

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

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**ELECTRONIC VOTING SYSTEM USING BLOCKCHAIN TECHNOLOGY.**

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**MUIA MULWA PAUL**

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# CHAPTER FOUR

# SYSTEM ANALYSIS

## 4.0 Overview

This chapter covers feasibility study done by the researchers to make the project viable; social feasibility was used to show how the signature verification system in a bank was socially accepted, economic feasibility to show the cost of the project. Feasibility report was documented and attached as an appendix. Overall description of the current system such as data flow diagrams is also covered. Requirements necessary for gathering information; functional requirements (the ones that can be shown), non-functional requirements (cannot be shown) and summary appear in this chapter.

## 4.1 Feasibility study

According to (Shah 2012) feasibility study is a preliminary exploration of a proposed project or undertaking to determine its merits and viability. It aims to provide an independent assessment that examines all aspects of a proposed project, including technical, economic, financial, legal and environmental considerations. This information then helps researchers whether or not to proceed with the project. The feasibility study results can also be used to create a realistic project plan and budget. While conducting the feasibility study, it was found out that technically the organization has enough computers to run the proposed system. However, software upgrades and random access memory (RAM) will also need to be upgraded. The current system will take four and a half months to develop. Legally the current system meets all the legal and contractual laws of the country. It was also discovered that the proposed system meets the economic feasibility since the cost that would be incurred to develop the proposed system would be minimal and can be handled by the organization. The proposed system is likely to change the work environment of the organization since some staff may need to be trained, replaced and a qualified system administrator be hired.

## 4.2. Overall description of the current online voting system.

## Online voting systems have been developed to streamline the electoral process by leveraging the internet. These systems prioritize secure authentication methods, utilizing unique identifiers and multi-factor authentication to verify the eligibility of voters. A strong emphasis is placed on security, with the implementation of encryption, firewalls, and comprehensive cybersecurity protocols to safeguard the integrity of the voting process. The core objective of online voting is to enhance accessibility, offering a convenient option for voters, particularly those facing physical limitations or residing in remote areas. Verification mechanisms and auditing processes are integral to confirming the legitimacy of votes and addressing concerns related to the accuracy of election results. Privacy protection measures are carefully implemented to ensure the confidentiality of individual votes. User interfaces are designed to be user-friendly, promoting a positive and straightforward experience for a diverse range of voters. Legislation and regulatory frameworks play a vital role in governing online voting, addressing issues pertaining to security, privacy, and overall electoral integrity. Despite potential benefits, online voting has encountered controversies and challenges, such as concerns about hacking and manipulation, necessitating careful consideration. Some jurisdictions opt for limited use or pilot programs to assess feasibility and identify potential issues before widespread implementation.

## 4.2.1. Online voting system use-case diagram.

A use-case diagram is a graphical depiction of a user's possible interactions with a system ("use-case diagram," 2021). Figure 4.1 below shows the use-case diagram for the current online voting system

Voting

Vote verification

Authentication

Profile editing

Ballot monitoring

Registration

Tally checking

Voter

System admin

Election

Commissioner

Figure 4.1: The current online voting system Use-Case diagram.

## 4.2.2. Online voting system class diagram.

In ("class diagrams," 2009) a class diagram is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among objects. It is important for translating the models into programming code. Figure 4.2 shows the use class diagram for the current online voting system.

Name

Registration No

Voter

Voting system

Name

Code

1 m

Cast vote ()

Verify vote ()

m

Verify signature ()

System Admin

Delegate

Name

School

Party

Position

Profile picture

m

Balance

m 1

Add delegate ()

Remove delegate ()

Profile editing ()

Ballot monitoring ()

Figure 4.2: The current online voting system class diagram.

## 4.2.3. 0nline voting system sequence diagram.

According to ("unified modelling language,"2011) a sequence diagram shows process interactions arranged in time sequence in the field of software engineering. It depicts the processes involved and the sequence of messages exchanged between the processes needed to carry out the functionality.

Figure 4.3 shows the sequence diagram for the current online voting system.

**Voter Voting system System admin**

1. Create account 1. Authentication
2. Verify account 2. Profile editing
3. List of candidates 3. Adding candidates
4. Select candidates 4. Deleting candidates
5. Cast vote 5. Ballot monitoring
6. Verify vote 6. Tally checking

Figure 4.3: The current online voting system sequence diagram.

## 4.2.4 Online voting system data flow diagram.

A data-flow diagram is a way of representing a flow of data through a process or a system. ("data flow diagram,"1990). Figure 4.4 shows the Data flow diagram for the current online voting system

Aspirants

Registration process

Voter

Registering candidate

Registering Voter

Database

Voting Process

Add voter

Add aspirant

Update aspirant details

Update voter details

System admin

Delete aspirant

Delete voter

View all aspirants

View all voters

Results checking

Managing aspirants

Managing voters

Figure 4.4: The current online voting system data-flow diagram.

## 4.2.5 Online voting system activity diagram.

According to (Rumbaugh,1999) activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. Figure 4.5 shows the activity diagram for the current banking system.

See voter information

Verify account

Voter registration

Sign in

No

Verify voter

Acknowledge

Login

Cast vote

Yes

Figure 4.5: The current online voting system activity diagram

## 4.3 Requirement gathering

According to(Boogaard,2022) Requirements gathering is the process of determining what your projects need to achieve and what needs to be created to make that happen.

## 4.3.1. Functional requirements.

Functional requirement defines a function of a system or its component, where a function is described as a specification of behavior between inputs and outputs.

## 4.3.1.1. Register

The bank attendant is provided with a platform to register a new customer. The attendant is required to enter the customer name, Identification number, phone number, Kenya Revenue Authority Pin and collect customer password. The system saves the information and confirm customer registration.

## 4.3.1.2 Report generation.

The system can generate reports according to the court information provided by the bank attendant. The following reports are generated by the system:

A monthly report showing the number of loans awarded. The attendant is required to query the database using customer identification number and loan number.

A monthly report of newly registered customers. This is initiated by the bank attendant by using the customer identification number. The report illustrates the details of all newly registered customers.

## 4.3.1.3 Verification.

The system is expected to verify a loan awarded to a customer. This is based on customer savings and the transactions the user has been making. The system is also expected to calculate the actual loan amount to be awarded to a customer.

## 4.3.2. Non-functional requirements.

According to (Rowel,1997) a non-functional requirement is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. The non-functional requirements will serve as constraints or restrictions to the bank signature verification system across the different backlogs. The non-functional requirements will also ensure effectiveness and usability of the entire system. In usability, it ensures the system functions the way it is supposed to, while effectiveness ensures the system gives correct output when given some input values.

## 4.3.2.1 Security

Security is the protection from or resilience against potential harm caused by others by restricting the freedom of others to act (Buzan,1998). The bank signature verification system requires a customer to identify himself or herself using a login username and password. The Metrix for measuring the security of the system is the number of attempts made to access the bank with the correct or wrong login attempt. This helps the manager to know the eligibility of the system to verify customer.

## 4.4 Summary.

This chapter entails feasibility study and how it affected the current system, the overall description of the current banking system. It also covers use-case diagram, class diagram, sequence diagram, dataflow diagram and activity diagram. It also entails requirement gathering.