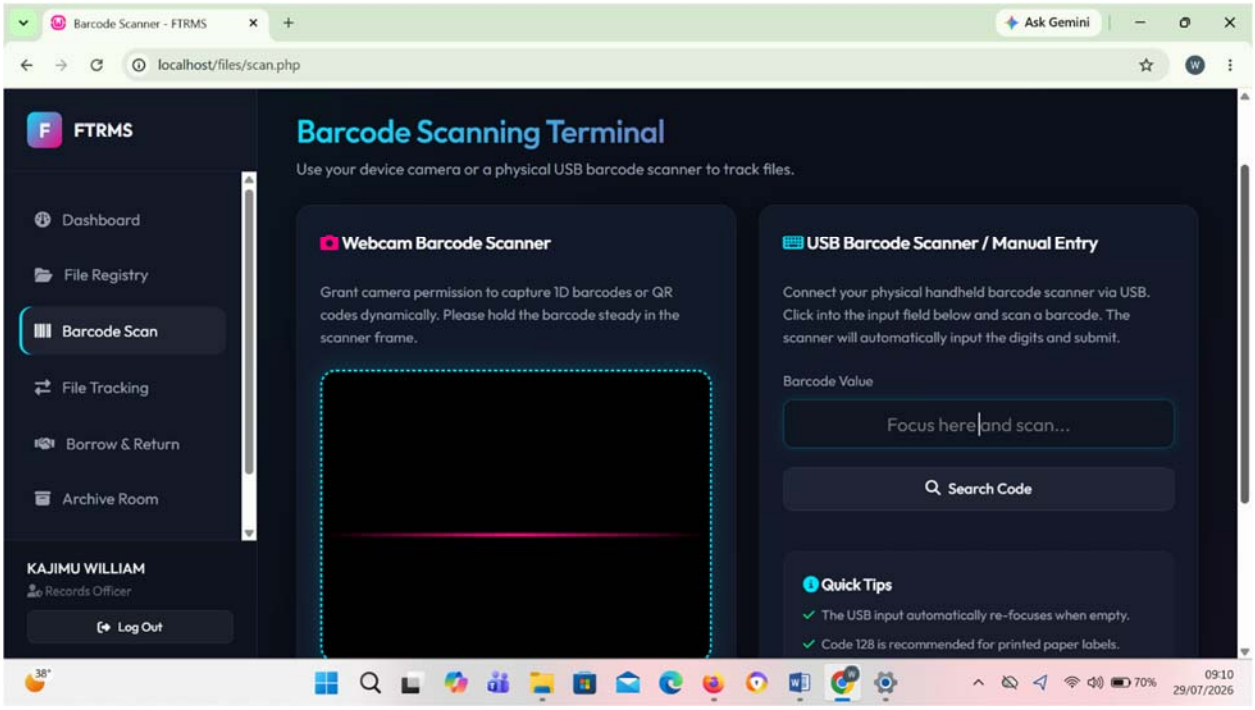
Figure 4: File Registration Interface



5.3.4 Barcode Scan Module

The Barcode Scan module enables users to scan file barcodes using a barcode scanner. Once a barcode is scanned, the system immediately retrieves the corresponding file information, including: File name, File number, Current holder, Current location, File status, Date borrowed, and Return date. It also has a manual entry icon in case of the barcode scanner fails to function. This feature minimizes manual searching, reduces retrieval time, and improves the accuracy of file identification.

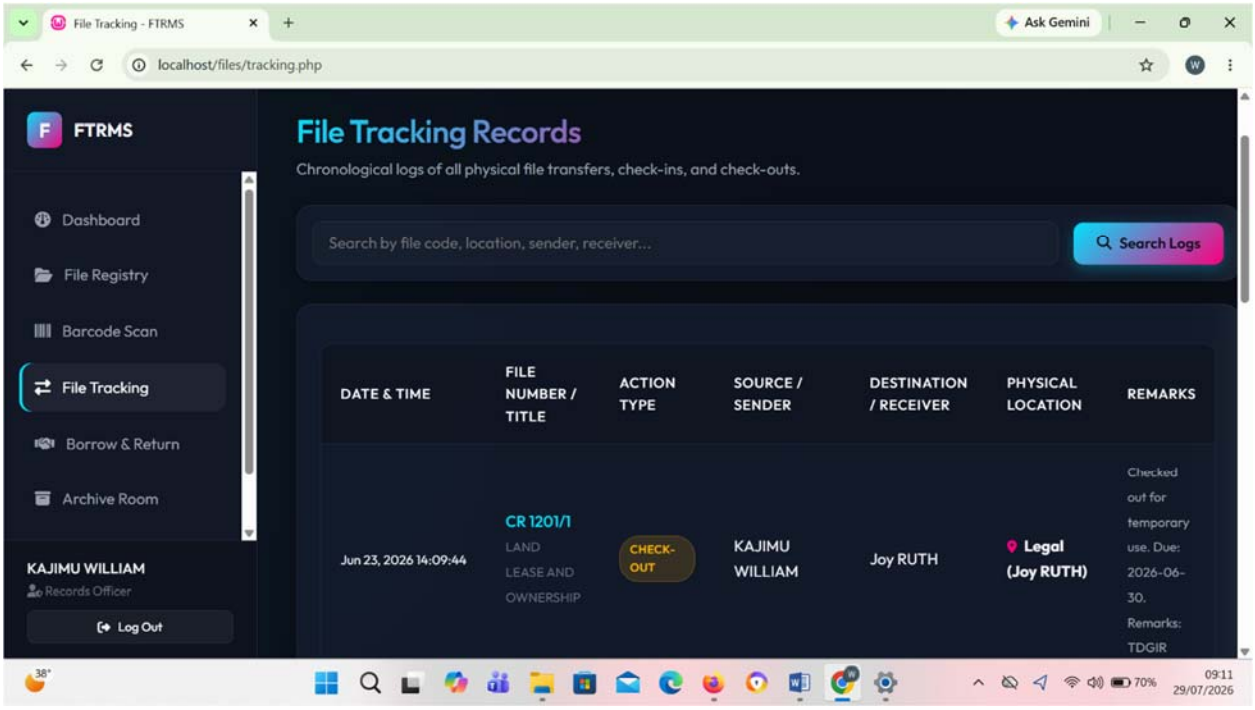
Figure 5: Barcode scanning interface



5.3.5 File Tracking Module

The File Tracking module records every movement of files from one office or department to another. Whenever a file changes location, the system captures: File Number /Title, Action Type, Source / Sender, Destination / Receiver, Physical Location, Remarks. This creates a complete movement history for every file, allowing registry personnel to trace where a file has been and identify the last officer who handled it. The module greatly improves accountability and minimizes the risk of misplaced files.

Figure 6: File tracking interface

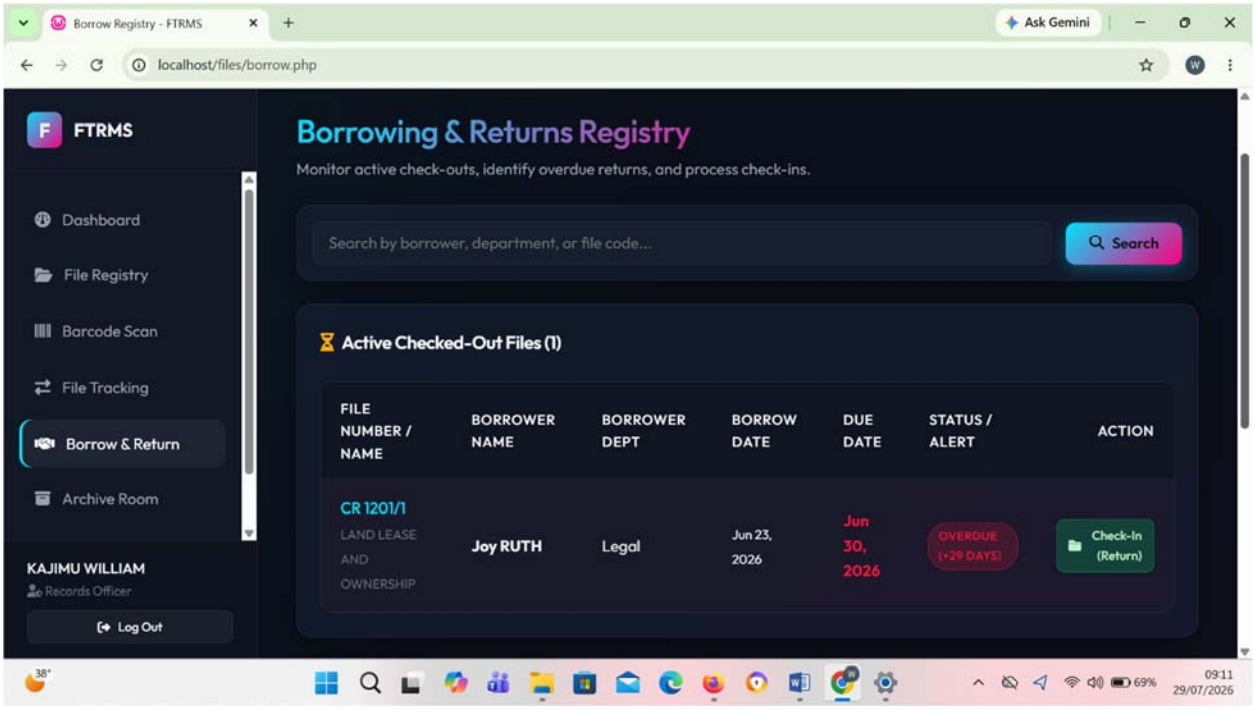


5.3.6 Borrow and Return Module

The Borrow and Return module monitors active check-outs, identifies overdue returns, and process check-ins, managing the lending and return of registry files. When a file is borrowed, the system records: File Number/Name, Borrower Name, Borrower Department, Borrow Date, Due Date, Status / Alert, Action.

Upon return, the system updates the file status to Available and records the return date. If a file is not returned by the expected date, the system automatically flags it as overdue and displays an alert on the dashboard. This module enhances accountability and prevents unauthorized retention of files.

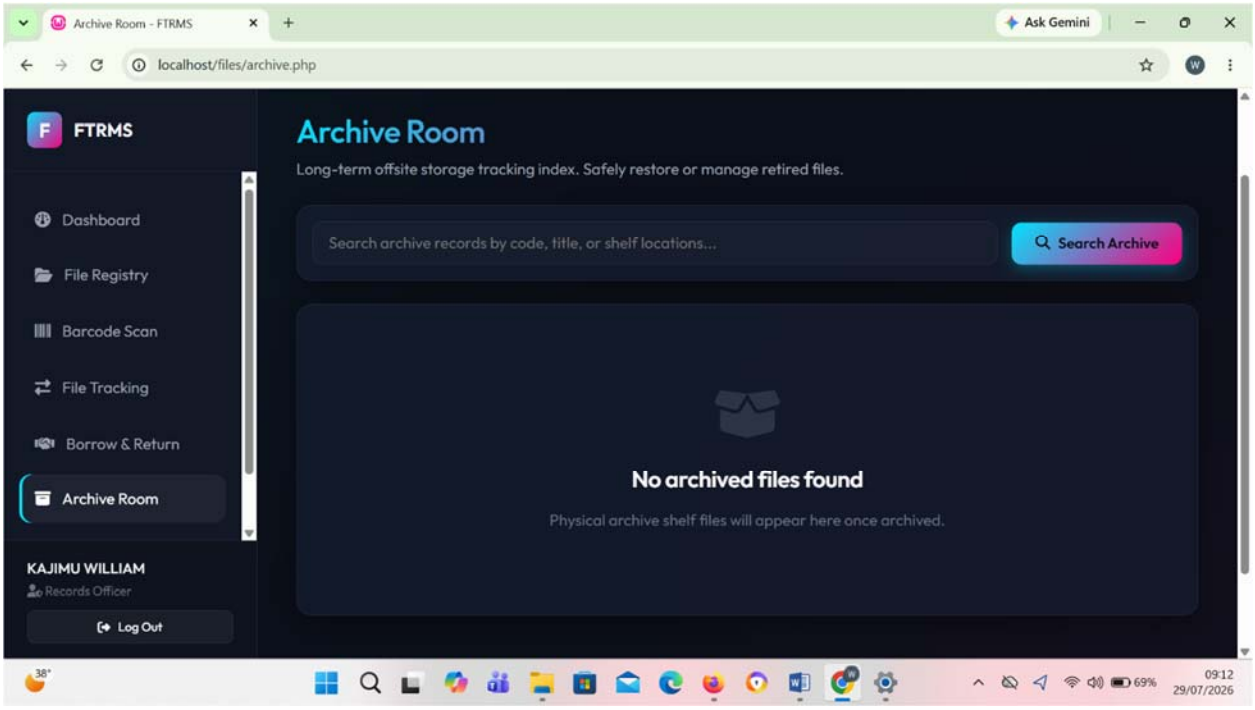
Figure 7: Borrowing and return interface



5.3.7Archive Room Module

The Archive Room module manages files that are no longer actively used but must be preserved for future reference. Users can transfer inactive files to the archive while maintaining their records within the system. Archived files remain searchable and can easily be retrieved whenever required. This feature supports proper records management and ensures compliance with records retention policies. The system instantly displays matching results, reducing the time required to locate records compared to manual searching.

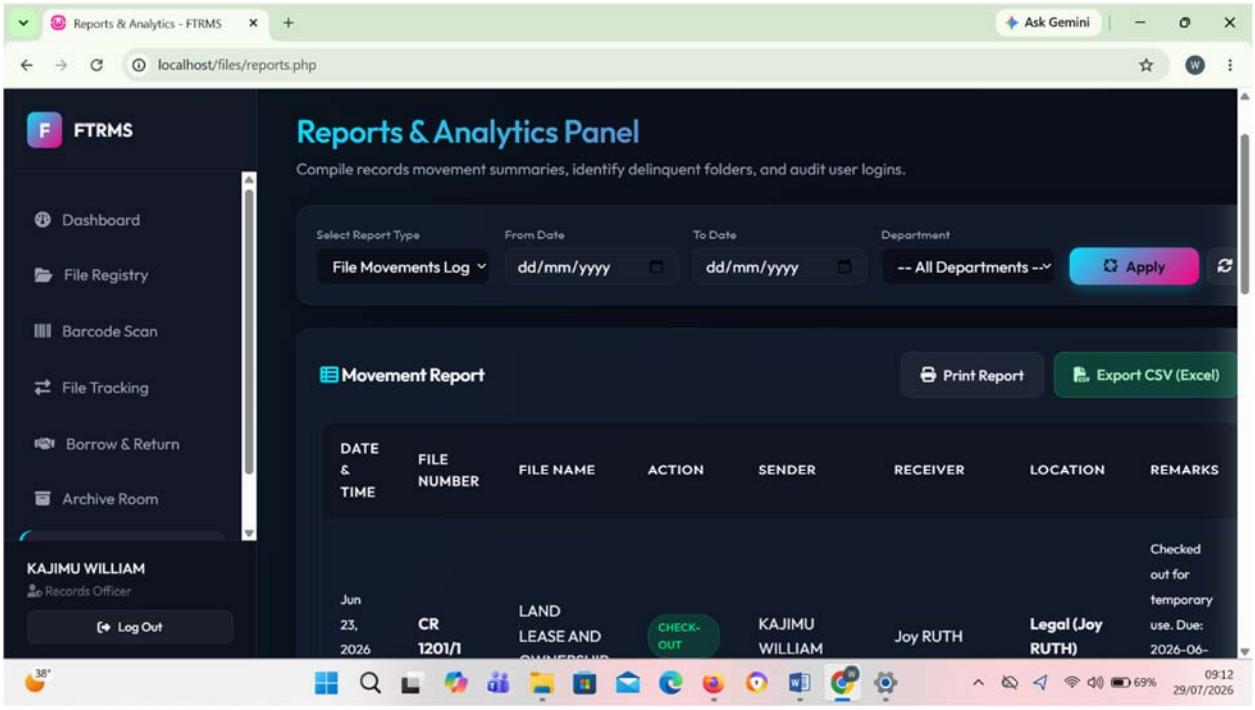
Figure 8: 7Archive Management Interface



5.3.8 Reports & Analytics Panel

This module compiles records movement summaries, identifies delinquent folders, and audits user logins. It helps in the data representation and visualization of the movement of different files across a desired period of time.

Figure 9: Reports Interface.



5.3.9 User Authentication

The system provides secure login functionality that allows only authorized users to access the system. Each user logs in using a username and password. Depending on user privileges, different users may have access to specific system functions such as registering files, borrowing files, or viewing reports. This feature enhances system security and protects sensitive organizational information.

5.4 System Testing

System testing was conducted to verify that the Digital File Tracking System met its functional requirements and performed as expected. The testing process involved executing various system functions using sample data to determine whether each module produced the expected results. The objective was to ensure that the system operated correctly, maintained data integrity and supported efficient file tracking and records management. Table presents the major system functions that were tested together with the expected outcomes and the actual results obtained.

Table 15: Table showing the System Testing Results

Test Case	Expected Result	Actual Result	Status
User Login	Authorized users should successfully access the system using valid credentials.	Users with valid usernames and passwords successfully logged into the system.	Passed
File Registration	The system should register a new file and store its details in the database.	File details were successfully saved in the **files** table.	Passed
Barcode Generation	A unique barcode should be generated for every registered file.	Unique barcodes were successfully generated and stored for each file.	Passed
File Search	Users should retrieve files using the file number, file name or barcode.	The system accurately retrieved matching file records.	Passed
File Borrowing	Borrowing information should be recorded and the file status updated.	Borrow transactions were successfully recorded and file status changed to **Borrowed**.	Passed
File Return	Returned files should have their status updated to **Active** and the return date recorded.	The system successfully updated the file status and recorded the return date.	Passed
File Tracking	Every file movement should be recorded in the tracking logs.	File movements were successfully recorded with sender, receiver, location and timestamp.	Passed
Archive Management	Archived files should be transferred to archive records while remaining retrievable.	Files were successfully archived and archive information stored in the database.	Passed
Audit Logging	User activities should be automatically recorded for accountability.	Login and system activities were successfully recorded in the **audit logs** table.	Passed
Report Generation	The system should generate reports on registered, borrowed, tracked and archived files.	Reports were generated successfully using data stored in the database.	Passed

The testing results indicate that all major functional requirements of the Digital File Tracking System were successfully implemented. Each module performed according to the expected specifications and interacted correctly with the database. The successful execution of the tests demonstrates that the system is capable of supporting file registration, tracking, borrowing, archiving and reporting activities while maintaining data accuracy, accountability and efficient retrieval of records.

5.5 Chapter Summary

This chapter presented the design, implementation and testing of the Digital File Tracking System developed for Kampala Capital City Authority (KCCA). It described the system architecture and the relational database design comprising the users, files, borrow records, tracking logs, archives and audit logs tables, which collectively support efficient file management and movement tracking.

The chapter further explained the implementation of the system modules, including user authentication, file registration, barcode generation, file borrowing and return, file tracking, archive management, audit logging and report generation. Each module was designed to address specific functional requirements identified during the system analysis phase and to improve the efficiency of tracking physical records within the organization.

Finally, the chapter presented the system testing results, which confirmed that all major system functions operated as expected. The successful implementation and testing of the system demonstrate that it provides an effective solution for improving file tracking, enhancing accountability, reducing the occurrence of misplaced records and supporting efficient records management at Kampala Capital City Authority.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter presents the summary, discussion, conclusions and recommendations of the study on the development of a digital file-tracking system for Kampala Capital City Authority (KCCA). The study was conducted to examine the existing file-tracking practices, identify the challenges associated with the manual tracking of registry files, determine the requirements for a digital file-tracking system and develop a system capable of improving the tracking and management of files within KCCA. The study employed a mixed-methods approach involving questionnaires, interviews, observation and document review. The findings presented in Chapter Four were based on responses from 29 respondents drawn from different departments and categories of staff involved in the creation, use, movement and management of files. This chapter therefore discusses

the major findings in relation to the study objectives, draws conclusions and provides recommendations for improving file tracking at KCCA.

6.2 Summary of the Findings

6.2.1 Existing File-Tracking Practices at KCCA

The study established that file tracking at KCCA was largely based on manual methods. The major methods identified included the use of movement registers, file registers, movement books and file transit forms. Staff recorded information about files as they were issued and returned. Although these methods provided a basic means of recording file movements, they were not sufficiently effective for a large organization handling numerous files. The manual nature of the system made it difficult for staff to obtain real-time information about the location and status of files. The study further established that the manual system required staff to search through physical registers in order to determine where a file had been sent. This made file tracking time-consuming and created opportunities for recording errors.

6.2.2 Types of Files Normally Tracked

The findings showed that different types of administrative and operational files were regularly tracked within the organization. These included personnel-related files, departmental correspondence files, financial and administrative files, procurement-related files, project files and other official records used in the day-to-day operations of KCCA. The movement of these files between departments and individual staff members created a need for an efficient tracking system. The more frequently files moved between offices, the more important it became to have a reliable mechanism for recording their current location.

6.2.3 Challenges Faced in the Existing File-Tracking System

The study identified several challenges associated with the existing manual file-tracking process. These included:

- Delays in retrieving files.
- Frequent misplacement of files.
- Difficulty in identifying the current holder or location of a file.
- Errors in manually recording file movements.

- Lack of real-time information about file status.
- Limited accountability when files were not returned on time.
- Delays in service delivery resulting from unavailable files.

The findings indicated that these challenges affected the efficiency of registry operations. When files could not be located quickly, staff were required to spend additional time searching for them. In some cases, this could delay administrative processes and decision-making.

6.2.4 Development of the Digital File-Tracking System

Based on the identified requirements, a barcode-based digital file-tracking system was developed. The system was designed to enable registry staff to register files, assign unique identifiers, record file movements and determine the current location or holder of a file. The system also provided functionality for searching file records, viewing file movement history, managing users and generating reports. By digitizing the movement records, the system was designed to reduce dependence on physical registers and improve the availability of information about files.

6.3 Recommendations

6.3.1 Recommendation to KCCA Management

KCCA management should consider adopting and supporting the implementation of a digital file-tracking system within the registry and departments that frequently request and use files.

6.3.2 Training of Staff

Staff who use the system should be provided with adequate training. Training should cover user login, file registration, barcode scanning, file issuing, file receiving, searching and reporting.

6.3.3 Development of Clear File-Tracking Procedures

KCCA should develop clear procedures governing the movement of files. Staff should be required to update the system whenever a file is issued, received, transferred or returned.

6.3.4 User Access Control

The system should use different levels of user access. For example, registry administrators may have greater privileges than ordinary users. This can help protect the system from unauthorized changes.

6.3.5 Regular System Maintenance

The system should be regularly maintained and updated. Technical problems should be addressed promptly to prevent interruptions in file-tracking activities.

6.3.6 Data Backup and Security

Regular backups should be maintained to prevent the loss of file-tracking information. Appropriate security controls should also be implemented to protect system records from unauthorized access.

6.3.7 Future Expansion

The system may be expanded in the future to include additional features such as email notifications, mobile access, advanced reporting, integration with other records-management systems and automated alerts for overdue files.

6.4 Suggestions for Further Research

Further research may examine:

1. The impact of digital file tracking on the speed of service delivery.
2. The cost-effectiveness of barcode-based file-tracking systems.
3. The integration of file-tracking systems with electronic document and records-management systems.
4. The security and privacy implications of digitizing file-movement information.
5. The use of RFID and other technologies for tracking physical records.
6. The long-term effects of digital tracking systems on records-management performance in public institutions.

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APPENDICES

APPENDIX A: QUESTIONNAIRE

INTRODUCTION

Dear Respondent,

I am a student of Makerere University conducting a study entitled "Design and Development of a Barcode-Based Digital File Tracking System for Kampala Capital City Authority (KCCA)."

The purpose of this questionnaire is to collect information on current file-tracking practices, challenges in file management, and user requirements for the proposed barcode-based digital file-tracking system. The information you provide will be treated with strict confidentiality and will be used solely for academic purposes. You are kindly requested to answer the questions honestly by ticking (✓) the most appropriate response or writing where necessary.

Thank you for your valuable participation.

SECTION A: DEMOGRAPHIC INFORMATION

(Multiple Choice)

1. Gender
    - ○ **Male**
    - ○ **Female**
    - ○ Prefer not to say
2. Age Group
    - ○ 20-29 years
    - ○ 30-39 years
    - ○ 40-49 years
    - ○ 50 years and above

3. Position at KCCA
    - ○ Registry Officer
    - ○ Records Assistant
    - ○ Administrative Officer
    - ○ ICT Staff

○ Supervisor

4. How long have you worked at KCCA?

○ Less than 1 year

○ 1-5 years

○ 6-10 years

○ More than 10 years

SECTION B: EXISTING FILE TRACKING PRACTICES

(Tick one)

1.How are files currently tracked in your department?

◯ Manual registers

◯ Movement books

◯ File transit forms

◯ Electronic system

◯ Other (Please specify): _____

2. How often do you use the current file tracking system?

◯ Daily

◯ Weekly

◯ Monthly

◯ Rarely

3. How easy is it to locate a file using the current system?

◯ Very Easy

◯ Easy

◯ Neutral

◯ Difficult

◯ Very Difficult

4. On average, how long does it take to retrieve a file?

◯ Less than 1 minute

◯ 1-5 minutes

◯ 6-10 minutes

◯ More than 10 minutes

5. Have you ever experienced a misplaced or missing file?

◯ Yes

◯ No

6. If Yes, how often does this occur?

◯ Very Often

◯ Often

◯ Sometimes

◯ Rarely

SECTION C: CHALLENGES OF THE CURRENT SYSTEM

Please indicate your level of agreement with the following statements by ticking (✓) the appropriate response.

File retrieval takes too much time.	○	○	○	○	○
Files are frequently misplaced.	○	○	○	○	○
It is difficult to know who currently has a file.	○	○	○	○	○
Manual tracking causes errors.	○	○	○	○	○
Current file tracking affects service delivery.	○	○	○	○	○
The current system lacks accountability.	○	○	○	○	○

SECTION D: REQUIREMENTS FOR THE PROPOSED BARCODE-BASED DIGITAL FILE TRACKING SYSTEM

(Tick one)

1. Are you aware of barcode technology?

☐ Yes

☐ No

2. Do you think a barcode-based tracking system can improve file management?

☐ Yes

☐ No

☐ Not Sure

3. Which features would you like to see in the proposed system?

☐ Barcode generation

☐ Barcode scanning

☐ File location tracking

☐ User authentication

☐ Search and retrieval function

☐ Reporting and analytics

☐ Audit trail/History

☐ Notifications/Alerts

4. How important are the following features in the proposed system?

Instruction: Please tick (✓) the appropriate response for each feature.

Barcode Scanning	☐	☐	☐	☐
Real-Time Tracking	☐	☐	☐	☐
Reporting Module	☐	☐	☐	☐
Search Function	☐	☐	☐	☐
User Security	☐	☐	☐	☐

SECTION E: USER ACCEPTANCE OF THE PROPOSED SYSTEM (TAM)

Instruction: Please indicate your level of agreement by ticking (✓) the appropriate response.

The proposed system would improve my work performance.	☐	☐	☐	☐	☐

The system would make file retrieval faster.	☐	☐	☐	☐	☐
The system would be easy to use.	☐	☐	☐	☐	☐
I would be willing to use the proposed system.	☐	☐	☐	☐	☐
I would recommend the system to other staff.	☐	☐	☐	☐	☐

SECTION F: OPEN-ENDED QUESTIONS

1. What challenges do you currently face when tracking files?

2. What improvements would you like to see in the proposed barcode-based digital file tracking system?

3. Any additional comments or suggestions?

Thank You

Thank you very much for taking the time to complete this questionnaire. Your responses are highly appreciated and will be treated with strict confidentiality. They will be used solely for academic research purposes.

APPENDIX B: INTERVIEW GUIDE

INTERVIEW GUIDE FOR REGISTRY SUPERVISORS, ICT STAFF, AND ADMINISTRATIVE OFFICERS

Introduction

The purpose of this interview is to obtain detailed information on the current file-tracking system, the challenges encountered, and the requirements for the proposed barcode-based digital file-tracking system.

Interview Questions

Section A: Current File Tracking Practices

1. How files are currently tracked within your department?
2. What procedures are followed when issuing or receiving files?
3. Who is responsible for monitoring file movement?

Section B: Challenges

1. What challenges do you experience in tracking files?
2. What are the major causes of misplaced or delayed files?
3. How do these challenges affect service delivery?

Section C: System Requirements

1. What features would you like to see in the proposed barcode-based file tracking system?
2. How should the system improve accountability?
3. What reports should the system generate?
4. What security measures should the system include?

Section D: Recommendations

1. What recommendations would you offer to improve file tracking at KCCA?
2. Is there anything else you would like to add?

APPENDIX C: OBSERVATION CHECKLIST

The observation checklist will guide the researcher in collecting firsthand information on the existing file-tracking practices and registry operations at KCCA.

Files are properly labelled
Files are arranged systematically
File movement register is available
File transit forms are used
Staff record file movement
Retrieval procedures are followed
Delays occur during retrieval
Misplaced files observed
Storage facilities are adequate
Computers are available
Barcode technology currently used
Registry has internet access
Security measures for files exist

APPENDIX D: DOCUMENT REVIEW CHECKLIST

This checklist will guide the review of organizational documents related to records management and file tracking.

Registry Manual	Understand registry procedures	File handling procedures
File Movement Register	Examine tracking practices	File movement records
Records Management Policy	Assess records management practices	Policy guidelines
Standard Operating Procedures	Identify workflow procedures	Operational processes
File Classification Scheme	Assess filing arrangement	Classification methods
ICT Policy	Determine ICT support	Technology guidelines
Previous Audit Reports	Identify recurring issues	File management challenges

APPENDIX E: BUDGET

Item	**Description**	**Quantity**	**Unit Cost (UGX)**	**Total Cost (UGX)**
Barcode Scanner	Handheld scanner (basic model)	2	400,000	800,000
Barcode Printer	Small desktop printer	1	700,000	700,000
Barcode Labels	Adhesive labels for files	500	500	250,000
Computer/Laptop	For system operation (reuse	2	1,000,000	2,000,000

	existing if possible)			
Software Development	Simple database & web interface	1	3,000,000	3,000,000
Internet/Data Costs	3 months	3 months	100,000	300,000
Staff Training	5 staff members	5	30,000	150,000
Printing & Stationery	Manuals, reports, documentation	N/A	100,000	100,000
Miscellaneous	Contingency	N/A	200,000	200,000
Total Budget: UGX 7,500,000 (~USD 2,000)	**Total Budget: UGX 7,500,000 (~USD 2,000)**	**Total Budget: UGX 7,500,000 (~USD 2,000)**	**Total Budget: UGX 7,500,000 (~USD 2,000)**	**Total Budget: UGX 7,500,000 (~USD 2,000)**

APPENDIX F: Introduction Letter from EASLIS

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COLLEGE OF COMPUTING & INFORMATION SCIENCES
EAST AFRICAN SCHOOL OF LIBRARY AND INFORMATION SCIENCE (EASLIS)

13.07.2026

The Human Resource
Kampala City Council Authority

Dear Sir/Madam

RE: INTRODUCTION LETTER

This is to introduce you to the following students who are pursuing a Bachelor of Library and Information science (BLIS) in Year III at the East African School of Library and Information Science under the College of Computing and Information Science, Makerere University.

1. Kajimu William 23/U/08672/PS
2. Tumukunde Winner Faith 23/U/18077/PS
3. Namuwonge Flavia 23/U/14947/PS
4. Kawerere Nicholas John 23/U/09422/PS
5. Nakigudde Ruth 23/U/13733/PS

As part of their degree programme, they are entitled to carry out a project under the course: BLS 3227 Project. The title of their project is ***"A Digital Tracking System for Kampala City Council Authority."***

The purpose of this communication is to request you to offer them the necessary assistance required.

Please note that all information provided to them will be used for academic purposes only.

Thank you.

Sincerely,

Dr. Mary Nalumansi
AG.HEAD OF DEPARTMENT
LIBRARY AND INFORMATION SCIENCE

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