

**KIRINYAGA UNIVERSITY**

**SCHOOL OF PURE AND APPLIED SCIENCES**

AGRICULTURAL LAND LEASING SYSTEM

**Submitted By:**

**EVANS KAMAU MBUGUA : PA101/G/9204/20 EVANS NJUGUNA NJOGU : PA101/G/10586/20**

**A RESEARCH PROPOSAL PRESENTED TO THE DEPARTMENT OF PURE AND APPLIED SCIENCES IN PARTIAL FULFILLMENT OF REQUIREMENTS OF BACHELOR'S DEGREE MATHEMATICS AND COMPUTER SCIENCE.**

**SUPERVISOR:**

**DR. MALANGA KENNEDY**

**NOVEMBER, 2024.**

**DECLARATION**

We declare that this project work as presented in this paper is our original work and has not been presented anywhere else for any degree, diploma or award at any university.

**EVANS KAMAU MBUGUA : PA101/G/9204/20**

Signature: Date:

**EVANS NJUGUNA NJOGU : PA101/G/10586/20**

Signature: Date:

Approval

This project proposal paper was received and approved by:

**Dr. Kennedy Malanga.** School of Pure and Applied Sciences. Kirinyaga University. Signature: Date:

**ACKNOWLEDGEMENT.**

We would like to express our sincere gratitude to everyone who contributed to the success of this project. Our deepest thanks go to Kirinyaga University and the School of Pure and Applied Sciences for the opportunity to work on this project and for providing the necessary resources. We are especially grateful to our supervisor, Dr. Kennedy Malanga, for his invaluable guidance, insightful feedback, and consistent support throughout the research and development phases. We also wish to thank the faculty members and students who participated in interviews and testing sessions, helping to shape the system to better meet the needs of the university community. Finally, we extend our heartfelt appreciation to our families and friends for their patience, encouragement, and unwavering support during this project. Their motivation and support were essential to our progress and completion of this work. Thank you all for your contributions and encouragement

# Abstract

Agricultural land is significant for food production but its access has become difficult for farmers due to dispersed information and lack of transparency. Farm Hub addresses this challenge by proposing a web-based platform to connect landowners and tenants searching for affordable agricultural land. The system will authenticate users, enable landowners to post available lands with details while allowing tenants to search using multiple criteria. The platform will facilitate direct messaging between parties and integrate M-Pesa and bank transfers for secure transactions. Additionally, it will display land locations on Google Maps along with relevant climatic data to help farmers make informed decisions. The proposal outlines a full-stack system development aimed at improving land rental transparency, efficiency, and ease of access in the agricultural sector. The primary beneficiaries of this system will be farmers seeking agricultural land, landowners with idle land to lease, and agricultural organizations looking to expand their farming operations. (Onofri et al., 2023).

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**CHAPTER 1: INTRODUCTION**

# Background

Agriculture represents the backbone of the economy, enabling assurance of food security and livelihoods; on the contrary, smallholder farmers and agricultural entrepreneurs cannot often access affordable agricultural land, and landowners with idle land fail to find the proper tenant. This stands as a cause for the inefficiency mentioned above in land use. (Podbolotova & Shaikina, 2022).

Farm Hub bridges the gap between landowners and tenants in need of productive agricultural land at an affordable cost: it helps landowners to list lands available, while tenants can search through the listed ones that suit their needs. Key features of the application include a secure payment system, weather updates, and Google Maps for locating the lands. It is easy for users to register and manage the listing, maintain transaction history, and thus have a smooth ride in leasing the land. (Choudhury et al., 2021; Mayboroda et al., 2024).

# Current/Existing systems

In Kenya, various platforms connect landowners with tenants, primarily offering agricultural and other land use listings. (Land For Sale & Lease in Kenya | Landstock Kenya, n.d.; Mfarm Ltd, Kenya // Farm-D, n.d.)

1. Landstock Kenya: Lists plots for agriculture and commercial purposes but lacks integrated payment and tenant-owner interaction features.
2. M-Farm: An agricultural information service, indirectly aiding tenants by providing farming data and market prices, but without a dedicated leasing function.
3. FarmBiz Africa: An online marketplace focused on agricultural resources, including some land listings, though lacking specific leasing capabilities.
4. Digifarm by Safaricom: Provides farmers with financial tools and resources but not direct land leasing functions.

These platforms illustrate the demand for an all-in-one leasing solution like Farm Hub, which would streamline tenant-owner connections with integrated payment, account-based interactions, and real-time land insights.(Land For Sale & Lease In Kenya | Landstock Kenya, N.D.; Mfarm Ltd, Kenya // Farm-D, n.d.).

# Problem Statement.

Current land leasing in agriculture is very fragmented and inefficient, with no centralized means for land owners to easily list their properties and for tenants to find suitable land. Farmers cannot efficiently determine if land is suitable through location, weather, and access to infrastructure in preparation for taking the product to market. Complex payment arrangements further complicate things for both parties. The solution should be digitized, which will reduce the hassle in leasing agricultural land but, on the whole, efficient, more transparent, and user-friendly. (Podbolotova & Shaikina, 2022).

# Objectives

* + 1. **Main Objective.**

To create a web-based platform that connects landowners with tenants for leasing agricultural land.

# Specific Objectives

By the end of the project, the system should be able to:

1. Authenticate users
2. Facilitate land listing by allowing property uploads with details.
3. Facilitate land bidding for the land.
4. Process payments securely through M-Pesa.
5. Display land locations on Google Maps for specific location.

# Scope Farm Hub System

The Farm Hub will be a system involving front-end and back-end development that matches landowners with tenants seeking affordable agricultural land. Some of the key highlights of the system include: (Mayboroda et al., 2024; Podbolotova & Shaikina, 2022; Wanjohi & Kiboi, 2022).

User Registration and Authentication: Secure sign-up and login processes, including multi- factor authentication, are vital for protecting user data. This ensures safe interactions between landowners and tenants (Choudhury et al., 2021a).

Land Posting and Browsing: Landowners can post detailed land listings, while tenants can search for properties based on location, size, and price. This feature promotes transparency and makes it easier for tenants to find suitable land (News and Knowhow for Farmers, n.d.).

Interactive Maps and Location Services: Integrating mapping tools like Google Maps allows tenants to assess land accessibility and nearby infrastructure, while providing valuable geographical context (Google Maps Platform, n.d.).

Weather Information Integration: Real-time weather data helps tenants evaluate land suitability for farming, taking into account climate conditions like temperature and rainfall, which influence agricultural decisions (Rajarajeswari et al., 2018).

Communication Module: Direct communication between landowners and tenants fosters transparency and facilitates smooth negotiations, ensuring that both parties can easily address concerns.

Rental System: A secure payment system, as suggested by Mayboroda et al. (2024), ensures safe transactions between landowners and tenants, providing trust and reducing fraud risks.

Together, these features create a streamlined and secure platform that meets the needs of both landowners and tenants, improving agricultural leasing processes.

# Limitations.

Internet dependence poses a significant challenge for Farm Hub, as the platform requires stable internet connectivity to function effectively. In rural areas, where internet access may be limited or unreliable, this dependence could prevent users from fully accessing or benefiting from the platform’s features.

Data accuracy is another critical aspect, as the system relies on authentic and up-to-date listings, weather reports, and location information. Maintaining this level of precision is resource-intensive and requires regular updates to ensure the information provided to users is reliable and trustworthy.

Access and literacy issues can further impact the platform’s usability, especially in rural areas where technological access and digital literacy levels may be lower. This could limit the adoption of the system, necessitating efforts to make the platform user-friendly and provide guidance to potential users.

Security and privacy are also crucial, as the platform handles sensitive payment and personal information. Ensuring that user data is protected against hacking and unauthorized access is essential to maintaining trust and safeguarding the system from cyber threats. ((PDF) Impact of Implementing the Ardhi Sasa Land Information Management System in Kenya: An Analysis of Selected Stakeholders in the Ministry of Lands, n.d.)

# Justification

On one hand, this is a highly sought-after platform in terms of connecting agricultural landowners with tenants. Assuring maximum use of lands is of great importance for food safety all over the world, but traditional leasing practice involves a lot of inefficiency, delayed decisions, and lost opportunities. Farm Hub replaces these with a smooth and efficient leasing process. More features include current climatic conditions for land suitability assessment, Google Maps for location insight, and a secure payment gateway for building trust and handling transactions between parties. (ResearchGate, n.d.).

# Assumptions.

Farm Hub relies on users having reliable internet access to ensure smooth functionality and uninterrupted interactions on the platform. Stable connectivity is crucial for delivering a

seamless experience.

The system depends on reliable information sources, including up-to-date weather data, accurate location details, and authentic land listings. These ensure users can make well- informed decisions.

Digital literacy among users is essential for effective interaction with the platform. Users

need sufficient technological skills to navigate the system and utilize its features efficiently.

Secure and trusted transactions are a key feature of Farm Hub. The platform ensures the safety of payment and personal data, fostering confidence among its users.

The increasing demand for agricultural land leasing supports the platform’s relevance. This growing market provides an opportunity to connect landowners with tenants effectively.

Regular system maintenance is vital to keep Farm Hub accurate, secure, and high- performing. Continuous updates ensure reliability and user trust over time.

These assumptions make Farm Hub functional and trustworthy for the connection between landowners and tenants. (ResearchGate, n.d.).

**CHAPTER TWO: LITERATURE REVIEW**

# Introduction

Agriculture is the backbone of the Kenyan economy, employing approximately 75% of the population and also a large part to the country's GDP. However, despite this vital role, Kenya's agricultural sector is underutilized in part due to idle agricultural land. It has begun to emerge that land leasing is a feasible solution that enables unused land to be harnessed by farmers, hence increasing production and putting available resources to better use. Digital platforms are constantly changing the game on the continent regarding agriculture. Farm Hub further aids this by providing a digital marketplace for agricultural land leasing in Kenya. This literature review attempts a quick study of agricultural land leasing practices, the available digital platforms, and how technology might be used to optimize agricultural land use. (Adenuga et al., 2021; (PDF) The Case for Long Term Land Leasing: A Review of the Empirical Literature, n.d.)

# Related Literature Reviews.

Various new digital platforms have emerged to bring landowners and tenants together for leasing agricultural land, but most of these lack integrated features that give a seamless experience.(Agricultural Land Leasing Web Application - Project A | PDF | Lease | Information Technology Management, n.d.; Land for Sale & Lease In Kenya | Landstock Kenya, n.d.; Mfarm Ltd, Kenya // Farm-D, n.d.; Shilaro, 2023)

1. **Landstock Kenya** and **M-Farm** are listed online, but have no key services like secure payment systems and real-time location mapping (Karimi, 2022). Both are more geared towards just land availability rather than leasing solutions in their entirety.
2. **Digifarm by Safaricom** integrates agricultural tools and financial services but does not fully support land leasing. It highlights the need for platforms that not only provide farming tools but also streamline leasing transactions (TechServe Solutions, 2024).
3. **Google Maps and Weather Data Integration** have proven beneficial in agricultural platforms. Recent studies emphasize the importance of location tracking and real-time weather conditions to assist tenants in making informed decisions (Ndirangu, 2024).
4. Safe user authentication and integrated payment allay fears about the safety of the transactions, as has recently been projected in some digital solutions (TechServe Solutions, 2024).

While existing platforms like **Landstock Kenya** and **M-Farm** are providing basic services only, **Farm Hub** will try to be a full-service platform, integrating land leasing, security of payments, weather data, and location mapping for efficiency and ease of use.

# Existing Gaps

Several digital platforms connect the owners with land lessees by providing access to plots available for use. An example is **Landstock Kenya,** which lists various plots for agriculture, commercial use, and other residential purposes. Although Landstock Kenya might be generally useful, it misses out on such crucial features as: (Choudhury et al., 2021a)

**Agricultural-specific data** would involve the climate, soil, and productivity information, which is quite fundamental in informed decision-making, none of which is provided by Landstock Kenya.

**Google Maps Integration:** Lack of geolocation services inhibits the user from viewing the exact location, hence assessing nearby infrastructure such as water sources and transport links. (Google Maps Platform - Location and Mapping Solutions, n.d.).

**Legal Documentation and Verification:** Without support for legal documentation and the verification of the same regarding land, the user is vulnerable to fraud.

# Lack of Agricultural-Specific Information

-Current Gap: Current land leasing platforms, such as Landstock Kenya, do not display useful data on soil quality, climate suitability, and productivity indicators.

Farm Hub Solution: Farm Hub will provide an all-rounded agricultural profile, thus allowing tenants to make informed decisions on leasing by considering various risks and higher productivity. (Choudhury et al., 2021b; Mandal et al., 2019).

# Poor Verification Mechanisms.

-Current Problem: Most of the present-day platforms possess poor verification mechanisms. This makes them more fraud-prone and presents problems regarding land ownership.

Farm Hub Solution: Farm Hub will implement a verification process - ownership and documentation checks, for example - that will help establish a trusted platform on which to lease the land. (Shibeshi et al., 2015).

# Limited Market Accessibility

Present Shortcoming: Inaccessibility of smallholder landowners, especially in the rural parts of the country, to potential tenants.

-Farm Hub Solution: Farm Hub will also offer national listing services in addition to the value- added targeted marketing of rural listings for improved exposure and access to markets. (El- Hallaq & El-Sheikh Eid, 2020; Jasińska, 2014).

# Lack of Integrated Legal Representation

-Existing Gap: The level of legal representation now available for lease agreements is either insufficient or unavailable, which makes the potential to enforce a contract or ownership disputes extremely problematic.

Farm Hub Solution: Farm Hub will provide the legal support needed for template contract provision, consultation support, and document processing, which will make leasing safe and valid. (El-Hallaq & El-Sheikh Eid, 2020; Rahman & Szabó, 2021).

**Farm Hub** will fill these gaps by offering detailed information on soil quality, climate suitability, land productivity, and integration with Google Maps. Additionally, it would introduce a strong verification mechanism as a means of security for users through secure documentation and complete transparency to reduce instances of fraud.

# Constraints to Agricultural Land Leasing

Various challenges contribute to low efficiency in agricultural land leasing in Kenya. Some of these are: (Kariuki & Ng’etich, 2016).

# Lack of Trust and Legal Bottlenecks

Land leasing is often looked at suspiciously since land owners mistrust any land grabbing or encroachment into their property. Further, weak legal structures make informal agreements hard to enforce. Because of this, landowners might be quite resistant to leasing their lands, hence affecting the potential of land leasing in Kenya.(Shibeshi et al., 2015)

# Risk of Scams and Lack of Verification

Without an appropriate verification procedure, both tenants and landowners can be easily subjected to fraud. Lack of proper documentation and appropriate, secure verification can result in financial and legal losses regarding transactions. (El-Hallaq & El-Sheikh Eid, 2020)

# Limited Market Access

Most smallholder landowners are usually exposed to only a few markets in rural settings, making it very hard to advertise for tenants. Also, most rural regions are usually characterized by poor infrastructure conditions, especially about transportation, which makes it hard and expensive to transport tenants to the leased land, thereby discouraging leasing activity. (Nyangweso & Gede, 2022).

# 2.7. Conclusion.

This therefore means that agricultural land leasing is a huge opportunity to realize the untapped agricultural potential of Kenya. Current land-leasing practices are faced by challenges: distrust from each other, exposure to fraud, limited market access, and limited data of the land. Other existing platforms like Landstock Kenya address the needs and requirements but not the special requirements of an agricultural user.

Farm Hub proposes to fill these gaps with a holistic platform that meets Kenyan agriculture's needs by stitching together information such as soil and climate information, integrating Google Maps, providing a secure verification process, and offering targeted market access. Farm Hub will transform the agricultural land lease into a more transparent, safer, and effective transaction that helps individual landowners and tenants while contributing to wider aspirations for sustainable agricultural development in Kenya. (Onofri et al., 2023b; Бурлан et al., 2016).

# 2.8 Theoretical/Conceptual framework.

**AVAILABLE LAND LISTING**

**LOCATION SERVICES**

**PAYMENT SERVICES**

**LAND LEASING SYSTEM**

**LANDOWNERS**

**TENANTS**

**LAND**

**BIDDING**

**AVAILABLE LAND LISTING**

## Figure 1: Theoretical Framework

This framework demonstrates how various components interact to connect landowners with tenants looking for agricultural land. Below is a concise explanation of each element and their relationships:

# Key Components:

1. **Landowners:**

They provide the supply side of the system by listing their available land for lease. This listing includes essential details such as size, location, and rental conditions.

# Tenants:

These are individuals or groups looking for agricultural land to lease. They interact with the system to find suitable land based on their preferences and affordability.

# Available Land Listing:

Acts as the central hub where all land listings are stored and displayed. It is fed by landowners and accessed by tenants.

# Climate and Location:

Integrates environmental data (e.g., weather conditions, soil type, and climate suitability) and geolocation services (e.g., maps) to help tenants make informed decisions about the land's agricultural viability.

# Payment Services:

Facilitates secure transactions between landowners and tenants. It ensures seamless and traceable payments through digital methods.

# Location Services:

Uses tools like Google Maps to provide precise land location and navigation for tenants, helping them visualize and locate available plots easily.

# Land Leasing System:

Serves as the core of the Farm Hub, linking all components together. It manages interactions between landowners, tenants, payment processes, and environmental data to streamline leasing.

# Relationships:

## Landowners and Available Land Listing:

Landowners upload their land details to the system, populating the land listing module.

## Tenants and Land Listing:

Tenants access the land listing module to search for land that meets their requirements.

## Climate & Location Integration:

Climate data and geolocation services support the decision-making process by providing information on land suitability.

## Payment Services and Tenants/Landowners:

Enables secure payment processing once tenants and landowners agree on terms.

## Land Leasing System:

Functions as the central processing unit, coordinating all modules to ensure seamless operation.

This theoretical framework outlines the flow of interactions and data between the stakeholders (landowners and tenants) and the core components of the FARM HUB system. It highlights the integration of user-friendly tools like payment systems, climate data, and location services, ensuring the system's functionality and reliability. This holistic approach supports both the leasing process and informed decision-making for agricultural purposes.

**CHAPTER THREE: METHODOLOGY**

# Introduction.

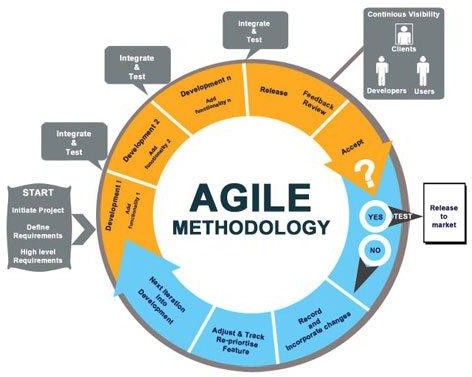
This study will aim to develop ‘FARM HUB’, a digital marketplace for agricultural land leasing in Kenya. This section describes the research methods that will be used, stages of research, justification of methodology, data collection, and chapter conclusion.

# Agile Methodology Overview

Agile is a methodology that is based on the incremental and iterative approach where

developers go through analysis, design, development, and testing stages. Agile is designed to be flexible and responsive, enabling the team to adapt to user feedback and changing

conditions throughout the development cycle. For FARM HUB this methodology will involve continuous iterative prototyping, and regular testing to deliver a robust platform that meets market demands. (Agile Implementation: A 6-Step Guide to Apply Agile, n.d.; Omonije, 2024)



## Figure 2: Agile Methodology Overview

# Agile process implementation

The agile process for the farm hub project will involve the following steps, repeated gradually. (Agile Implementation: The Approach, Process and Models, n.d.)

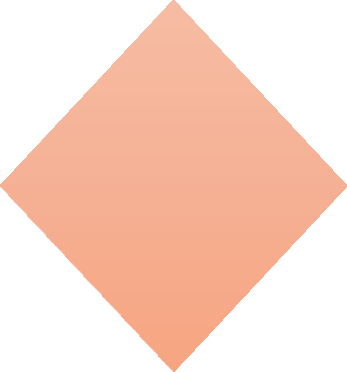
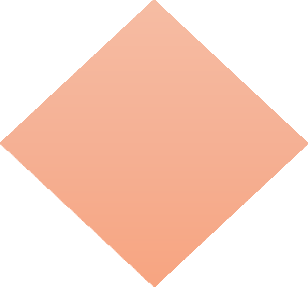
# planning phase

This is the first stage of the software development cycle; it will facilitate the development of planning how the entire process will be undertaken. It will help in the identification of the

resources that were required for the successful completion of the system. (Agile Guide to the Planning Processes - Agile Approach, n.d.; Agile Planning: Step-By-Step Guide |

Monday.Com Blog, n.d.)

Landowner Posts the available land



Tenant Searches for the available land

Is the land

Notifies the Customer

availabl

Tenant Clarifies Land Details

Get Land Details

If

Search for Another land

contented **NO**

with Details

**YES**

Rent the Land

Start Negotiation for payments

## Figure 3: Flowchart

# Requirement analysis phase

This phase will ensure that all project requirements are gathered, refined, and aligned with our needs. Requirements will be revisited frequently to adapt to the evolving needs. This phase is important in revealing important information surrounding the system such as user requirement, development requirements like environment and parameters that should be

placed to ensure successful development. This is where the developer will go out and collect data and the development requirements. (Requirements Analysis in an Agile World, n.d.)

# Design phase

After identifying and collecting all the system requirements the design phase will begin. This phase will involve the using of system design models to represent the architecture to present the architecture of the system to be developed.

The two main models applied are Use Case Diagrams, and Entity-Relationship Diagrams (ERD). Each model serves a unique purpose in translating requirements into a structured design. (Agile Design, n.d.; Agile Design | Overview, Process & Uses | Study.Com, n.d.)

1. **Use Case Diagrams:** Use Case Diagrams provide a high-level view of user interactions with the Farm Hub platform. These diagrams outline the primary user roles, including landowners, tenants, and administrators, and illustrate how each role interacts with core

functionalities.

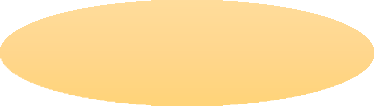
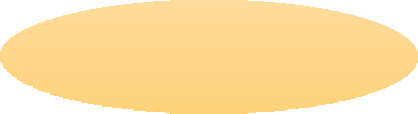
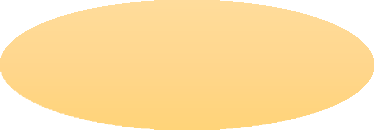
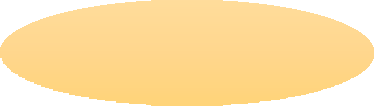
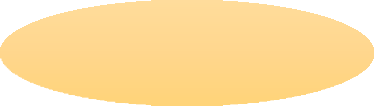
The Use Case Diagram for Farm Hub illustrates how different users interact with the system.

At its core, there are three main types of users: landowners who want to lease their

agricultural land, tenants searching for land to rent, and administrators who manage the platform. Landowners can register accounts, post their available land, manage their listings, and communicate with potential tenants. Tenants, on the other hand, can search for suitable land based on their preferences, view detailed property information, and initiate lease

agreements. The system also integrates with external services - a payment gateway for secure transactions, weather services for real-time climate data, and Google Maps for location

services. Administrators oversee the entire platform, managing user accounts and ensuring smooth operations.



**FARM HUB SYSTEM**

**Log in**

**Land Posting**

**Land Searching**

**Viewing Land Information**

**Payment System**

**TENANT**

**SERVER**

**LAND OWNER**

## Figure 4:Entity Relationship Diagram

1. **Entity-Relationship Diagrams (ERD):** The ERD provides a detailed structure of the database design, critical for managing the various data points Farm Hub will handle. Key entities include User Profiles (for both landowners and tenants), Land Listings, Lease Agreements, and Location Data (which includes attributes like soil type and climate information).

The Farm Hub database centers on four key entities: Users, Land Listings, Messages, and Payments. The Users table maintains profiles for both landowners and tenants with their contact and verification details. Land Listings stores property information including size, location, and price, linked to property owners. Messages tracks communications between

users about specific listings, while Payments records all lease transactions between tenants and landowners. These entities are interconnected through foreign keys, allowing the system to efficiently manage the entire land leasing process.

# Development phase

In this phase, this is where the developers will develop the system based on the architecture and models developed in the design phase. This phase will be carried out iteratively and incrementally, ensuring timely delivery and high-quality results. (Agile Software

Development Life Cycle, Phases, Tools, n.d.)

# main activities.

1. A frontend framework such as React or Angular will be used to create a user-friendly and responsive interface.
2. A backend framework like Node.js will be employed to handle server-side logic and data processing
3. An Effective database system like MYSQL will be used to store data, land listings and transaction history.

# Testing

Upon completing the system, the system will undergo series of tests to ensure it meets all

objectives of the research, is user friendly and it implements the design laid out for it: (Agile Testing Process - Principles, Methods & Advantages - Reqtest, n.d.)

1. User ability test- this will be conducted to determine how use able and user friendly it is.

Few respondents will be chosen to test and feedback will be used to correct errors.

1. Functional test- this will be conducted to test out the system's functional and non- functional requirements.
2. Validation- to validate the system, five respondents will be chosen to test the system and ensure the process of submitting projects and getting feedback is complete. Feedback

collected from the testing will be analyzed to come up with validation.

# Justification of Methodology

The agile methodology was chosen because of the following reasons.

* It offers flexible and iterative improvements which align perfectly with the goals and constraints of the project.
* It welcomes changes in requirements even late in development, it processes

harnessing this change for the customer competitive giving an additional advantage.

* The agile methodology provides a faster market strategy with a greater guarantee of user acceptance due to a constant user engagement in development process.
* Efficiency in Resource Management: Agile ensures optimal use of time and resources by focusing on high-priority features first.
* Team Collaboration: The Agile approach promotes continuous collaboration among

the development team, soil and climate experts, and marketing professionals, ensuring that the final product is well-rounded and practical.

Agile will ensure that the platform remains relevant, user-friendly, and responsive to market demands, ultimately supporting Farm hub’s mission to enhance land leasing efficiency in

Kenya.

# Data collection

To ensure that Farm Hub addresses the needs of its users effectively, a comprehensive data collection process is implemented.

## Primary Data Collection

* User Surveys and Interviews: Gather insights from landowners, tenants, and

agricultural experts about challenges in land leasing and desired platform features.

* Focus Groups: Facilitate discussions to validate proposed features and usability.
* Observation: Study current land leasing practices to identify inefficiencies and opportunities for optimization.

## Secondary Data Collection

Review of Existing Literature: Analyse research on land leasing, agricultural productivity, and digital platforms.

* Analysis of Existing Platforms: Evaluate competitors like Landstock Kenya to identify gaps and areas for improvement.
* Soil and Climatic Data: Collaborate with agricultural and weather organizations to gather relevant data for the platform.

# Tools and Techniques for Data Collection

* + - * Digital surveys (e.g., Google Forms)
      * Statistical analysis tools (e.g., SPSS, Excel)
      * APIs for agricultural and climatic data
      * Moderated focus group discussions

# Conclusion

This chapter takes an in-depth look at all methods that will be used in the planning, analysis, design, and development of the Farmhub system. Through the methodology, the research can come up with a clear picture of the prototype implementation process taking into account the software development and tools required. Continuous testing and iterative improvements

ensure that Farm Hub will address the challenges of agricultural land leasing in Kenya effectively.

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**APPENDECIES.**

**WORKPLAN**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Weeks**  **ACTIVITY** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** |
| Define requirements, workflows, and architecture design. |  |  |  |  |  |  |  |  |  |  |  |  |
| Build user interfaces (UI) for  account creation, land posting, browsing, and payments. |  |  |  |  |  |  |  |  |  |  |  |  |
| Develop user authentication, payment integration, and  database management. |  |  |  |  |  |  |  |  |  |  |  |  |
| Integrate weather API, Google  Maps, and interactive chat. |  |  |  |  |  |  |  |  |  |  |  |  |
| Test functionality,  compatibility, and security of the platform. |  |  |  |  |  |  |  |  |  |  |  |  |
| Deploy the system on a  hosting platform and launch. |  |  |  |  |  |  |  |  |  |  |  |  |
| Train users on system use and gather feedback for  improvements. |  |  |  |  |  |  |  |  |  |  |  |  |

***Table 1: Work Plan***

**BUDGET**

***Table 2: Budget***

|  |  |  |
| --- | --- | --- |
| ITEM | QUANTITY | PRICE |
| LAPTOPS | 2 | 100,000 |
| WIFI | 20MBS | 3500 |
| PRINTING | 35PAGES + BINDING | 400 |
| TOTAL |  | 103,900 |