INFORMATION MANAGEMENT SYSTEM FOR THE DISTRIBUTION OF FARM INPUTS:

A CASE OF LUWERO DISTRICT.

By

Group 30

DEPARTMENT OF INFORMATION SYSTEMS.

SCHOOL OF COMPUTING AND INFORMATICS TECHNOLOGY

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DECLARATION

We, group 30, hereby declare that this report is our own original work and that it has not been presented and will not be presented by any other group. The information contained in this report has been compiled with the utmost care and accuracy within the parameters specified in this document. Any decision based on the content of this report is however the sole responsibility of the decision maker.

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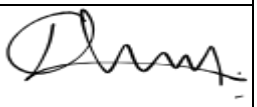
AYEBALE APOLLO	**1900700766**	**19/U/0766**	
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DEDICATION

We dedicate this report to the almighty God for the gift of life he has rendered to us, our parents and guardians who have been always there for us for our duration of our stay in Makerere University.

It also dedicated to all our lecturers who have taught us for the past three years and given us the knowledge which helped us to write this report.

Finally, it's also dedicated to our dear supervisor Dr. Hawa Nyende for her guidance, and moral support given to us during the time when we were working on this project.

ACKNOWLEDGEMENT

We acknowledge and thank the Almighty God who has given us the gift of life, strength, wisdom and enabling us to complete this project.

We also want to acknowledge our parents and guardians who taught us the value of hard work by their own example and we also thank them for having supported us both morally and financially.

To our dear lecturers who have made us what we are now because of their efforts and love towards our learning

To our fellow students for the spirit of sharing ideas through discussions for the past three years of our stay at Makerere university.

Special thanks go to our own supervisor Dr. Hawa Nyende for her resourceful support, guidance and time she has offered to us throughout the course of this project. We choose this moment to acknowledge her contribution gratefully. May the almighty Allah grant her all she deserves.

ABSTRACT

The information management system for the distribution of farm inputs is a system that enables farmers to receive information in form of feedback from the Ministry of Agriculture, Animal Industry and Fisheries, and NAADs about farm inputs distribution.
It will also enable farmers to apply and receive farm inputs from the Ministry of Agriculture, Animal Industry and Fisheries, and NAADs using both a portal for farmers with internet enabled devices and USSD for those without internet enabled devices.

The system was developed because of the problem of inappropriate management of information related to distribution of farm inputs, this was due to lack of clear information management in relation to distribution of farm inputs.

The system requirements for the developed system were collected using questionnaires and interviewing the farmers in Luwero district and officials from the Ministry of Agriculture, Animal Industry and Fisheries.
Data from the interviews and questionnaires was analyzed using SPSS and excel to come up with the functional, non-functional system requirements.

The requirements were later used to design the system by creating data flow diagrams and entity relationship diagrams. The designed system was implemented using different development tools which are; HTML for creating interfaces, MySQL was used to build database and PHP as server side scripting language to connect the user interfaces to the databases.

Improvements and enhancements of the systems are highly possible and viable such as the current functions in order to produce better output.

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LIST OF ACRONYMS

AGRA: Alliance for a Green Revolution in Africa.

DFD: Data Flow Diagrams

ERDs: Entity relationship diagrams

GDP: Growth Domestic product

HTML: Hypertext mark-up language

CSS: Cascading style sheets

IoAT: Internet of Agricultural Things

MAAIF: Ministry of Agriculture, Animal Industry and Fisheries, Animal Industry and Fisheries

MSC: Message Sequence Charts

MYSQL: My sequence Query language

NAADS: National Agricultural Advisory services

NDP: National Development Plan

OWC: Operation Wealth creation

PHP: Hypertext processor

USSD: Unstructured supplementary service Data

CHAPTER

INTRODUCTION

This research focused on development of Information management system for distribution of farm inputs. The system that enables farmers to receive information from the Ministry of Agriculture, Animal Industry and Fisheries about farm inputs distribution. The system also enables farmers to apply and receive farm inputs from the Ministry of Agriculture, Animal Industry and Fisheries using both website for farmers with internet supported devices and USSD for those without internet supported devices.

The system also enables the government and other agricultural organizations in the registration of farmers legible to receive farm inputs.
In addition to that, the system manages records of the distributed farm inputs, the distributor's details and the recipient details.

Therefore, this section comprises of background to the problem, problem statement, main objective, specific objectives, and research scope and research significance.

1.1 Background

Uganda's vision 2040 is to transform Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years. This vision is to be achieved through engaging the citizens in the commercial activities like farming by distributing farmers with agricultural inputs. (NDP, 2015).

The Government's mission in the agriculture sector is to transform subsistence farming to commercial agriculture. Agriculture is the main source of economic livelihood for the majority of Uganda's population. The Agricultural sector contributes 23.2% of GDP and the majority of the population directly or indirectly depend on agriculture. (WORLDBANK, 2013).

In 2001, the government of Uganda through the Ministry of Agriculture, Animal Industry and Fisheries animal industry and fisheries (MAAIF) established National Agriculture Advisory Services (NAADS). NAADS is one of the statutory semi-autonomous bodies in the Ministry of Agriculture, Animal Industry and Fisheries, Animal Industry and Fisheries (MAAIF); this was established in 2001 by an Act of

Parliament (NAADS Act 2001) to specifically facilitate efficient and effective delivery of agricultural advisory services. (NAADS, 2001)

However, much as NAADS was established to facilitate efficient and effective delivery of agricultural advisory services, the government also established Operation Wealth Creation (OWC).

OWC was launched by H.E the President of the Republic of Uganda in July 2013 as an intervention to replace NAADs and efficiently facilitate national social-economic transformation, with a focus on raising household incomes and wealth creation by transforming subsistence farmers into commercial farmers. (OWC, 2013)

The distribution of agricultural inputs is a decentralized service that is mainly undertaken by Ministry of Agriculture, Animal Industry and Fisheries, Animal industry and Fisheries (MAAIF) and the semi-autonomous agencies through local governments to ensure service delivery to intended beneficiaries.

The distribution focuses on agricultural inputs such as; seeds and seedlings, fertilizers, agro-chemicals, cultivators, levelers, irrigation pump sets, motors, sheds and animals. This distribution strategy is aimed at increasing productivity in food cultivation, animal husbandry and export promotion.

The distribution process of farm inputs in Uganda is associated with challenges such as failure of local governments to follow established criteria for distribution, late release of funds that partly contributes to the late delivery of farm inputs, inadequate supervision and monitoring of the distribution of farm inputs.

Therefore, the main aim of this research is to develop an information management system that enables the Ministry of Agriculture, Animal Industry and Fisheries, Animal Industry and Fisheries (MAAIF) and NAADs to distribute farm inputs to the farmers.

1.2 Problem statement

The government has tried to improve the livelihood of farmers through the distribution of agricultural farm inputs to both the local and the modernized farmers through the establishment of NAADs in 2001 (NAADS, 2001) and Operation Wealth Creation (OWC) in 2013 (OWC, 2013)

Much as the government has come up with these programs of NAADs and OWC, the government has been faced with the problem of inappropriate management of information related to distribution of farm inputs, this is due to lack of clear information management in relation to distribution of farm inputs. This

has hindered the government's plan in agricultural sector to transform subsistence agriculture to commercial agriculture due to shortage of information regarding farmers and farm inputs distribution.

In attempt to have a solution to these challenges, we developed an information management system for distribution of farm inputs to enables farmers to receive information from MAAIF and NAADs. The information is about farm inputs distribution processes using text messages and emails. Also there is a USSD code to request for services by farmers without internet enabled devices. It also enables the government in registration of farmers legible to receive farm inputs.

1.3 Objectives and aims.

1.3.1 Main objective.

The main objective of this research was to develop a system that enables the Ministry of Agriculture, Animal Industry and Fisheries, Animal Industry and Fisheries (MAAIF) to manage information regarding to the distribution of farm inputs to the farmers.

1.3.2 Specific objectives.

i. To identify system requirements by reviewing existing information management systems for the distribution of agricultural inputs.
ii. To design an information management system for the distribution of farm inputs.
iii. To implement the designed information management system for the distribution of farm inputs.
iv. To test and validate the information management system for the distribution of farm inputs

1.4 Research scope

This consists of geographical and functional scope as explained in section 1.4.1 and 1.4.2

1.4.1 Geographical Scope

The geographical scope of this study covered specifically Luwero district. Luwero was selected due to the following reasons;

The distance is close to Makerere university and this makes our research feasible, here we can easily reach the ground and interview farmers.

Luwero is one of the leading agricultural districts in central Uganda with several agricultural activities (Michael, 2001).

There has been distribution of farm inputs to the farmers for example livestock distribution in sub counties of Buntuntumula, Makulubita, Bamunanika (Sarah, 2011) in Luwero district.

1.4.2 Functional scope

i. The system enables government and other agricultural organizations in the registration of farmers legible to receive farm inputs.

ii. The system manages records of the distributed farm inputs, the distributor's details and the recipient details.

1.5 Significance of the study

The research allowed us understand the benefit of the system to the following people either directly or indirectly in the following ways: -

1.5.1 The Farmers

i. The system will enable farmers to receive information from the government through MAAIF and NAADs regarding farm inputs distribution and be able to apply for farm inputs.

ii. The system will enable farmers to interact with the agricultural officials.

1.5.2 The Government

i. The system will enable the government to make appropriate budget on the distribution of farm inputs.

ii. The system will enable the government to record particular number of farmers in a particular area ready to receive farm inputs.

iii. The system will enable the government to distribute farm inputs using the records of farmers in the system.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter introduces us to the available literature of different scholars that is related to information management systems for distribution of farm inputs.

It includes types of farm inputs, various literature about Systems and Applications put in place locally and globally which involve the distribution of farm inputs.

2.2 Types of farm inputs

Agricultural inputs are identified into two types, that is; consumable inputs and capital inputs. The consumable inputs are those products used commonly for small scale farms like seeds, fertilizers and insecticides.

While the capital inputs are materials such as tractors and materials such as wood, wrought iron, strong synthetics or plastics and wire. (Eastwestseed, 2018)

2.3 Existing systems and applications related to distribution of farm inputs

This section gives brief overview of existing computer based systems currently being used in agriculture sector to record farm inputs distributed.

2.3.1 Famunera Web App

Famunera is a digital (USSD, Web App and Call Center) marketplace that sources for genuine quality affordable farm inputs and also provides convenient last-mile delivery within 24 hours to farmers across Uganda (Famunera, 2016)

Since the official launch of Famunera web app in 2016, the app has served over 110,000 farmers, 150 agribusinesses and created over 5000 indirect jobs across the entire agriculture value-chain in Uganda

2.3.2 Internet of agriculture things

According to FarmERP, Internet of Agricultural Things (IoAT) provides enterprises with vital insights into farm conditions to make well-informed decisions for better agricultural productivity. FarmERP's IoAT-based system optimizes the use of resources and ensures more productive agricultural practices (FARMERP, 2021).

By providing sensors, automated irrigation systems, weather stations and biometric systems, FarmERP enables enterprises to enhance their agribusiness operations. FarmERP also facilitates the integration of partner devices as well as client devices to ensure ease in implementation and management.

FarmERP enables the integration of machinery tracking devices to keep track of machinery usage and fuel consumption. This can help agribusinesses to aptly manage and optimize the use of machinery for maximum efficiency.

2.3.3 AGRA - Alliance for a Green Revolution in Africa.

Following initial agro-dealer development pilot initiatives funded by The Rockefeller Foundation, AGRA took the work to scale in sub-Saharan Africa with the objective of creating numerous points of sale for farm inputs in rural areas close to smallholder farmers (AGGRA, 2015).

This strategy enhances availability, accessibility and affordability of inputs by reducing the distance farmers' travel and by increasing farmer awareness through shops within the villages.

AGRA works with the hub agro-dealers to expand the network of new retail agro-dealers by encouraging each hub to identify and establish business linkages with 10 to 50 retail agro-dealers, depending on farmer populations and the volume of business. New retail agro-dealers receive basic training in business management and product knowledge (AGGRA, 2015).

2.3.4 Comparison Evaluation

In this section we compare the above existing systems with the Information Management System for the distribution of farm inputs.

Table 1 Agricultural systems' features comparisons

Features	Famunera web app	Internet Of Agriculture things	AGRA	Information management system for distribution of farm inputs
Connects government and agriculture organizations directly to farmers	✗	✗	✓	✓
Ability to select Inputs and view products	✓	✗	✓	✓
Text message, Mobile APP or Website alerts	✓	✓	✓	✓
Adoption of the system in Uganda	✓	✗	✗	✓
Use of USSD code	✓	✗	✗	✓

2.4 Conclusion

All the above technologies have been put in place to solve the problem of agricultural products information on the markets globally and nationally. However, they mainly base on displaying agricultural products. In addition, these systems do not give the farmers a chance to view the Agricultural farm inputs alternatives. Also these technologies are not able to create a farmer-government and farmer-agricultural organizations relationship. Hence the above existing technologies are not effective and not convenient compared to the Information management system for distribution of farm inputs as illustrated in table 1.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter of the report focuses on explaining how the objectives were achieved. We therefore present the Research Design in Section 3.2, Data Collection Methods in Section 3.3, Data Collection Tools and Techniques in section 3.4, Design Methods in Section 3.5, Implementation in Section 3.6 and Testing and Validation in Section 3.7

3.2 Research design

In this study, we used quantitative and qualitative approaches, according to Kumar (2005), a research design serves as a plan, structure or strategy of investigation, or the arrangements of conditions for collection and analysis of data.

This study based on a descriptive research designs which helped us gather data from a wide range of respondents on the development of the information management system for the distribution of farm inputs.

3.3 Data collection methods

In this study, we employed survey research methods to collect data. Survey research methods involved collecting primary data through administering questionnaires that consisted of a predetermined set of questions. Secondary data was also obtained from Journals and Reports in relation to the distribution of farm inputs in Uganda.

In addition, interviews were conducted with seven officials in agricultural offices at both the Sub County and district level and 28 local farmers in Luwero district.

3.4 Data collection tools and techniques

This study employed two research instruments: Interview Guides and Questionnaires

3.4.1 Interviews

An interview is a face-to-face conversation between the interviewer and the interviewee, where the interviewer seeks replies from the interviewee for choosing a potential human resource (Rowley, 2012).

We used an interview guide as shown in appendix b to interview system users.

We conducted face to face interviews with 28 farmers from sub counties of Zilobwe, Luwero town council, and Buntuntumula in Luwero district which helped us to get a better understanding about the distribution of farm inputs to farmers in Luwero.

We also had face to face interviews with 7 agricultural officials. They helped us identify the frustrations they face when getting farmers information and report generation when it comes to accountability.

3.4.2 Questionnaires

We administered questionnaires to 7 agricultural officials of Luwero district who were not interviewed that is to say agricultural engineer, soil and plant scientist, conservation planner and agricultural salesperson.

Questionnaires were also given to 28 farmers who were not interviewed.

3.4.3 Observation

We used our naked eyes to see the kind of crops grown in Luwero, the records of farm input supply at the district. This was a means of verifying information that respondents would have provided through interviews and questionnaires.

3.4.4 Data analysis methods

Quantitative data obtained through questionnaires was arranged in order of priority and similar responses were grouped.

We entered quantitative data into Microsoft Excel and categorized into different graphs and illustrations. We then identified the problems associated with the current system by studying both qualitative and quantitative outcomes from data. This enabled to determine requirements for information management system for the distribution of farm inputs.

3.5 Design Methods

In this section we look at Process Modeling, Functional Modeling and Data Modeling.

3.5.1 Functional Modeling

This refers to a structured representation of functions (activities, actions, processes, operations) within the modeled system (Campean & Yildirim, 2017). In this project, Sequence diagrams based on the Message Sequence Charts (MSC) of the Specification and Description Language was used to show the inputs to the system, the outputs of the system as well as the internal data stores

3.5.2 Data Modeling

Data modeling is the process of creating a simplified diagram of a software system and the data elements it contains, using text and symbols to represent the data and how it flows using DFDs (Rudy Hirschheim, 2003).

In this project, Entity relationship diagrams (ERDs) were used to show the relationships between entities, attributes and to facilitate communication about the information requirements (Kahn, Batson, & Schilling, 2012). We used Microsoft Visio to come up with ERDs.

The conceptual data model; is a structured business view of the data required to support business processes, record business events, and track related performance measures (Trinkunas & Vasilecas, 2007). This model focused on identifying the data used in the business but not processing flow or physical characteristics.

3.6 Implementation

Implementation is the process of defining how the information system should be built (Eynard, Gallet, Roucoules, & Ducellier, 2006).

Physical realization of the proposed system was done using a number of implementation tools and technologies such as HTML 5, CSS, MySQL, PHP and Bootstrap as defined below:

3.6.1 MySQL

MySQL is an open source relational database management System that uses Structured Query Language (Nixon, 2021). This was used to run the system database.

3.6.2 Hypertext Markup Language

Hypertext Markup Language (HTML) is a predominant markup language used for designing web pages (Apoorva, et al., 2021). This is open source and user friendly and was used to develop the user interface of information management system for the distribution of farm inputs.

3.6.3 Cascading Style Sheets

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language (Apoorva, et al., 2021), CSS was used to implement the user interfaces as derived from the design prototype of the system.

3.6.4 PHP

PHP is a server scripting language, and a powerful tool for making dynamic and interactive Web pages (Nixon, 2021).

PHP is a server-side scripting language that was used to connect the front and back end parts of the system.

3.7 Testing and validation

This section is about the methods that we used to test and validate the information system for distribution of farm inputs.

3.7.1 System testing

Testing is the process of evaluating a system by manual or automated means (Mukherjee & Patnaik, 2020).

Under testing and validation, we used unit testing, system integration testing and usability testing as indicated below;

Unit testing is a software development process in which the smallest testable parts of a system called units are individually and independently scrutinized for proper operation. (Kim, Kim, & Kim, 2013)

Individual units of the information management system for the distribution of farm inputs were tested to validate if they functioned as expected.

We also carried out partial testing of the system where we tested its independent parts. This involved testing the system back-end database through running individual SQL statements from MySQL console instead of system user interfaces. It also involved testing the middle tier Apache web server through running HTTP commands on the server from browser window.

We checked for errors through integrative testing by running the built system on the computer systems. This helped identify run-time errors as well as ascertain that system application programs function as programmed.

3.7.2 System validation

Usability testing is the practice of testing how easy a design is to use with a group of representative users. (Carty, 2022).

To validate the system, we took the system to farmers in the three sub counties of Luwero that is to say Luwero town council, Zilobwe and Buntuntumula in Luwero district. We gave it to 7 agricultural officers

from each sub county and five farmers from each of the three sub counties.

A farmer was required to create an account where he was prompted to put in his email, full names and phone number. A confirmation email was then received requiring a farmer to verify his or her details and then linked to the dashboard where he or she can apply for the preferred farm input and quantity. Then the agricultural officer approved some requests and rejected some and it worked out as we expected.

CHAPTER FOUR
SYSTEM ANALYSIS AND DESIGN

This chapter provides a detailed description of the current system with respect to the distribution of farm inputs to farmers and gives an in-depth analysis of the requirements of the new system as well as the design parameters.

4.1 Study of the existing system

During research, interviews and questionnaires were used to collect information about distribution of farm inputs in Luwero district. We discovered that most of the information recording and report generation is done manually. Sub county agricultural officials store farmers' information and farm inputs and their distribution process using Microsoft excel and then handed over to the district agriculture officer, who then makes a report to the Chief administration officer.

Sometimes sub county agricultural officials misplace farmers and farm inputs information and this results into inconsistence in reports. Should there be absenteeism of any sub county agricultural official due to illness, the process slows down because sometimes those that stand-in do not understand how he or she handles his or her work.

4.1.1 Strengths of the existing system

After collecting information about the existing system in Luwero district, we discovered the following strengths;

i. The system captures all details of the farmers.
ii. The system captures information about farm inputs.
iii. The current system helps avoid duplication of the farm inputs distribution reports. All information is written down with a pen and clearly signed by each sub county agricultural official and the district agricultural official.
iv. The existing manual system uses readily available resources like papers, these are easy to find as compared to computers.

4.1.2 Weakness of the existing system

The following weaknesses were identified with the existing farm input distribution information system in Luwero district;

i. The system is prone to errors since information recording is done manually by the agricultural officials for a long time.
ii. It is time consuming especially during filling in farmer records and farm inputs and the distribution process records by the agricultural officials.
iii. File based storage system poses danger to the records in case of destructions like fire outbreaks, floods, and theft. This can lead to loss of farmers' and input reports.
iv. The system has poor security management as it ensures mostly physical security which can easily be breached hence locating files for malicious intentions.

4.2 Data analysis.

We carried out interviews using interview guides and issued questionnaires to those who were not interviewed to collect data that was used in data analysis.

4.2.1 Findings from our research.

A total of 28 farmers and 7 agricultural farms were interviewed. We also administered questionnaires to a total of 28 farmers and 7 agricultural officials who could not be interviewed.

We observed that the system in existence at Luwero district was tiresome and prone to errors during farmers and distributed farm inputs recording.

4.2.2 Results from interviews

Types of farmers in Luwero district.

Out of 28 farmers that we were able to interview in Luwero district, we found out that 54.3% of 28 farmers operated on a small scale and 45.7% operated on a large scale as shown in figure 1 below.

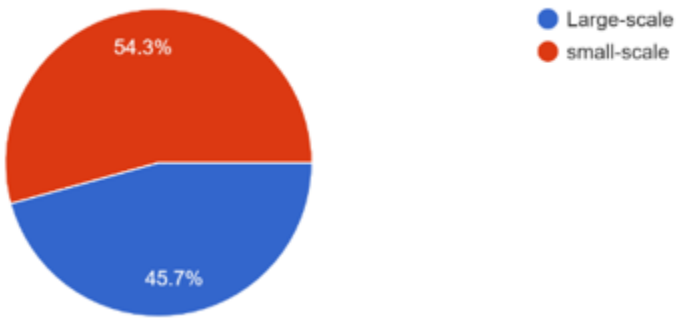


Figure 1: shows the type of a farmer

On the question relating to the location of the farmer, out of 28 farmers that we interviewed, 14 were coming from Luwero town council, 8 from Zilobwe Sub County and 6 from Buntuntumula Sub County as shown in figure 2 below.

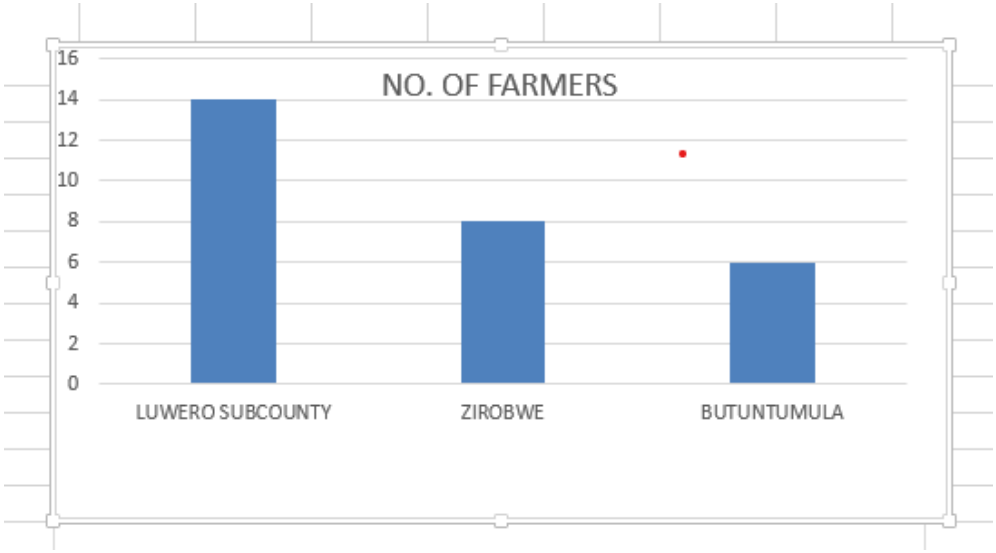


Figure 2: shows the sub county where the farmer is coming from

On the question relating to whether the farmers had smart phones or not, we found out that out of 28 farmers that we interviewed, 51.4% of 28 had no smart phones and 48.6% of 28 farmers had smart phones as shown in the figure 3 below.

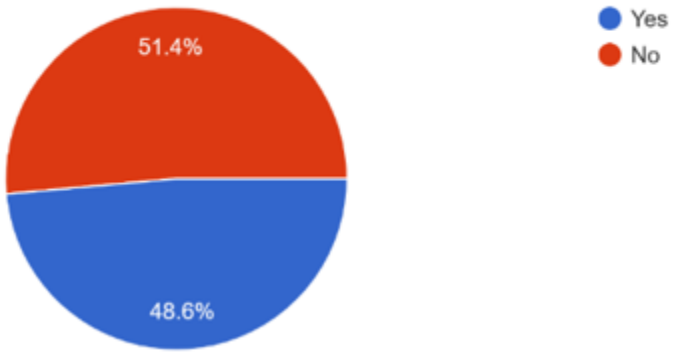


Figure 3: shows the number of farmers with smart phones and without

On the question relating whether farmers were able to use smart phones or not, out of 28 farmers that we interviewed, we found out that 51.4 of 28 farmers could not use the smartphones and 48.6% of 28 farmers could use the smart phones the shown in figure 4 below.

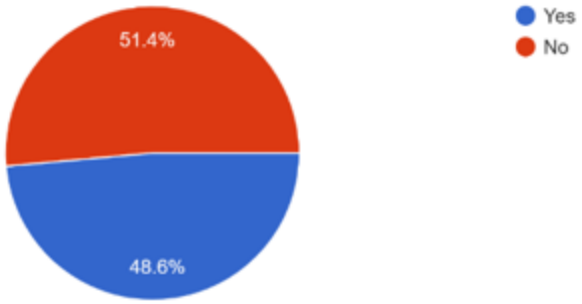


Figure 4 show those who can use smart phones

Regarding whether farmers were able to access the internet or not, out of 28 farmers that we interviewed, we found out that 37.1 % of 28 farmers could access and sometimes could not access the internet, 60% of 28 farmers could not access the internet and only 2.9% of 28 farmers could be able to access the internet as shown in the shown in figure 5 below.

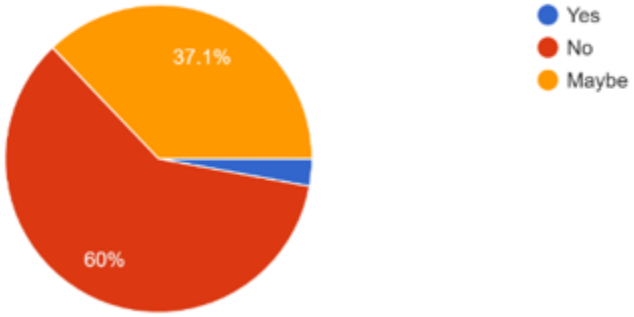


Figure 5 shows the number of farmers without access to internet

Types of farm inputs received by farmers in Luwero;

Out of 28 farmers that we were able to interview, 14 farmers received crops, 6 received animals, 4 received machinery and only 2 farmers could receive all the above inputs as shown in the figure 6 below.

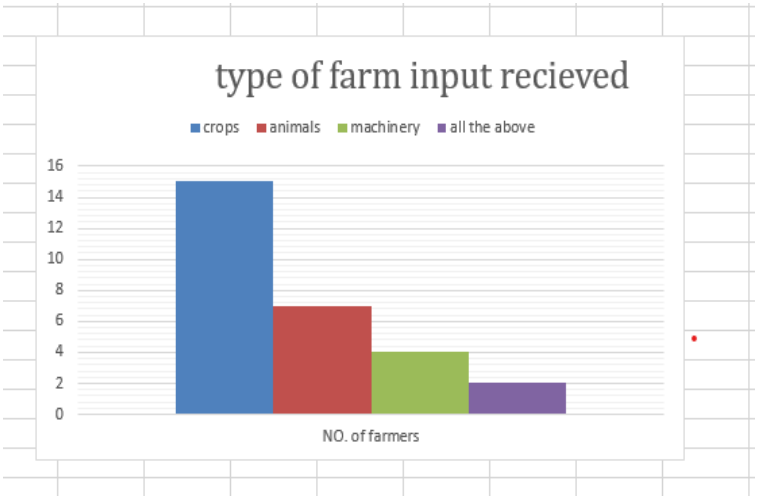


Figure 6 shows type of farm input received

About how long have the farmers been receiving farm inputs, we found out that most of the farmers have received the inputs in the period of 1-5 years as shown in the figure 7 below.

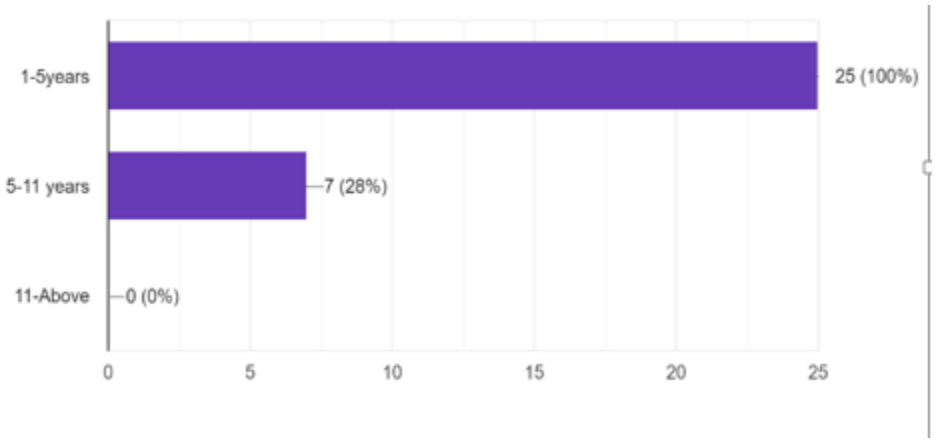


Figure 7 shows the rate at which farmers receive farm inputs

Concerning problems faced by the farmers during the distribution of farm inputs, we found out that farmers majorly face a problem of poor timing and poor quality of supplies as shown in figure 8 below

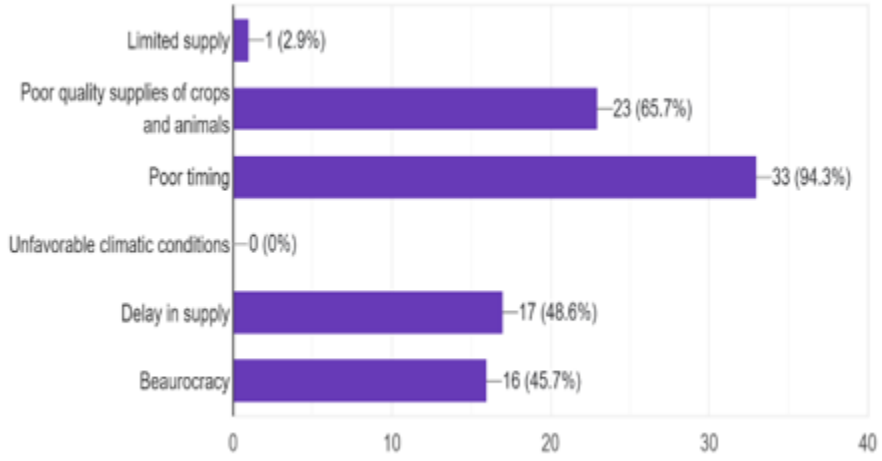


Figure 8 shows problems faced during supply

Most supplied farm inputs in Luwero district.

Out of 28 farmers that we interviewed, we found out that the most supplied farm input was coffee, followed by maize seeds, followed by bean seeds then goats is the least supplied farm input as shown in figure 9 below.

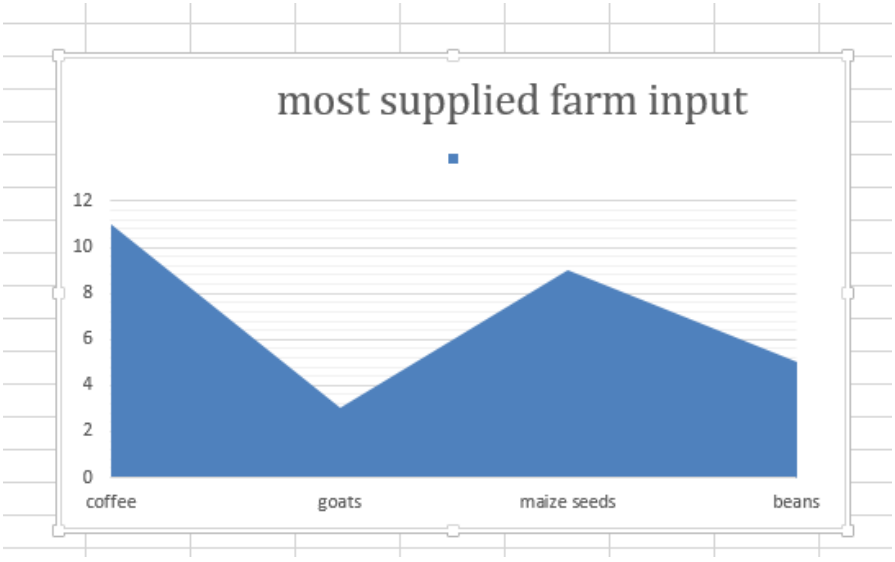


Figure 9 shows most supplied farm input

On the issue of problems faced by farmers in Luwero district, we found out that most farmers faced a problem of limited supply as shown in figure 10 below.

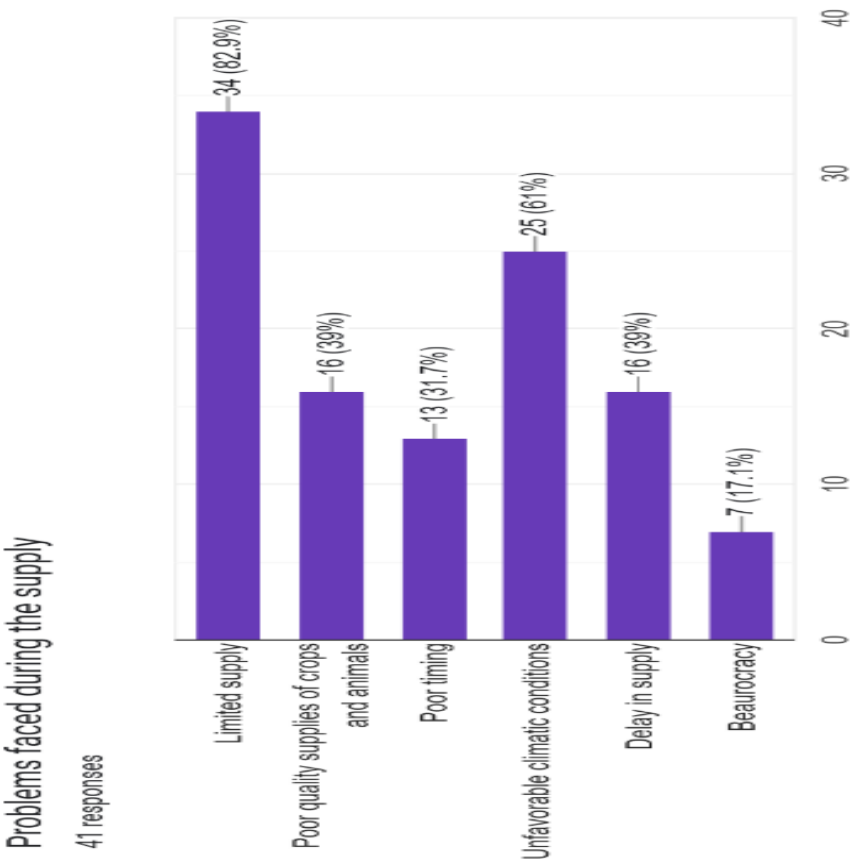


Figure 10 shows problems faced by farmers

4.2.3 Findings from agricultural officials

Location of the Agricultural officers in Luwero district.

Out of 7 officials that we interviewed from Luwero district, 71% out of 7 officials were from the district and only 29% of 7 officials were from the sub county level.

Problems faced by agricultural officers during the distribution of farm inputs in Luwero district.

Out of the 7 officials that we were able to interview, we found out that mainly they faced a problem of poor quality of supplies and poor storage facilities as shown in the figure 11 below.

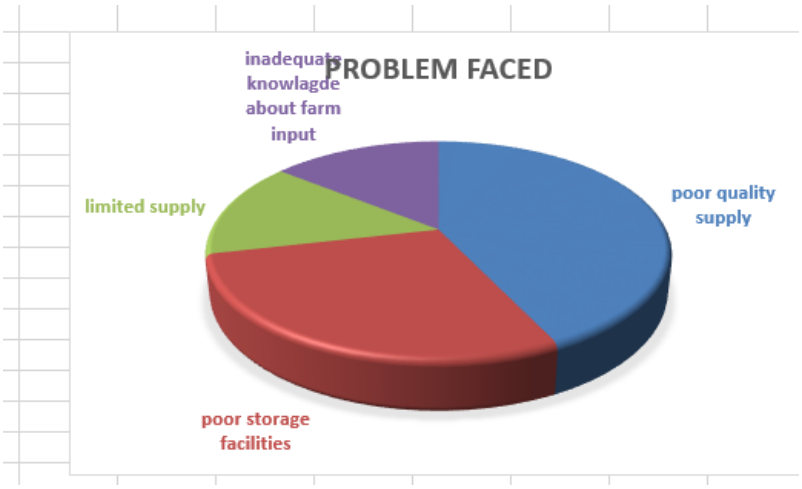


Figure 11 shows problems faced during the supply of inputs

How the agricultural officers have managed to solve the above problems;

1. Agricultural officers sensitize farmers by informing farmers about the available inputs.
2. They ensure supplying contracts are given to recognized contractors.
3. Taking of records whenever the supply is made is ensured.

4.2.4 Summary of key findings

- Out of 28 farmers who were interviewed in Luwero district, we found out that 54.3% of 28 are small scales farmers and 45.7% 0f 28 are large-scale farmers.
- According NAADS coordinator of Luwero town council, Farm inputs have been distributed as follows;

  Ministry of Agriculture, Animal Industry and Fisheries has always brought farm inputs on the sub county headquarters. It is the work of the coordinators to make announcements through local radio

stations and putting information on the noticeboards. This is to inform the public about the availability of the inputs ready to be distributed.

- The most distributed farm input to farmers in Luwero is coffee seedlings

The distribution process has mainly faced the following problems.

- Poor accountability. Ministry of Agriculture, Animal Industry and Fisheries has faced this problem given the fact that there is no direct communication with farmers to confirm that they have received a specific farm input and in what quantities.
- Poor storage. Farm inputs do not have proper storage facilities when delivered at the sub county headquarters, which makes them, get perished before they are distributed to farmers.
- Poor timing. Sometimes farm inputs specifically seedlings are distributed in un appropriate seasons where they can't yield when planted

4.3 System requirements.

This section describes the hardware components and software requirements needed for effective and efficient performance of the system.

4.3.1 Software requirements.

Table 2: shows the minimum software requirements

Software	Minimum system requirements
Operating system	Windows 10,11, server 2003 or later, Linux
Database management system	MySQL
Web server	XAMPP,WAMP
Web browser	Chrome, Mozilla Firefox, Microsoft Edge, Opera Safari.

4.3.2 Hardware minimum requirements

Table 3 : shows minimum hardware requirements

Hardware	Minimum system requirements
Processor	2.4 GHz processor speed
Memory	512 MB Ram (1 GB Recommended)
Disk space	500GB (Including 80gb for database management system
Display	800*60 colors (1024*768 high color- 16 bit recommended)

4.4 Functional requirements

These requirements are both functional and non-functional as explained below

4.4.1 Functional requirements

(a) **To the farmer**

I. The system should enable farmers to register revealing the necessary information about them for example name, sub county, village, phone number and description of what they do.
II. The system should also enable farmers to apply for specific farm inputs basing on the category of input they registered for.
III. The system should enable farmers to apply for farm inputs using USSD.
IV. The system should also send notification emails and a messages to farmers when their applications have been successful approved.
V. The system should enable the farmer to cancel his/her application when it's not yet approved

(b) **To the MAAIF/ADMIN**

VI. The system should enable Ministry of Agriculture, Animal Industry and Fisheries to input/feed in farm inputs that are available for distribution.
VII. The system should enable the admin (MAAIF) to accept or reject farmers who have applied for the farm inputs

VIII. The system should as well enable the admin to add the available farm inputs ready to be distributed.

IX. The system should enable the admin to generate reports of farmers, applications, distributions and users.

X. The system should enable admin to update, add and delete farm inputs

XI. The system should enable the admin to add a distribution after accepting the application made by the farmer.

4.4.2 Non- functional requirements

I. The system should be reliable. It should produce the same results under the same situations on repeated occasions.

II. The system should be secure. Only registered users should be authorized to login.

III. The system should detect user login errors.

IV. The system should be accessible using both internet enabled phones and none internet enabled phones.

V. The system should be accessible from anywhere irrespective of the user location

4.5 System design.

This section defines the physical, architectural design, logical design and the database design needed to meet specific requirements.

4.5.1 Architectural design of the system.

Architectural design is the process of defining a collection of hardware and software components and their interfaces to establish the framework for the development of the computer system. It shows the main components of the system and how they communicate to each other.

THE SYSTEM ARCHTECTURE

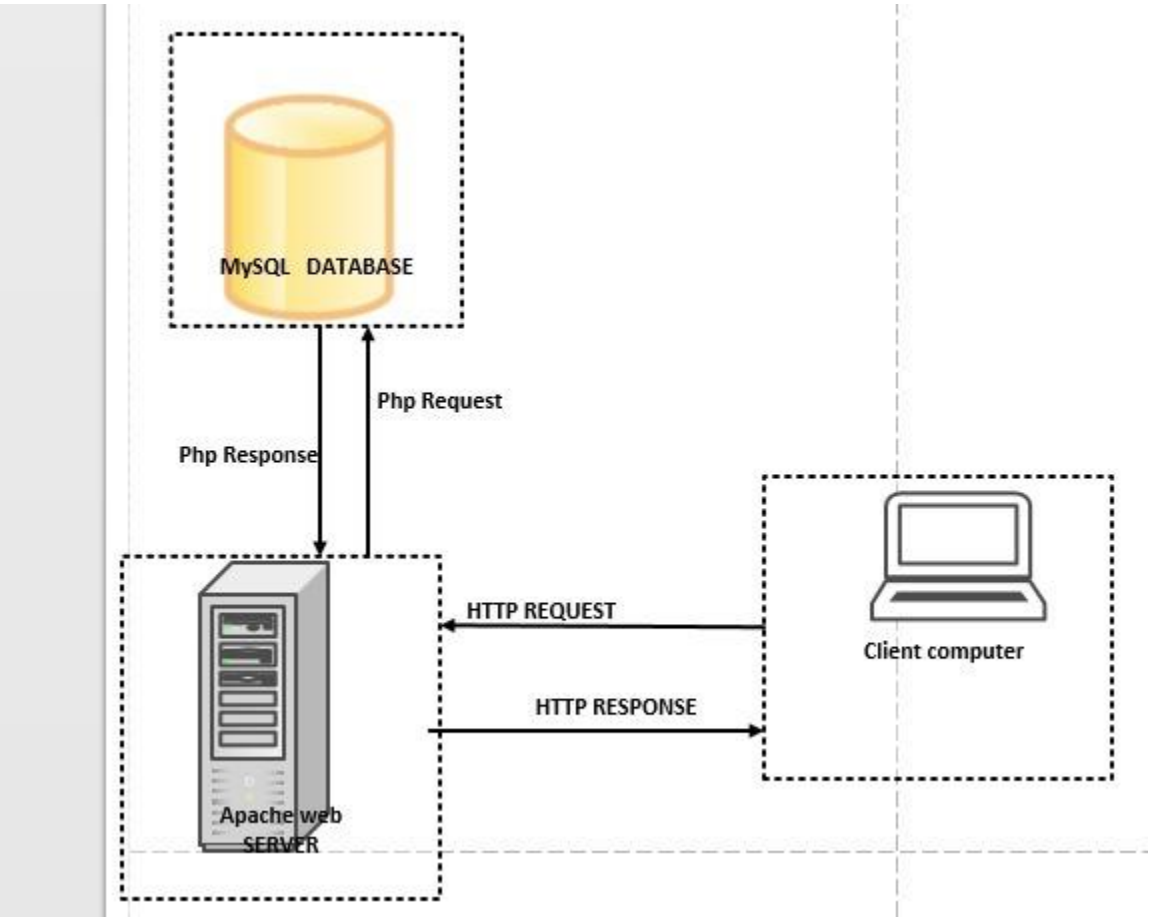


Figure 12 shows the architectural design of the system

4.5.2 Process modelling.

We used Data Flow diagrams and Entity Relationship Diagrams to illustrate activities and data flows for the information management system for distribution of farm inputs

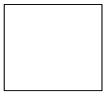
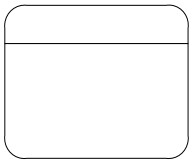
The following symbols were used;

4.5.3 Process modelling.

We used Data Flow diagrams and Entity Relationship Diagrams to illustrate activities and data flows for the information management system for distribution of farm inputs

The following symbols were used;

Table 4 shows symbols used in the data flow diagrams

Symbol		name
		Entity
		Data Store
		Process
		Data flow

4.5.4 Context diagram of the software to support the information system for distribution of farm inputs.

Context diagram represents all external entities that interact with the system. It's a simple data flow diagram that shows an overview of the system to support the information system for distribution of farm inputs, the external entities that interact with it and the major information flows between external entities and the system.

Context Data flow diagram for the system

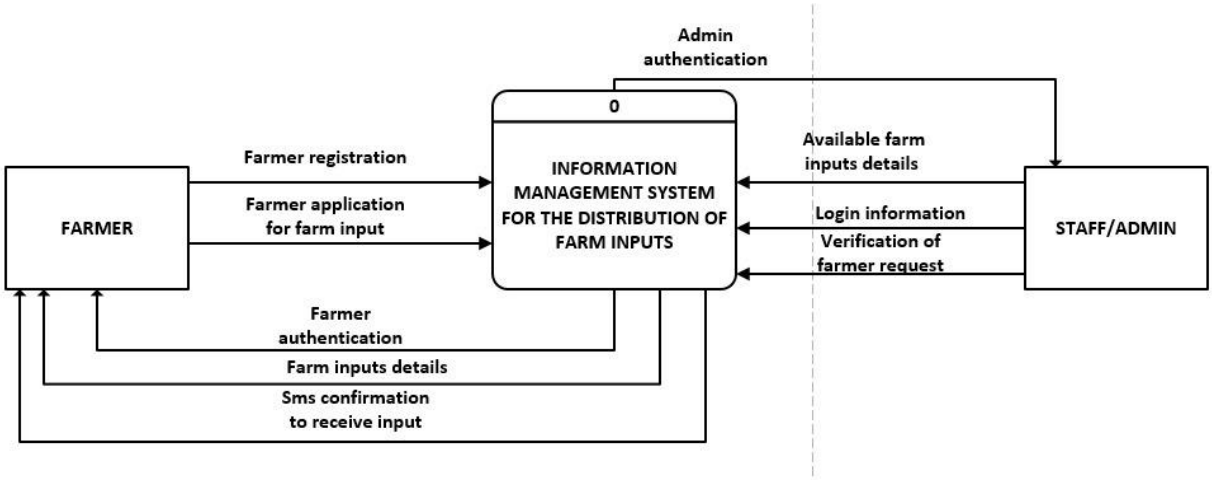


Figure 11 shows the context data flow

4.5.5 Level 1 Data flow diagram for the system to support the distribution of farm of inputs to farmers.

The level 1DFD is more detailed than the context diagram. It illustrates how data is processed by the system in terms of inputs and outputs. Its focus is on the flow of information, where data comes from, where it goes and how it gets stored

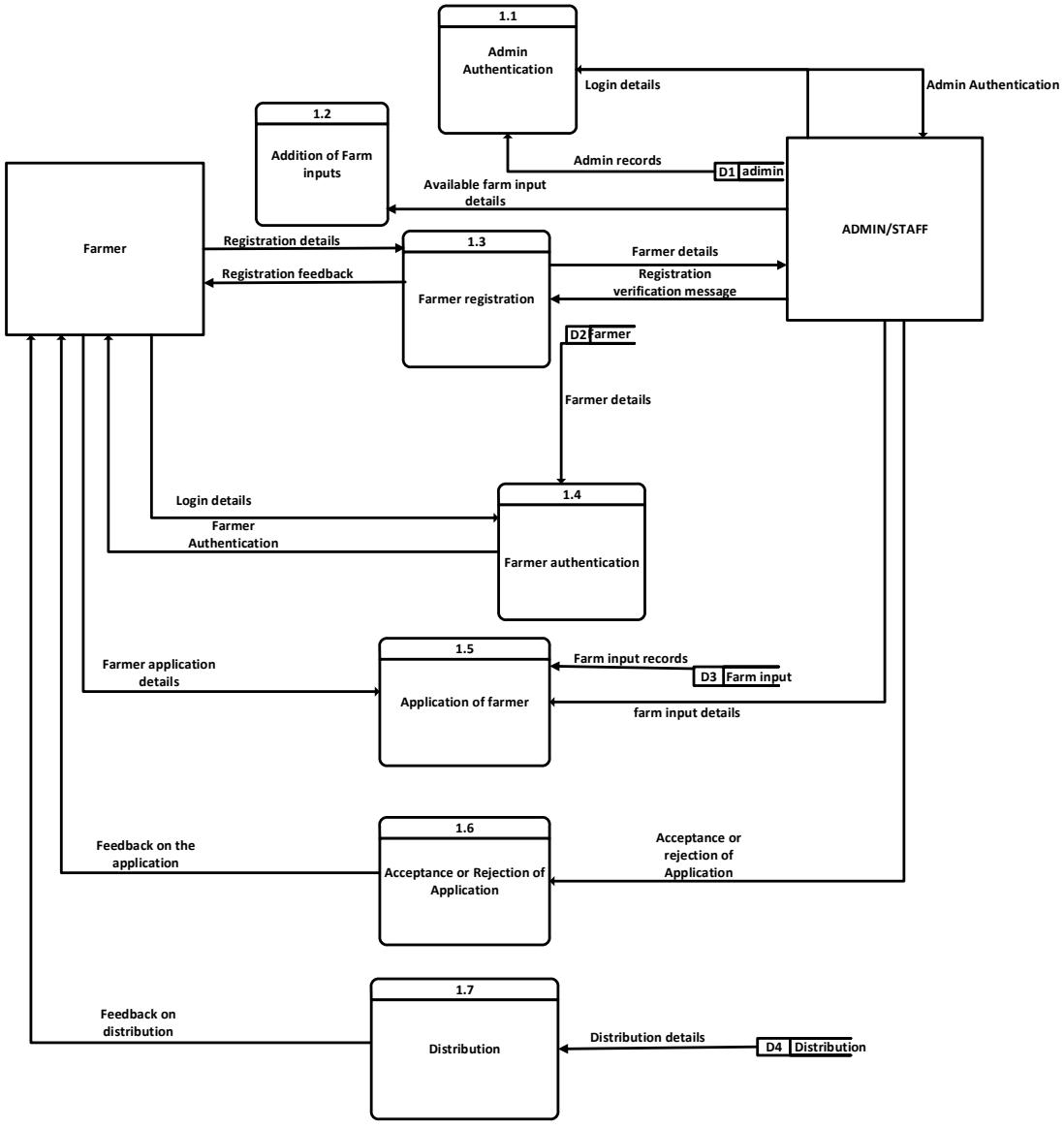


Figure 12 shows the system DFD

4.5.6 Data dictionary of the DFD

The data dictionary contains descriptions for the processes, data store and the external entities identified during the modelling process.

4.5.7 Description of the entities in information system for farm inputs distribution

Table 5 shows description of the entities

ENTITY	**DESCRIPTION**
System admin/officer	The admin login into the system with the user name and password and performs the following tasks. ▪ Accepts/rejects the farmer's application ▪ Adds, updates, deletes farm inputs ▪ Adds farmer to the system ▪ Generates reports on farmers, farm inputs, distribution and application
Farmer	The farmer logs into the system with the user name and password and performs the following tasks. ▪ Applies for farm inputs ▪ Can view his/her previous applications

Description of the processes in the information system for distribution of farm inputs

Table 6: shows description of the processes

PROCESSES	PROCESS ID	DESCRIPTION
Admin authentication	1.1	This enables the system to validate the administrator using his user name and password
Farm input registration	1.2	This involves adding farm inputs to the system
Farmer registration	1.3	This process enables farmer to create user account to access the system.
Farmer authentication	1.4	This process enables the system to verify the farmer using username and password
Farm input Application	1.5	This process involves applying for farm inputs
Acceptance and rejection	1.6	This process involves accepting and rejecting the applications made
Distribution process	1.7	This process involves supplying of farm inputs

Data stores for the information system for distribution of farm

Table 7: shows data stores

Data store	Data store id	Description
Login details for admin	D1	Stores logins for admin
Login for the farmer	D2	Stores details for the farmer
Farm input details	D3	Stores details for farm input
Distribution details	D4	Stores details for distribution

Data modeling for the information system for farm inputs distribution

This describes what we used in an entity relationship diagram to capture the data entities and their relationships

Table 8: shows data modelling

Entity	**Description**	**Attributes**
Admin	This is a system administrator	Id number {pk},name,email,passward
Farmer	This a person who applies for farm inputs	user-Id{pk},name,subcounty,village,email,,farmer-Type,phone number,category
Farm input	This is the product to be applied for and distributed to the farmer	Input-Id{pk},name,unit,quantity,status,date,category
Distribution	This is a process of supplying the applied inputs to the farmers	distributionId {pk}, distributionDate, farmerId {fk}, farmInputId {pk} distributed-By, application-Id{fk});
Application	This is a process of requesting for farm inputs to be distributed to the farmers.	Application-Id{pk},farm-input,quantity, unit,status

4.6 Description (modeling) relationships between entities

We used entity relationship sets to describe the entities, relationships as well as multiplicities of the system in the relationship with one another.

4.6.1 Relationship between an officer and the farmer

An officer can distribute one to many farm inputs to a farmer and a farmer can receive one to many farm inputs

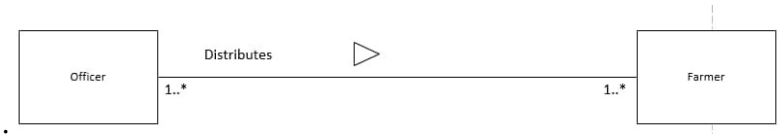


Figure 13 shows the relationship between an officer and a farmer

4.6.2 Relationship between farmer and farm input

A farmer can receive one farm input type and one farm input can be received by one to many farmers

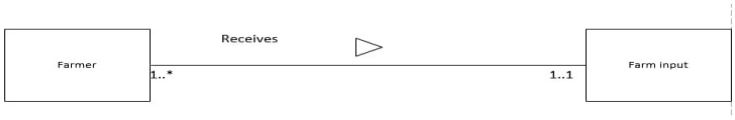


Figure 14 shows the relationship between the farmer and input

A farmer can apply for only one farm input type and one farm input can be given to one to many farmers.

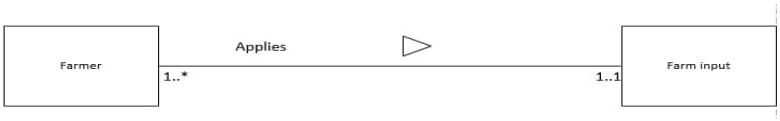


Figure 15 shows the relationship between farmer and farm input

4.6.3 Relationship between officer/admin and farm inputs

An officer can add one to many farm inputs and one to many farm inputs can be added by an officer.

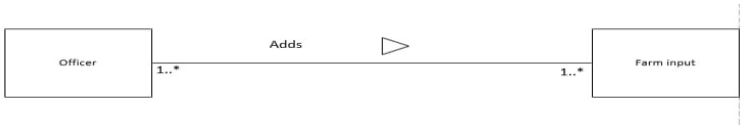


Figure 16 shows the relationship between officer and farm input

4.7 Entity relationship diagram

An ERD was used to show all the relationships between the entities involved in the system together with their attributes and to indicate the number of occurrences an entity can exist for a single occurrence related entity.

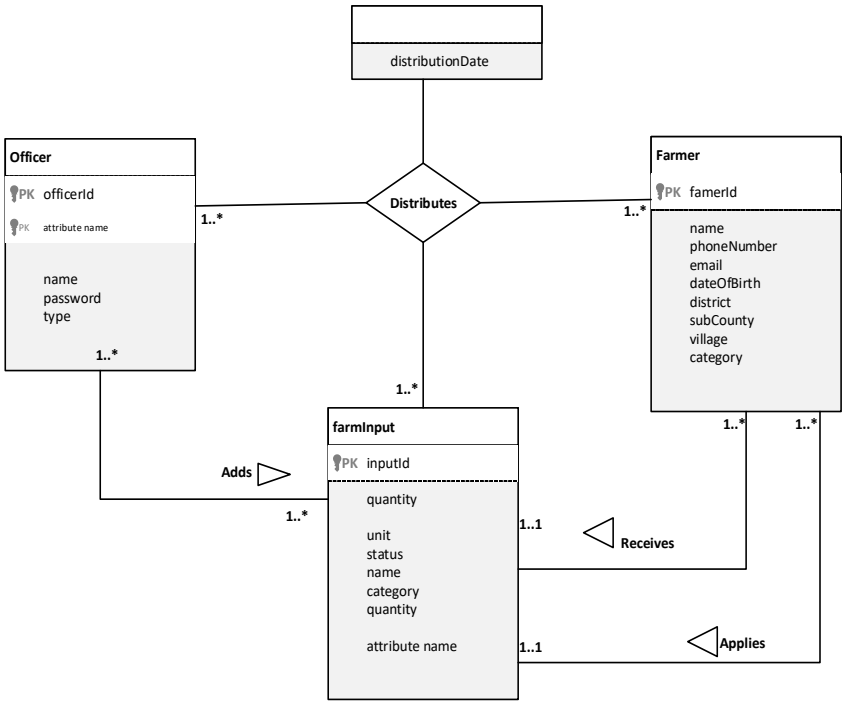


Figure 19 shows the project ERD

4.8 Logical database design.

The logical design of a system relates to an abstract representation of the data flows, inputs and outputs of the system. It is a logical representation of a system showing the system processes, and the flows of data into and out of the processes.

This is often conducted via modelling using an abstract (and sometimes graphical) model of the actual system. This can be illustrated below.

Admin (adminId {pk}, userName, password, type);

Farm input (farmInputId {pk}, name, quantity, category, unit, status);

Farmer (farmerId {pk}, subcounty, village, phoneNumber, email, category, name);

Distribution (distributionId {pk}, distributionDate, farmerId {fk}, farmInputId {pk} distributed-By, application-Id{fk});

Application (application-Id{pk},farm input-Id{fk},user-Id{fk},quantity ,status, created-At, updated-At);

4.9 Physical database design

Physical design it is a graphical illustration of the system representing external and internal entities of the system to and from data flow.

This deals with how the input data is provided, processed and how the output is displayed. In the physical design, one looks at the most effective way of storing and retrieving information in the database.

Details of attributes in the application table

Table 9: shows application table.

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	bigint(20)	UNSIGNED	No		auto_increment			
farm_input_id	int(11)		No					
quantity	int(11)		No					
reason	varchar(255)		No					
user_id	int(11)		No					
status	varchar(255)		No	pending				
created_at	timestamp		Yes	NULL				
updated_at	timestamp		Yes	NULL				

Details of attributes in the distribution table

Table 10: shows distribution table

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	int(11)		No		auto_increment			
dist_id	varchar(25)		No					
farm_input_id	int(11)		No			-> farm_inputs.id ON UPDATE CASCADE ON DELETE CASCADE		
quantity	int(11)		No					
farmer_id	int(11)		No			-> farmers.id ON UPDATE CASCADE ON DELETE CASCADE		
user_id	bigint(20)	UNSIGNED	No			-> users.id ON UPDATE CASCADE ON DELETE CASCADE		
dist_date	datetime		No	current_timestamp()				
created_at	datetime		Yes	NULL				
updated_at	datetime		Yes	NULL				

Details of attributes in the mail verification table

Table 11: shows the email verification table

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	bigint(20)	UNSIGNED	No		auto_increment			
email	varchar(255)		No					
token	varchar(255)		No					
created_at	timestamp		Yes	NULL				
updated_at	timestamp		Yes	NULL				

Details of attributes in the rejected table

Table 12: shows the rejected requests

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	bigint(20)	UNSIGNED	No		auto_increment			
uuid	varchar(255)		No					
connection	text		No					
queue	text		No					
payload	longtext		No					
exception	longtext		No					
failed_at	timestamp		No	current_timestamp()				

Details of attributes in the farmers' table

Table 13: shows the rejected requests

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	int(11)		No		auto_increment			
user_id	bigint(20)	UNSIGNED	No			-> users.id ON UPDATE CASCADE ON DELETE CASCADE		
sub_county	varchar(255)		No					
village	varchar(255)		No					
category	varchar(255)		No					
description	varchar(255)		No					
phone_number	varchar(14)		No					
email	varchar(60)		Yes	NULL				
farmer_type	varchar(30)		No					
created_at	datetime		Yes	NULL				
updated_at	datetime		Yes	NULL				

Details of attributes in the inputs table

Table 14: shows farm inputs table

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	int(11)		No		auto_increment			
name	varchar(100)		No					
category	varchar(255)		No					
quantity	int(11)		No					
unit	varchar(10)		No					
status	varchar(15)		No	available				
created_at	datetime		Yes	NULL				
updated_at	datetime		Yes	NULL				

Details of the attributes in the migration table

Table 15: shows migration table

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	int(10)	UNSIGNED	No		auto_increment			
migration	varchar(255)		No					
batch	int(11)		No					

Details of the attributes in the password resets table

Table 16: Shows password resets

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
email	varchar(255)		No					
token	varchar(255)		No					
created_at	timestamp		Yes	NULL				

Details of the attributes in the personal access tokens

Table 17: shows personal access tokens

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	bigint(20)	UNSIGNED	No		auto_increment			
tokenable_type	varchar(255)		No					
tokenable_id	bigint(20)	UNSIGNED	No					
name	varchar(255)		No					
token	varchar(64)		No					
abilities	text		Yes	NULL				
last_used_at	timestamp		Yes	NULL				
expires_at	timestamp		Yes	NULL				
created_at	timestamp		Yes	NULL				
updated_at	timestamp		Yes	NULL				

Details of attributes in the users table.

Table 18: shows users' table

Column	Type	Attributes	Null	Default	Extra	Links to	Comments	MIME
id	bigint(20)	UNSIGNED	No		auto_increment			
name	varchar(255)		No					
email	varchar(255)		No					
email_verified_at	timestamp		Yes	NULL				
password	varchar(255)		No					
type	varchar(10)		No	farmer				
remember_token	varchar(100)		Yes	NULL				
created_at	timestamp		Yes	NULL				
updated_at	timestamp		Yes	NULL				

CHAPTER FIVE
IMPLEMENTATION OF INFORMATION SYSTEM FOR DISTRIBUTION OF FARM INPUTS

5.1 introduction

From the results and discussion of the findings in the previous chapter, we embarked on implementing an information system for distribution of farm inputs. The following describes the phase of implementation process of the information system for distribution of farm inputs.

5.2 Requirements for designing an information system for distribution of farm inputs

An information system for distribution of farm inputs comprises of a communication channel between the farmer(s) and the government agricultural official(s) or staff who acts as an administrator. In the current situation, many people have smart phones, which usually ease communication. However, farmers have not adopted the use smart phones however; most of them own mobile phones that support voice calls, messages and USSD.

5.2.1 Application technologies.

We developed the front end of the system with HTML, styled it with CSS and validated some inputs with JavaScript.

We developed the backend / the system functionality with PHP. All these languages are supported in visual studio code which was our development tool.

5.2.2 System map

The figure 17 below is the appearance of the system on the administrator side.

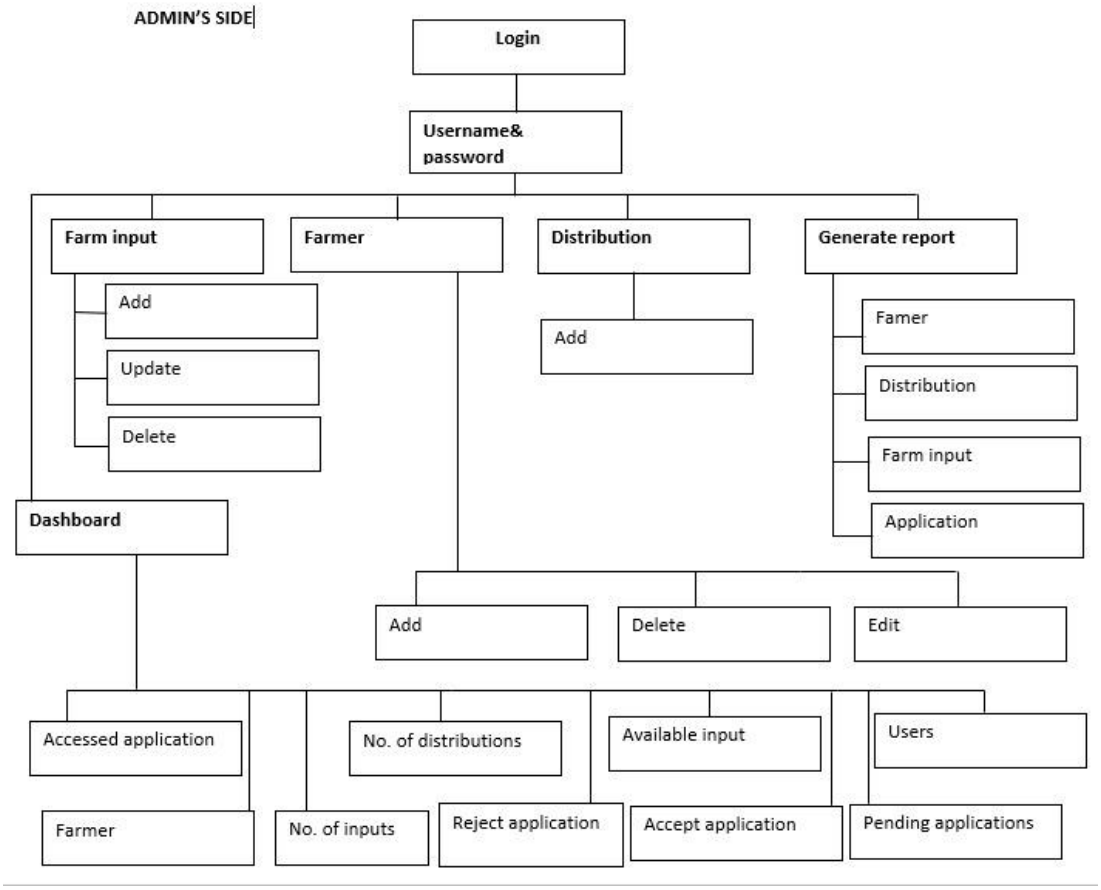


Figure 17 shows the system map on the admin side

The figure 18 below is the appearance of the system on the farmer's side

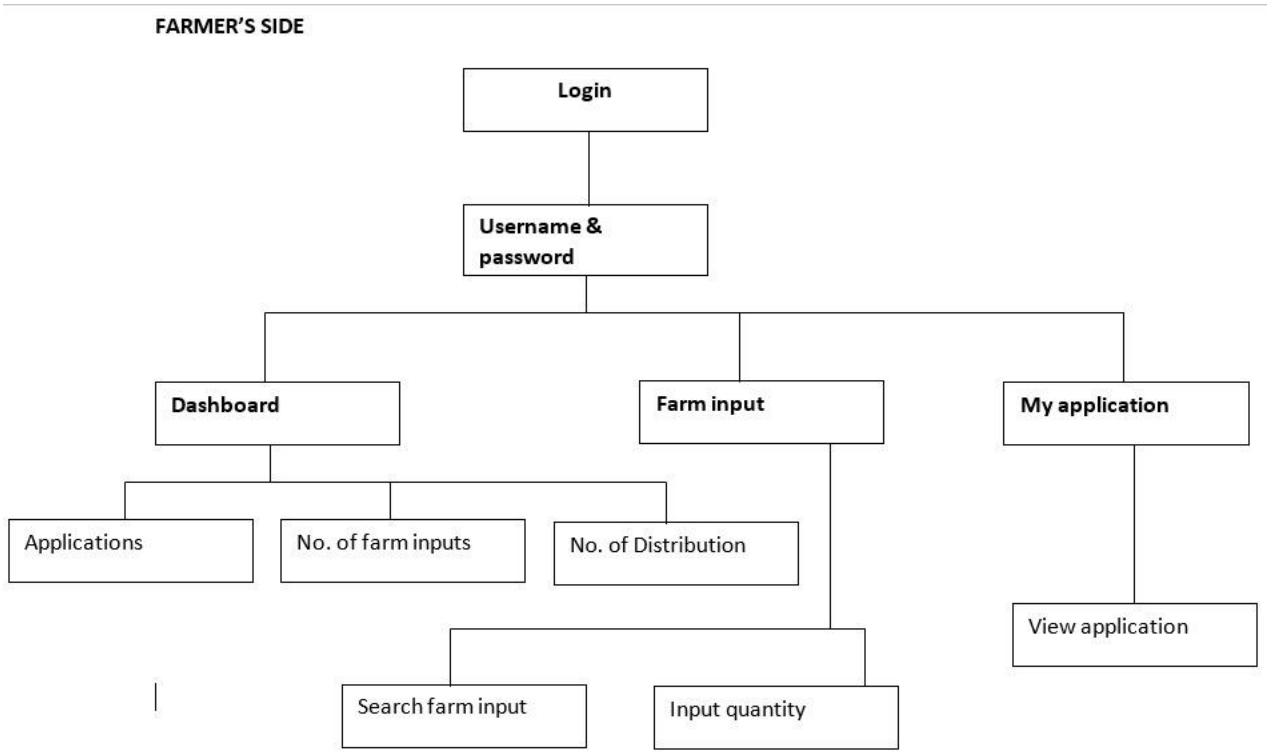


Figure 18 shows the appearance of the system on the farmer's side

5.3 List of modules within the information system for distribution of farm inputs

These modules are used to show some of the visual appearances of the system interfaces and the users who use them.

5.3.1 Login page

On the login page the user is required to login in using his or her username and password. When the user does not have an account, they are informed that they do not have an account. For the new users they are required to create an account, with user name, email and a password, which has to be confirmed after the first input. This is shown in the figure 19 below

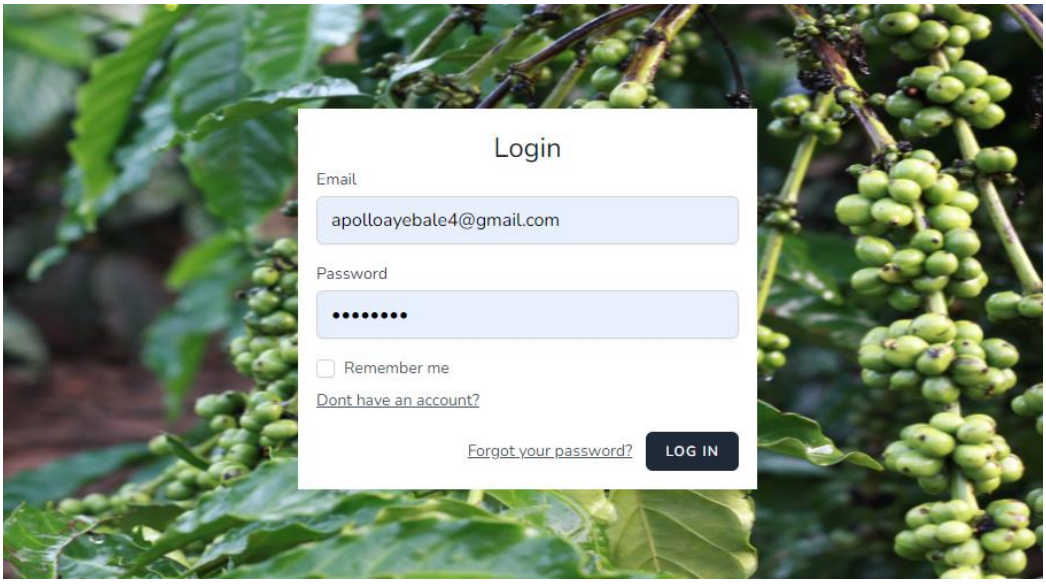


Figure 19 : shows the login page

5.3.2 Admin panel

When the admin has successfully logged in, he is able to perform the following tasks.

1. He approves and rejects the pending applications made by the farmers.
2. The administrator adds farm inputs into the system
3. The admin can also add distribution when the farmer's application has been accepted. This is shown in the figure 20 below.

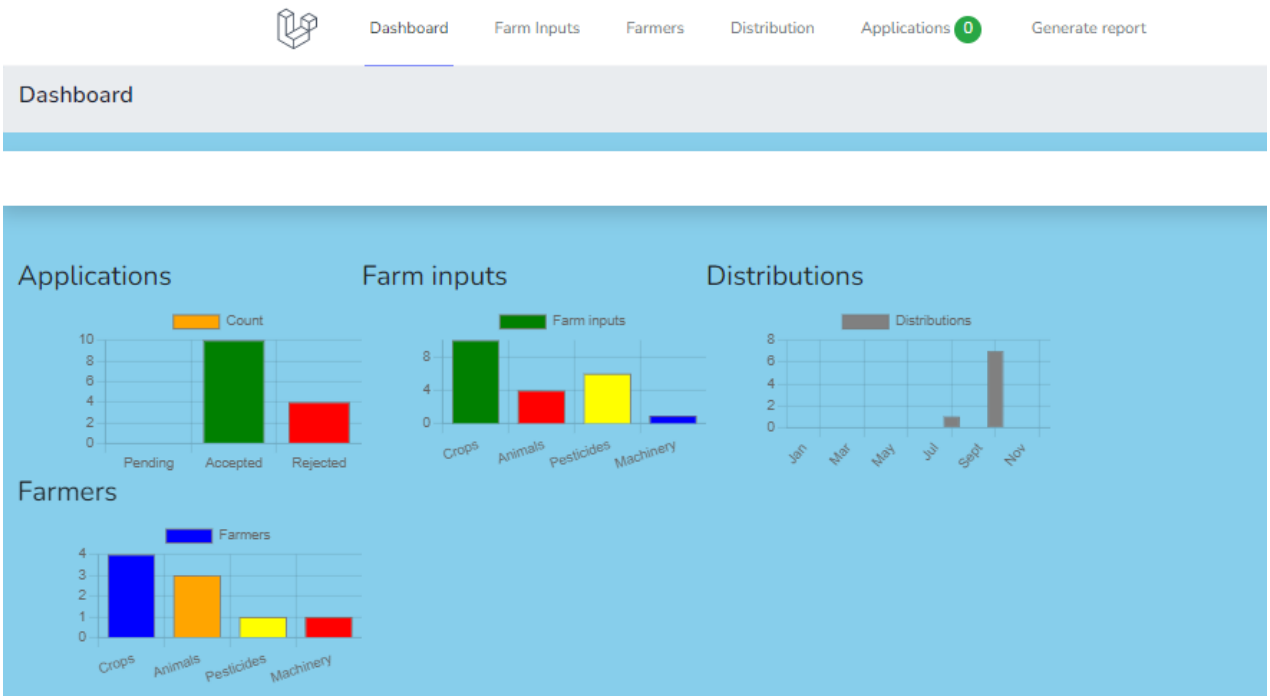


Figure 20 shows the admin dashboard

5.3.3 Farm input

On the farm input page, the admin can add, update and delete farm input in the system. This is shown in the figure 21 below.

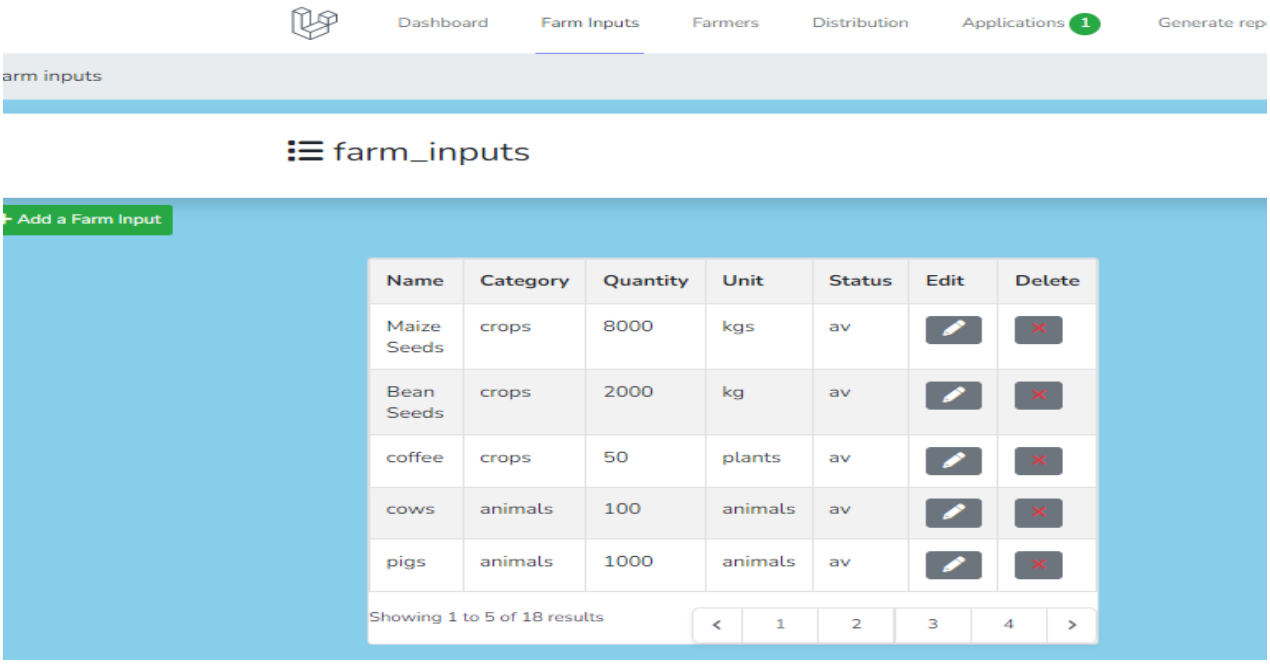


Figure 21 shows the farm input page

5.3.4 Farmer

On the farmer's page, the admin can add, update and delate the farmer. This is shown in the figure 22 below.

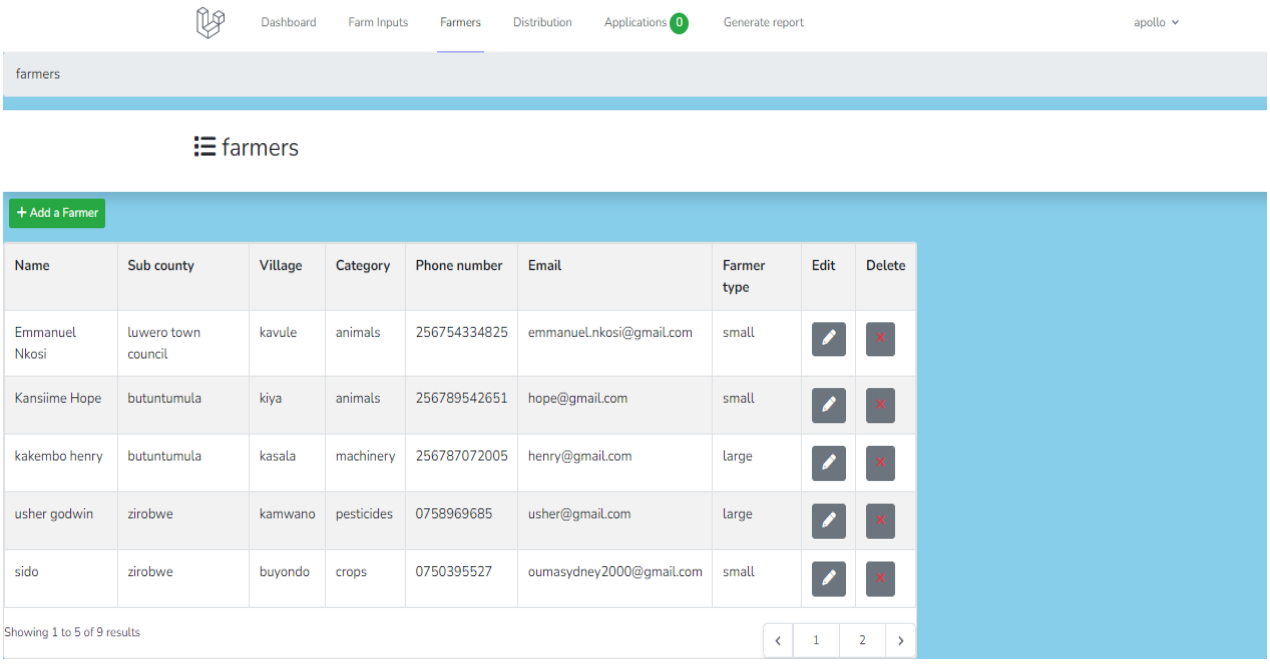


Figure 22 shows the farmer's page

5.3.5 Distribution

On the distribution page, the admin can only and only add a distribution.

The admin can see the distribution id, farm input supplied and its quantity, unit, the farmer who is to be given the input, the person who distributed and the distribution date. This is shown in the figure 23 below.

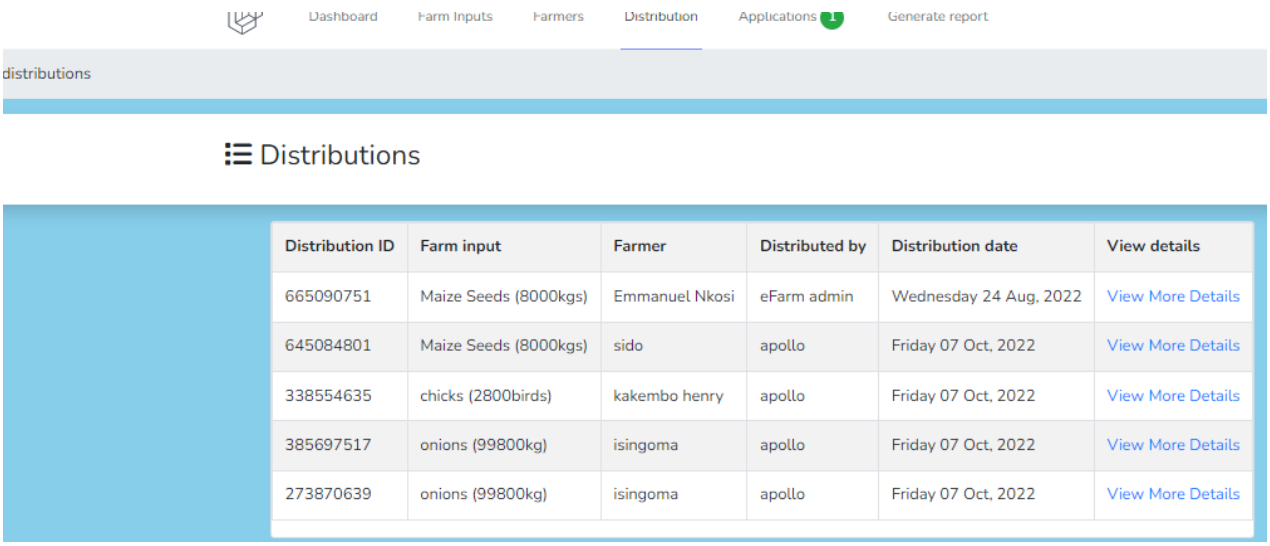


Figure 23 : shows the distribution page

5.3.6 Application

On the application page, the admin can view the pending applications, accepts applications made by the farmer and can also reject application for the farm inputs made by the farmer. This is shown in the figure 24 below.

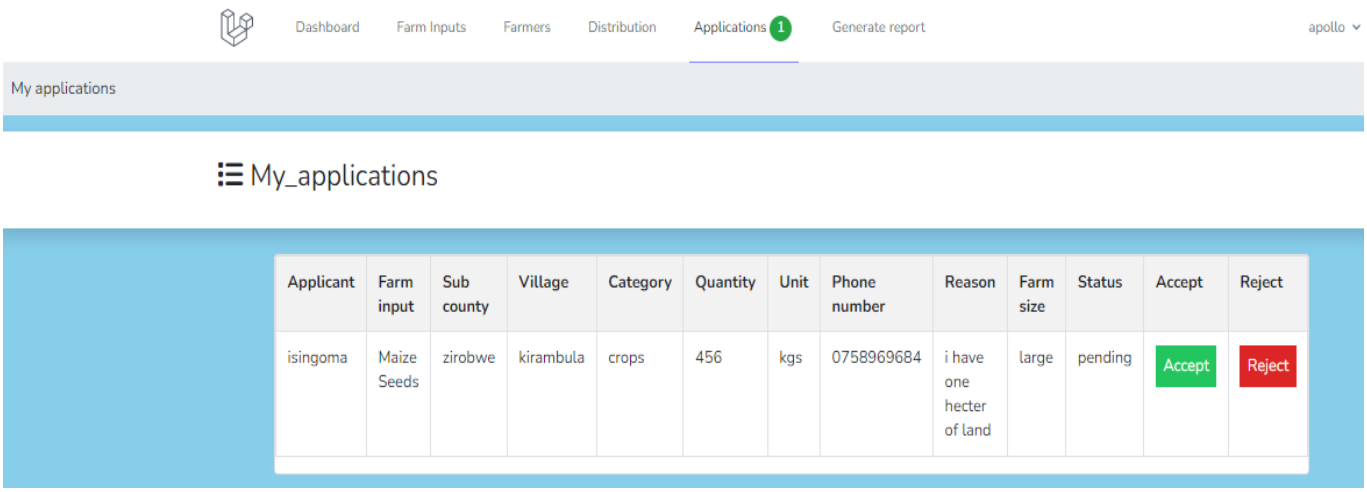


Figure 24 : shows the application page

5.3.7 Generate report

On the generate report page, the admin can generate the following reports.

- He can generate a report of the registered farmers according to their category that is to say crops, animals, machinery and pesticides.
- Can generate a report of distributions

- Can generate a report of farm inputs available in the system according to their category that is to say crops, animals, machinery and pesticides.
- He can also generate a categorized report on the applications that is to say pending, approved /accepted and rejected applications made by the farmer. This is shown in the figure 25 below.

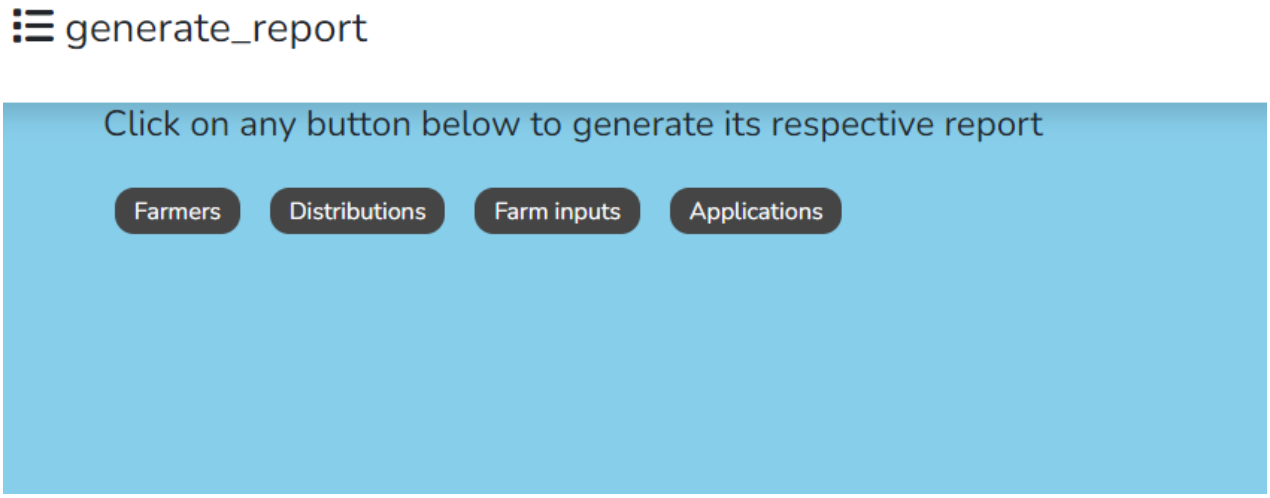


Figure 25 shows the generate report page

5.3.8 On the farmer's dashboard

When the farmer has successfully logged into the system, he/she can be able to view the available farm inputs. And he can only apply for the input which is available.

After the farmer has finished applying for an input, it is the work of the admin to accept or reject the farmer's application. The farmer gets a notification inform of message that either your application for farm input has been successful received or rejected. This is shown in the figure 26 below

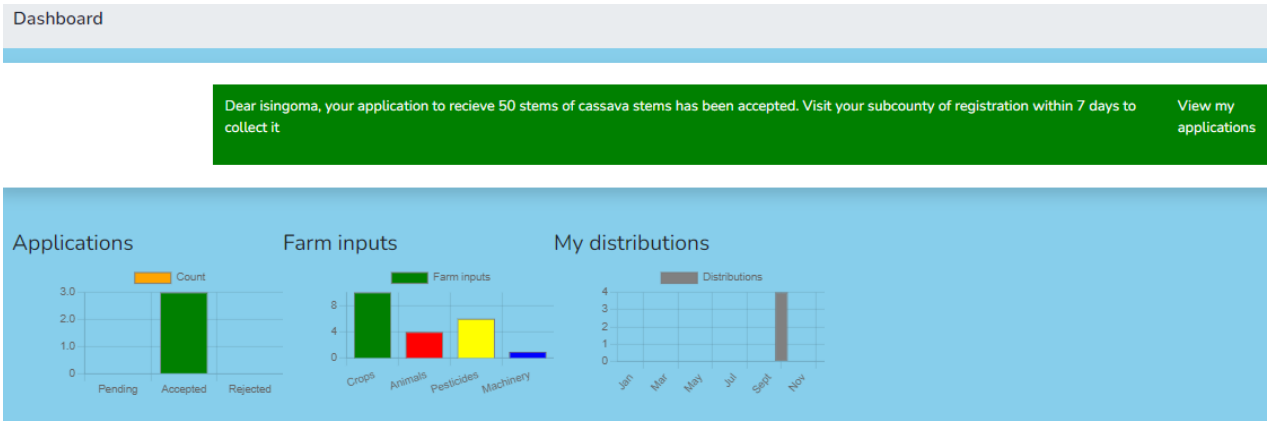


Figure 26 shows the farmers page.

5.3.9 My application

On this page, the farmer is able to view his already made application, the type, category, unit, status and quantity of the input he/she has applied for. This is shown in the figure 27 below.

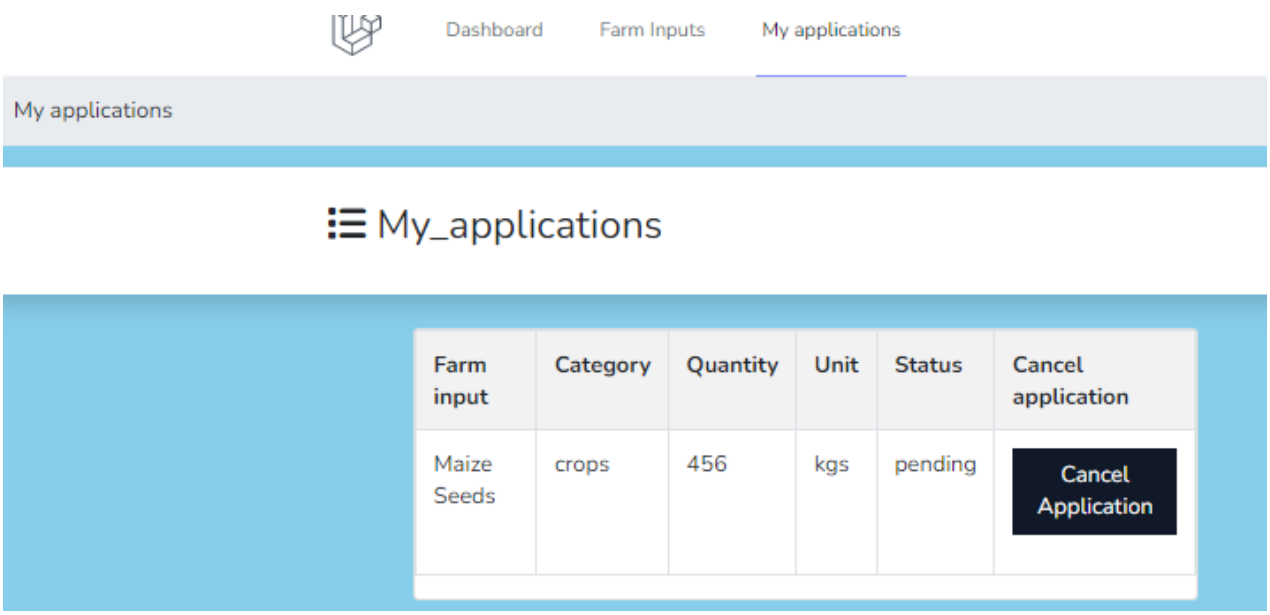


Figure 27 shows the application page

5.3.10 Farm inputs

On this page, the farmer is able to apply for farm inputs basing on the category he registered for, and their quantity available. However, they cannot apply for inputs which is above the available stock and farmer cannot apply for something is not available. This can be shown in the figure 28 below.

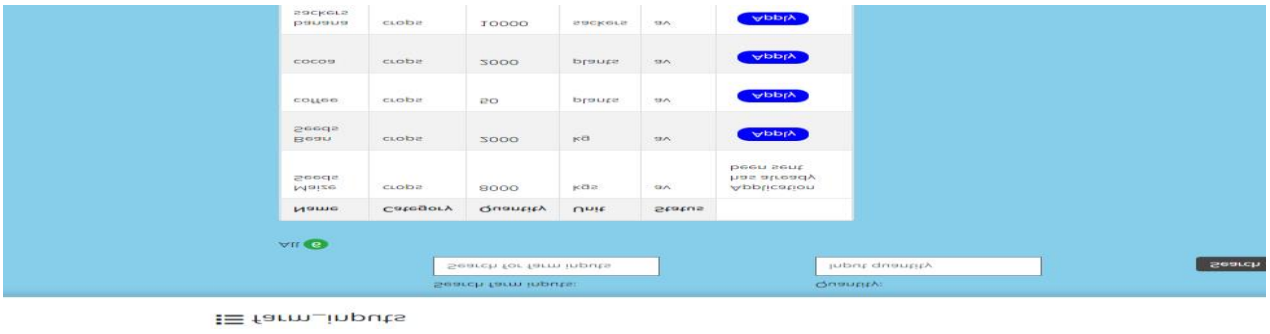


Figure 28 : shows farm inputs

5.4 System testing

We carried both unit and integration testing in the following ways

5.4.1 Unit testing

We carried out unit testing where each component/module of the system was tested independently to ensure it is error free. The testing provided an insight of data conversion, insertion, deletion, and update error. For the case of the login, a user cannot login without a user name and password.

5.4.2 Integration testing

We carried out integration testing where we tested the system as a whole to ensure successful transition between different system components and to ensure that the interfaces are successfully linked together.

5.4.3 System verification

Unit and integration testing were carried out by us the developers to ensure that the system requirements are met and the system does what it is supposed to do.

The farmer is also required to apply for the input, which does not exceed the available stock.

5.4.4 System Validation.

To validate the system, we took the system to farmers in the three sub counties of Luwero town council, Zilobwe and Buntuntumula where 7 agricultural officers from each sub county and five farmers from the 3 sub counties were able to interact with the system.

A farmer was required to create an account where he was prompted to put in his email, full names, and category of a farmer, Sub County, village, and phone number. A confirmation email was then received requiring a farmer to verify his or her details and then linked to the dashboard where he or she can apply for the preferred farm input and quantity.

A farmer was also required to register with the system, after registering he was given a unique farmer number which he used to apply for farm input using USSD.

Then the agriculture officer was able to approve/accept some requests and rejecting some, and he advised us in case the Ministry of Agriculture, Animal Industry and Fisheries approves the system, we can go ahead and add features like GPS.

CHAPTER SIX
DISCUSSIONS, RECOMMENDATIONS AND SUMMARY

6.1 Introduction

This chapter presents a discussion to the project report; highlights the summary of results and recommendations from the project.

6.2 Discussion.

The main aim of this research was to develop an information management system that will enable the Ministry of Agriculture, Animal Industry and Fisheries, Animal Industry and Fisheries (MAAIF) to manage information regarding the distribution of farm inputs to the farmers and the specific objectives were;

i. To identify system requirements by reviewing existing information management systems for the distribution of agricultural inputs.
ii. To design an information management system for the distribution of farm inputs.
iii. To implement the designed information management system for the distribution of farm inputs.
iv. To test and validate the information management system for the distribution of farm inputs.

The first objective was achieved by reading about existing information management systems for distribution of agricultural inputs. Three information management systems for the distribution of farm inputs were reviewed that is to say Famunera web app, Internet of Agriculture things and AGRA.

The second objective was accomplished by the use of a CASE Tool (MS Visio) to draw Entity Relationship Diagrams (ERD) and data flow diagrams (DFD) which represent the logical database design of the system.

The third objective was achieved by use of different frameworks, programming and scripting technologies such as PHP, MYSQL, JAVASCRIPT, HTML, CSS to implement the system (system coding and database creation

6.3 Recommendations.

This system (information system for the distribution of farm inputs) is highly recommended to Ministry of Agriculture, Animal Industry and Fisheries in Uganda because it can help eliminate middle men who

engage in corruption activities during the distribution of farm inputs for example selling these farm inputs instead of giving them freely to serve their purpose of supporting farmers in order to boost agriculture in Uganda.

This system is also recommended because it will enable farmers to apply and receive farm inputs that they really need from the Ministry of Agriculture, Animal Industry and Fisheries. In addition, it will help Ministry of Agriculture, Animal Industry and Fisheries to avoid wastage of resources like giving a farmer maize seedling yet the farmers' land does not favor maize growth and they really do not need it.

Lastly, this system is recommended because it will enable the government make appropriate budget on the distribution of farm inputs basing on the registered farmers and what they have applied for.
The system is also highly recommended since it favors the local farmer who cannot use the smart phone but they can be in position of applying for farm inputs using unstructured supplementary service data (USSD)

6.4 Summary

The study was carried out in Luwero with the aim of developing an information management system for distribution of farm inputs, which eases the distribution process of farm inputs to farmers .By enabling admin (staff from Ministry of Agriculture, Animal Industry and Fisheries) to add/upload farm inputs available for distribution. Enabling farmers to register for farm inputs, application/ordering for farm inputs of choice. In addition, enable the administrator to approve or reject orders made by farmers.

This study was necessary because the process of distribution of farm inputs is that the government brings farm inputs on the sub county headquarters, and it is the work of the coordinators to make announcements through local radio stations or displaying information on the notice boards and inform the public about the availability of the inputs ready to be distributed. In addition, this has brought about corruption in a way that coordinators of this program and other involved parties consider their friends and relatives only when distributing these farm inputs and at times, they sell them yet they are meant to be free as a way of supporting agriculture in the country.

In conclusion; the project sought to develop an information management system for the distribution of farm inputs to farmers, existing systems were compared with this new system (information management system for the distribution of farm inputs) and it was discovered that many core functionalities were not offered by the previously existing systems.

The developed system is a web-based system that enables the administrator (a staff from Ministry of Agriculture, Animal Industry and Fisheries) to add/upload the farm inputs available for distribution, allow farmers to register and apply/order for farm inputs available and then the pending orders will be approved or rejected accordingly by the administrator. When the application is either accepted or rejected, the farmer is able to get notification through short message service (sms).

The farmer can also be in position to use USSD, when he or she has finished registering and given a unique farmer id.

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Appendix A

Questionnaire on an information management system for the distribution of farm inputs.

We are a group of students from Makerere University offering a Bachelor of Information Systems and technology.

We are in our final year of study, and we a conducting a survey on how Ministry of Agriculture, Animal Industry and Fisheries through its programs supplies farm inputs to farmers and the findings will aid the development of an online information management system for the distribution of farm inputs. We shall be grateful of your responses. Thank you.

1. Name……
   ……
2. Do you have a smartphone?
   ☐ Yes ☐ No
3. If yes, do you know how to use it?
   ☐ Yes ☐ No
4. If yes, Do you have access to internet?
   ☐ Yes ☐ No
5. What sub-county are you from?
   ☐ ZIROBWE
   ☐ BUNTUNTUMULA
   ☐ LUWERO TOWN COUNCIL
6. What type of Farmer are you?
   ☐ Large scale
   ☐ Small scale
7. Do you engage in farm input distribution program?
   ☐ Yes ☐ No

8. If **yes** what type of input have you received/distributed in the distribution program?

☐ Crops

☐ Animals

☐ Machines/Tools

☐ All the above

9. On average, how many kilograms of crops have you received/ distributed around Luwero district

☐ 10-50KG ☐ 50-100KG ☐ 100- above

10. On average, how many animals have you received/ distributed around Luwero district?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ more

11. On average, how many tools/Machinery have you received/ distributed around Luwero district?

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ more

Mention the tools or machinery……

12. How long have you been receiving/distributing the farm inputs in the above mention region?

☐ 1-5years ☐ 5-11 years ☐ 11-Above

13. What relationship do you have with the distributors of the farm inputs?

☐ Bad ☐ Fair ☐ Good ☐ Very good ☐ Excellent

14. What problems have you faced during the supply of farm inputs?

☐ Limited supply

☐ Poor quality supplies of crops and animals

☐ Poor timing

☐ Unfavorable climatic conditions

☐ Delay in supply

☐ Beaurocracy

15. As an agricultural official how have you managed to solve the above problems

……

……

16. Which is the most supplied farm input?

……..

17. Rate the timing of the seasons during the supply of farm inputs

Low ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 High

18. Who supplies you the farm inputs?

Contractors

MAAIF

Other…….

THANK YOU FOR YOUR TIME