

# **Mobile Farming Marketing Advisory System**

**By**

**CS0075**

**Department of computer science**

**Faculty of computing and information technology**

A Project Proposal Submitted to the Faculty of Computing and Information Technology  
For the Study Leading to a Project in Partial Fulfillment of the  
Requirements for the Award of the Degree of Bachelor of  
Science in Computer Science of Makerere University

**Supervisor**

Nyende Hawa

Department of Informatics Technology

Faculty of computing and information technology, Makerere University

[hnyende@cit.mak.ac.ug](mailto:hnyende@cit.mak.ac.ug), +256704023443

June, 2010

## Declaration

We CS0075 do hereby declare that this project report is original and has not been published and/or submitted for any other degree award to any other university before.

#	Names	Registration Number	Signature
1.	Mwanje Musa	07/U/11255/EVE	
2.	Lutwama Geoffrey	07/U/9957/EVE	
3.	Nabulya Josephine	07/U/11605/EVE	
4.	Kakaire Wilber	08/U/18350/EVE	
5.	Arinaitwe Sophia	07/U/6761/EVE	

Date: .....

## Approval

This Project Report has been submitted for Examination with the approval of the following supervisor/s.

Signed: .....

Date: .....

Nyende Hawa

Department of Informatics Technology

Faculty of Computing and Information Technology

## **Acknowledgement**

The team acknowledges the contribution of Dr. Kanagwa Benjamin and Madam Hawa Nyende for their guidance and supervision towards the success of this project. The team also acknowledges all those who may have helped us in one way or another. They include: our parents/guardians, the faculty, our friends, etc. Overall thanks go the Almighty God for having kept us in good health and giving us wisdom that enabled us to undertake this project.

## Table of Contents

Declaration.....	i
Approval.....	i
Acknowledgement.....	ii
List of Tables.....	vi
List of Figures.....	vii
List of Appendices.....	viii
List of Abbreviations.....	ix
Abstract.....	x
Chapter 1.....	1
Introduction.....	1
1.1 Background.....	1
1.2 Problem Statement.....	2
1.3 Main Objective.....	3
1.4 Specific Objectives.....	3
1.5 Scope.....	3
1.6 Significance.....	3
1.7 Conclusion.....	4
Chapter 2.....	4
Literature review.....	5
2.1 Review of the Current System.....	5
2.2 Activities of Cooperative Alliance.....	6
2.3 Problems with the Current System.....	6
2.4 Other Advisory Services.....	7
2.4.1 The national agricultural advisory services (NAADS).....	7
2.4.2 Uganda national farmer’s federation (UNFFE).....	7
2.4.3 Nkoola institutional development associates (NIDA).....	8

Chapter 3.....	9
Methodology.....	9
3.1 Requirements identification.....	9
3.1.1 Data collection methods.....	9
Interviews.....	9
Document reviews.....	9
Participant observation.....	9
3.2 Analysis of system requirements.....	10
3.3 System Design.....	10
3.3.1 Logical data modeling.....	10
3.3.2 Data flow Diagram.....	10
3.3.3 Entity Relationship Diagram.....	10
3.4 System Implementation.....	11
3.5 System Testing and validation.....	11
3.5.1 System testing.....	11
3.5.2 System Validation.....	11
Chapter 4.....	12
System Analysis and Design.....	12
4.1 System Analysis.....	12
4.2 Existing system.....	12
4.2.1 Weaknesses.....	12
4.3 User Requirements.....	13
4.4 Functional System Requirements.....	14
4.5 Non-functional System Requirements.....	14
4.6 System Requirements.....	15
4.7 System Design.....	16
4.7.1 Architectural Design of the proposed system.....	16
4.7.2 Context Diagram.....	17
4.7.3 Data Flow Diagram.....	18
4.7.4 Data Dictionary.....	19

4.8 Data modeling.....	20
4.8.1 Conceptual data model.....	20
4.8.2 Modeling Relationships between entities .....	23
4.8.3 Entity Relationship Diagram for the proposed MFMAS.....	25
4.9 Logical Design.....	26
Chapter 5.....	30
Implementation.....	30
5.1 System implementation .....	30
5.1.1 Mobile phone implementation.....	30
5.1.2 Desk top application implementation .....	30
5.1.3 Buyer’s site Implementation.....	30
5.2 System Testing and Validation .....	32
5.2.1 System Testing .....	33
5.2.2 System Validation .....	33
Chapter 6.....	33
Conclusion, Summary and Recommendations.....	33
6.1 Summary.....	33
6.3 Recommendations .....	33
References.....	34
Appendices.....	35

**List of Tables**

Table 1: System Hardware requirements .....14

Table 2: System software Requirements .....14

Table 3: Data Dictionary .....18

Table 4: A table showing the description of entities and their attributes .....21

Table 5: Description of the entity Staff .....25

Table 6: Description of the entity Farmer .....26

Table 7: Description of the entity Buyer .....26

Table 8: Description of the entity planting .....26

Table 9: Description of the entity need\_for\_sotre ..... 27

Table 10: Description of the entity buyer\_order .....27

Table 11: Description of the entity store\_in .....28

Table 12: Description of the entity buyer\_comments .....28

Table 13: Description of the entity store\_out .....28

**List of Figures**

Figure 1: System architecture.....15

Figure 2: Context Diagram.....16

Figure 3: Data Flow Diagram.....17

Figure 4: Entity Relationships Diagram.....24

## List of Appendices

Appendix A:

Appendix B:

## List of Abbreviations

ERD – Entity Relationship Diagram

ICT – Information and Communication Technology

MAAIF - Ministry of Agriculture Animal Industry and Fisheries

MFMAS – Mobile Farming Marketing Advisory System

NAADS - National Agricultural Advisory Services

NIDA - Nkoola Institutional Development Associates

PEAP - Poverty Eradication Action Plan

PMA - Plan for Modernization of Agriculture

SMS - Short Message Services

UCA - Uganda Cooperative Alliance

UML – Unified Modeling Language

UNFFE - Uganda National Farmer’s Federation

## Abstract

The process of marketing, finding storage and planting advice is a challenge to farmers. This is mostly because of ignorance about existing information on market, storage facilities and planting advice from the area cooperatives and the farmers themselves. This leads to price fluctuations, value loss of the produce as some of them are perishable and are of poor yields due to lack of advice from the cooperative. At the end of the day, the farmer will go for the least prices, thus a reduction in produce.

Therefore, there is a need for more reliable, efficient and automated system to help farmers on finding information on storage, marketing and accessing planting advise from fellow farmers.

Systems analysis was done to ascertain user and system requirements. Requirements collection was done through review of related literature, observation and interview of potential end users like the staff members at the cooperative and farmers. This was analyzed so as to determine the functional and non-functional requirements of the proposed system. The solution was designed and implemented to physically realize the impact of system. The developed tool was subjected to testing (i.e. unit, system and user testing) to identify and correct errors.

The system works with mobile phones that provide information to the farmers from the area cooperatives. This information is then periodically relayed over the network to near and remote locations of the farmers. Encryption is used to secure data transmission.

In summary, the system is aimed at providing information pertaining to marketing, storage and planting advice to farmers. An option that is cost effective for both the cooperatives and farmers.

# Chapter 1

## Introduction

Uganda has experienced a rapid increase of area covered by mobile phone service. As the information flow increases due to the mobile phone coverage expansion, the cost in crop marketing, finding storage and planting advice is expected to decrease, particularly more so for perishable crops, such as bananas, red paper, etc in remote areas.

The process of marketing, finding storage and planting advice is a challenge to farmers. This is mostly because of ignorance about existing markets for the produce, storage facilities and planting advice from the area cooperatives. This leads to price fluctuations, value loss of the produce as some of them are perishable and poor yields due to lack of advice from the cooperative. At the end of the day, the farmer will go for the least prices; there will be reduction in produce.

The existing systems for providing information on market farmer to farmer planting advice are not reliable and others are manual so they do not help farmers to knowing what to plant, where to find nearest appropriate stores and good markets for their produce. Farmers have to guess on what to plant depending on the current market and what their land has ever yielded therefore so many farmers are being affected as a result of this.

Therefore, there is a need for more reliable, efficient and automated system to help farmers on finding storage facilities, marketing their produce and accessing planting advice from fellow farmers.

### 1.1 Background

Using SMS (short message services) as a method of dissemination is not farfetched ever since telecom organizations started extending their services to rural areas. But also, in the past, farmers in rural Uganda heavily relied on agricultural extension workers for support regarding their crops. Disappointingly, this kind of support always delays due to lack of accessible roads, electronic networks and other logistical constraints. The resultant effects due to the lack of quick response usually left farmers in despicable situations with no recourse whatsoever.

Community radios that would have helped to bridge the vacuum, also suffered from coverage problems and to say the least, they were what one would refer to as one way vectors that offered no mechanism of feedback from farmers.

Based on the data collected from 856 households in 94 communities, the number of communities with mobile phone network coverage increased from 41 to 87 communities over a two year period. Banana farmers who sold banana increased from 50 to 69 percent in the communities more than 20 miles away from district centers after the expansion of the mobile phone coverage. For maize, which is another staple but less perishable crop, mobile phone coverage did not affect market participation.

These results suggest that mobile phone coverage expansion induces market participation, finding storage and planting advice of farmers who are located in remote areas and produce perishable crops.

Most farmers are finding market and storage as a very challenging issue. Research in Uganda has shown that some farmers don't really know where to find market with good prices, storage of their produce and planting advice. Farmers do not have any mechanism of finding out ready market with good prices as well as buyers finding their desired products. There is no platform that helps farmers to access market outside their reach.

The use of mobile phones has reinforced initiatives in areas that were particularly reluctant to the use of any modern ICT as one of the ways of getting the much needed information.

One of such initiatives is to design the MFMAS (Mobile farming Marketing advisory system) project that will create impact among farmers in the rural areas of Uganda. With this project, Ugandan farmers are leapfrogging from their conventional methods to methods that incorporate ICTS as major tools in development.

With this kind of technology, timely dissemination and response has become the culture. As farmers yearn for where to find market with good prices, storage of their produce and planting advice, the MFMAS will provide it in equal or more proportions. The system will remarkably connect farmers and also help them in finding information on the available markets, storage as well as planting advice as a very challenging issue as digging on the phone.

## **1.2 Problem Statement**

The process of marketing produce, finding storage and obtaining/accessing planting advice is a challenge to farmers. The existing systems in Uganda are unreliable and manual as they don't offer information concerning marketing services, advise on what to plant and storage facilities to farmers. Farmers have to sell off their produce at low prices confined to their localities, produce less yields thus the situation being less profitable and time consuming.

It is necessary to carry out an investigation on the current method of searching for storage facilities, market and planting advice so as to develop a mobile advisory system that displays, informs and manages these three components.

### **1.3 Main Objective**

The main objective is to develop a mobile farming marketing advisory system that provides information pertaining to marketing, storage and planting advice to farmers.

### **1.4 Specific Objectives**

1. To carry out an investigation on the existing systems that provide information on available markets, storage facilities and planting advice in order to come up with the system requirements.
2. To design the Mobile Farming Advisory System to enable farmers get access to information pertaining to marketing their crops, planting advice and available storage facilities.
3. Develop the MFMAS.
4. To test and validate the MFMAS.

### **1.5 Scope**

The area of study is Uganda, Our main target in the development of the intended system is to register all large scale and small scale farmers irrespective of their districts and help them using their respective identities to access information concerning planting advice, marketing and storage of their produce.

### **1.6 Significance**

- The system will directly impact farmers and area cooperatives to make a difference in their lives for years to come. Through automating the whole process, the system will help to solve one of the biggest dilemmas faced by farmers.
- The farmers will have an advisory support system to help them find the most convenient information on market, storage and planting advice.
- The system will also help the area cooperatives to know the number of farmers who are registered in a particular area.

## 1.7 Conclusion

In conclusion, the system will be to the best advantage of both modern and local farmers today as it will avail information pertaining to marketing, storage and planting advice.

## Chapter 2

### Literature review

This section covers a wide range of related literature as far as mobile farming marketing advisory system is concerned. It's concerned with both existing and past data about tools on mobile advisory services. Planting advice, market, and storage are a very important factor in producing quality farm products both local and international. Farmers are now seeking better storage facilities, good market prices and planting advice.

### 2.1 Review of the Current System

#### Structure of the cooperative alliance

A co-operative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise.

Main actors in the co-operative are the area cooperative enterprises. They are established by the members to fulfill an economical goal at the local level. All their activities must be geared towards the needs of their members on an economically viable basis. These can be co-operative service centers, village banks and co-operative marketing centre. At the local area level, these different structures interact without having to refer to district unions as it was the case under the previous hierarchical structure. Village banks are opened to everybody and mobilized savings that they can use to offer loans either to private people, to traders or to the other co-operatives if village banks are satisfied with their economic performances.

It radically changed to become a training catalyst that assists co-operatives to re-organize their approach and their structure. It is a very flexible structure that is controlled by whoever decides to become a member. Many area co-operatives took this opportunity and they are more dynamic than the previous arrangement which was a succession of delegates' delegates of delegates. At the end of the day, the big shots that were representing the people cared very few for the cooperatives which they were meant to speak for. Uganda Cooperative Alliance (UCA) lost its past prestige of being an apex, although inefficient, to become a rather small organization but which is member based and member concerned. Mayer (1999).

## **2.2 Activities of Cooperative Alliance.**

A small core team composed of the secretary and his deputy handle administrative issues as well as management of funds. It financially relies on members' subscriptions and incomes from its own investment. Development and educational programs are specifically donor funded and they are targeted at grass-root level activities. Implemented programs focus on business development for area co-operatives, training in building capacities in management and accounting and women empowerment in the cooperative movement.

## **2.3 Problems with the Current System**

In Uganda, the trade liberalization changed drastically the context for the established rural co-operatives and their district unions. No banks were any more interested in financing agricultural activities in the rural areas. All privatized banks now concentrate financial activities in urban areas where it is easier to follow-up and less costly to operate. Liberalization of trade broke the monopoly of purchase that was detained by the co-operative unions on the export crops that were then sold to the export crop respective boards. On the other hand, the private sector has up to now fail to cover all the producing areas. Where it operates, it is yet to be challenged to avoid that few big traders impose a new monopoly. If the farmers owned co-operative is to play a role in this regard, it is however important to reform the co-operative movement and to re-instill co-operative values, on which one can build genuine capacities. Laar (1999)

## **2.4 Other Advisory Services**

### **2.4.1 The national agricultural advisory services (NAADS).**

Is a new program of the government of Uganda put in place to increase the efficiency and effectiveness of agricultural extension service. It is a semi-autonomous body formed under National Agricultural Advisory Services (NAADS) act of June 2001 with a mandate to develop a demand driven, farmer-led agricultural service delivery system targeting the poor subsistence farmers, with emphasis to women, youth and people with disabilities. Its development goal is to enhance rural livelihoods by increasing agricultural productivity and profitability in a sustainable manner. NAADS is working in pursuit of the national development framework of poverty eradication agenda, which is guided by the Poverty Eradication Action Plan (PEAP).

NAADS overall supervision is vested in the ministry of agriculture animal industry and fisheries (MAAIF). The program was officially launched in March 2002.

NAADS is one of the seven components under the plan for modernization of agriculture (PMA), the planning framework of the government for the transformation of subsistence agriculture to market oriented for commercial production. NAADS programme aims to redress past shortcomings in the provision of the agricultural extension services through far reaching reforms and innovative approaches in service delivery.

### **2.4.2 Uganda national farmer's federation (UNFFE)**

Is the largest non-governmental farmers' organization in Uganda. Farmers from all over Uganda founded this organization in 1992 with the objective to mobilize the farming community and voices under one independent umbrella organization. It started as Uganda national farmers association (UNFA) and changed to a federation in 2002 to embrace various commodity associations and service providers.

It promotes favorable policies and strengthens farmer organizations for increased farmer empowerment.

### **2.4.3 Nkoola institutional development associates (NIDA)**

NIDA is a Uganda-based consultancy firm with expertise and a proven track record in the field of rural and institutional development. The firm functions as a limited liability company with a small team of core staff, anchoring a network of local and international associates. Since its founding in 1998, NIDA has undertaken consultancy services for a wide range of clients who include: dfid, the European Union, World Bank, ifad, government of Uganda and many ngos.

It has been particularly active in the reform processes of agricultural research and extension. It has provided strategic inputs in these areas at sub-regional and regional levels. In the area of research management, nida coordinated the dfid renewable natural resources research strategy research portfolio in Kenya, Uganda and Tanzania from 2000 to 2006. It was also a member of the consortium that initiated the dfid-funded research into use program that commenced in 2007. Its major role in this program was the setting up of the country programs in Malawi, Nigeria, Rwanda, Sierra Leone, Tanzania and Zambia.

In a nutshell so to mention, we have three advisory services that we are familiar with. As noted above, they are of great use to farmers and home based agricultural groups.

## **Chapter 3**

### **Methodology**

The methodology will consist of both the quantitative research methods which were originally developed in the natural sciences to study natural phenomena; the data is quantified into calculations or figures. And qualitative research methods which were developed in the social sciences to enable researchers to learn social and cultural phenomena, it does not involve numbers but basically asks people questions and writing down their responses, the qualitative data sources to be used include observation and participant observation (fieldwork), interviews, documents and texts.

### **3.1 Requirements identification**

Requirement identification was done through interviewing farmers and other stakeholders. It was also done through reviewing the procedure taken while planting a certain crop to harvesting it. From the data collection methods used above, requirements identification were easily achieved, data collection methods used are elaborated below:-

#### **3.1.1 Data collection methods**

##### **Interviews**

Interactive interviewing techniques were used to obtain information from potential end users. They were asked to verbally describe their experience with existing patient monitoring systems. We also observed existing practices and reviewed any efforts that were being made to improve those practices.

##### **Document reviews**

In data collection, retrieving and locating of data is a good starting point and the main advantage is that it is cheap to collect the data in terms of cost and time spent. Documents were analyzed mostly to find out what the cooperative offers in terms of services.

##### **Participant observation**

Participant observations were aimed at gaining a close and intimate familiarity with the farmers and their practices through an intensive involvement with the farmers in their natural environment, over an extended period of time. This method involved the systematic selecting, watching and recording behavior and characteristics of farmers.

## **3.2 Analysis of system requirements**

Data analysis is the process of looking at and summarizing data with the intent to extract useful information and develop conclusions. Researchers analyzed data from the area cooperative and farmers. The farmers responses from the interviews were recorded and analyzed using Microsoft excel. Researchers were able to obtain insights from the analyzed data. Particularly, researchers were able to highlight useful information, suggest conclusions, and obtain in depth insights that supported us during decision making.

The research results provided inputs and suggestions from potential end users of the system.

Their views were included in the initial design, building and implementation of the system.

This greatly reduced the risk of system failure.

## **3.3 System Design**

The object oriented approach was used in the design of this system. Graphical illustrations were used to visualize the system using the Unified Modeling Language (UML). UML is a standardized general-purpose modeling language in the field of software engineering. It includes a set of graphical notation techniques to create abstract models of specific systems.

### **3.3.1 Logical data modeling**

In this process, researchers identified, modeled and documented the data requirements of the system.

The data separated into entities (things about which a business needs to record information) and relationships (associations between the entities).

### **3.3.2 Data flow Diagram**

In this process researchers identified, modeled and documented how data moves around an information system. Data flow Diagrams examine processes (activities that transform data from one form to another), data stores (the holding areas for data), external entities (what sends data into a system or receives data from a system), and data flows (routes by which data can flow).

### **3.3.3 Entity Relationship Diagram**

In this process researchers identified, modeled and documented the events that affect each entity and the sequence in which these events occur. ERDs were created to show the entities and their relationships.

## 3.4 System Implementation

System Implementation involved the use of the following development tools.

- i. Java was used to build the mobile application.
- ii. C# was used to implement the desktop part which is used by the staff.
- iii. PHP scripts and HTML were used to implement the interfaces on the buyer's side.
- iv. MySQL was used to implement the database.
- v. Web services were used as an interaction for all applications

## 3.5 System Testing and validation

### 3.5.1 System testing

The system was tested to ensure that it conforms to the user requirements and is functionally correct. Test data was used to ensure that the system correctly identifies potential buyers of the farmer's products and also automatically send planting advice through SMS. The goal of testing was to ensure the reliability of the system before implementation.

Black box testing was used to demonstrate that the software functions are operational; that inputs are correctly accepted and the output is correctly produced and analyzed.

System testing was carried out at three levels:

- i) **Unit testing.** This tests the minimal software component, or module. Each basic component of the software was tested to verify that the detailed design for the unit had been correctly implemented. In an object-oriented environment, this is usually at the class level, and the minimal unit tests include the constructors and destructors.
- ii) **Integration testing.** This exposes defects in the interfaces and interaction between integrated components (modules).
- iii) **System testing.** The completely integrated system was tested to verify that it meets user requirements.

### 3.5.2 System Validation

System validation refers to the documented process of assuring that a computer system does exactly what it is designed to do in a consistent manner. The model of the system was validated by presenting it to stakeholders to interact with it and confirm if it suited the intended objective.

# Chapter 4

## System Analysis and Design

Existing farming system was studied to evaluate their performance and effectiveness so as to come up with the correct user requirements. Researchers concentrated on providing marketing information to farmers, storage and being in position to access planting advice. This chapter describes the design process of the system. It also defines the user and system requirements of the developed system.

### 4.1 System Analysis

Before we embarked on the design process, we had to identify the different end user requirements. Identifying and documenting end user requirements involved interviewing and observing end users. The requirements can be categorized into three groups i.e. user, functional and non-functional requirements.

### 4.2 Existing system

A manual system that exclusively involves paper work to accomplish its tasks. It involves black books to record their records and transactions of their stocks, use of receipt books to carry out transactions and as means of reference which is a slow system when it comes to recoding and retrieval of farmer's records.

Such a manual system can easily be destroyed, for example by fire, rats, cockroaches, termites and weather leading to loss of very important farmer information such as the season dates, stock available, sales and profits. Generating annual reports is very tedious. However, this systems is cheap, easy to start up yet do not require backup space. It is equally good for small records.

#### 4.2.1 Weaknesses

- The current system is unable to keep track of the information regarding farmers produce during the whole season for example farmers advise to each other using SMS, storage and market provision by the cooperative. Since receipt books are used to carry out transactions and as a means of reference.
- It's a slow system when it comes to recoding and retrieval of farmer's records, also not easy to update the farmer and staff records yet it requires more labor to use.

- loss of very important farmer information such as the season dates, stock available, sales and profits Generating annual reports which is very tedious when the system is destroyed by fire, rats, cockroaches and termites.
- The records are vulnerable to threats such as access by unauthorized people.

### 4.3 User Requirements

It is very important to get users of the system fully involved such that the problem of change management does not arise. The stake holders who will use the system therefore were approached during the study and were asked what they expected of the proposed system and the following were the findings;

1. A system should be able to restrict access to information to only authorized personnel.
2. A system should be easy to learn and use.
3. A system should improve on the efficiency of information storage and retrieval.
4. A system should have an element of error validation, one that prompts the user on entering unusual command or data format inconsistent.
5. A system should be faster, flexible and consistent

## 4.4 Functional System Requirements

The system should perform the following functionalities:

1. The system should store information about farmers, staff members and the buyers.
2. The system should allow notifications from the buyers and farmers.
3. The system should respond to the buyers request either through sending SMS or using the web site.
4. The system should authenticate and allow the staff on duty access rights.
5. The system should have away for buyers to register them selves to access the flow of information and transactions
6. The system should allow generation of reports.

## 4.5 Non-functional System Requirements

The system was designed to fill the following non-functional system requirements.

1. The system should verify and validate all user input and provide notification in case of an error.
2. The system should only allow authorized personnel to access the system i.e. the staff and the buyer.
3. The system should ensure that the system administrator is the only one privileged to add or remove users.
4. The system should allow for future expansion.
5. The system should have a high level of performance and reliability.

## 4.6 System Requirements

In order for the system to perform as expected, the following hardware is required.

Hardware	Minimum Specifications
Server	Random Access Memory - 2GB.  Processor Speed - 2GHZ  Hard disk space - 120GB Server  Display - 1024 x 768 (32 bit) High Colour.
Computer	512MB Random Access Memory Processor Speed - 1GHZ.  Hard disk space - 40GB  Display - 1024 x 768 (32 bit) High Colour.
Mobile Phone	Memory - 32MB RAM - 80MB Onboard storage  Display - TFT LCD, 16M Colors

**Table 1: System Hardware requirements**

Software	Minimum requirement
Operating system	<ul style="list-style-type: none"> <li>• Windows Server 2003(server)</li> <li>• Windows Mobile 5.0 (phone)</li> <li>• Windows XP, vista etc</li> </ul>
Database	MySQL

**Table 2: System software Requirements**

## 4.7 System Design

The object oriented approach to design was used in development of this system. This section describes the design that includes: the structure, behavior, and interaction of the different components in the system.

### 4.7.1 Architectural Design of the proposed system

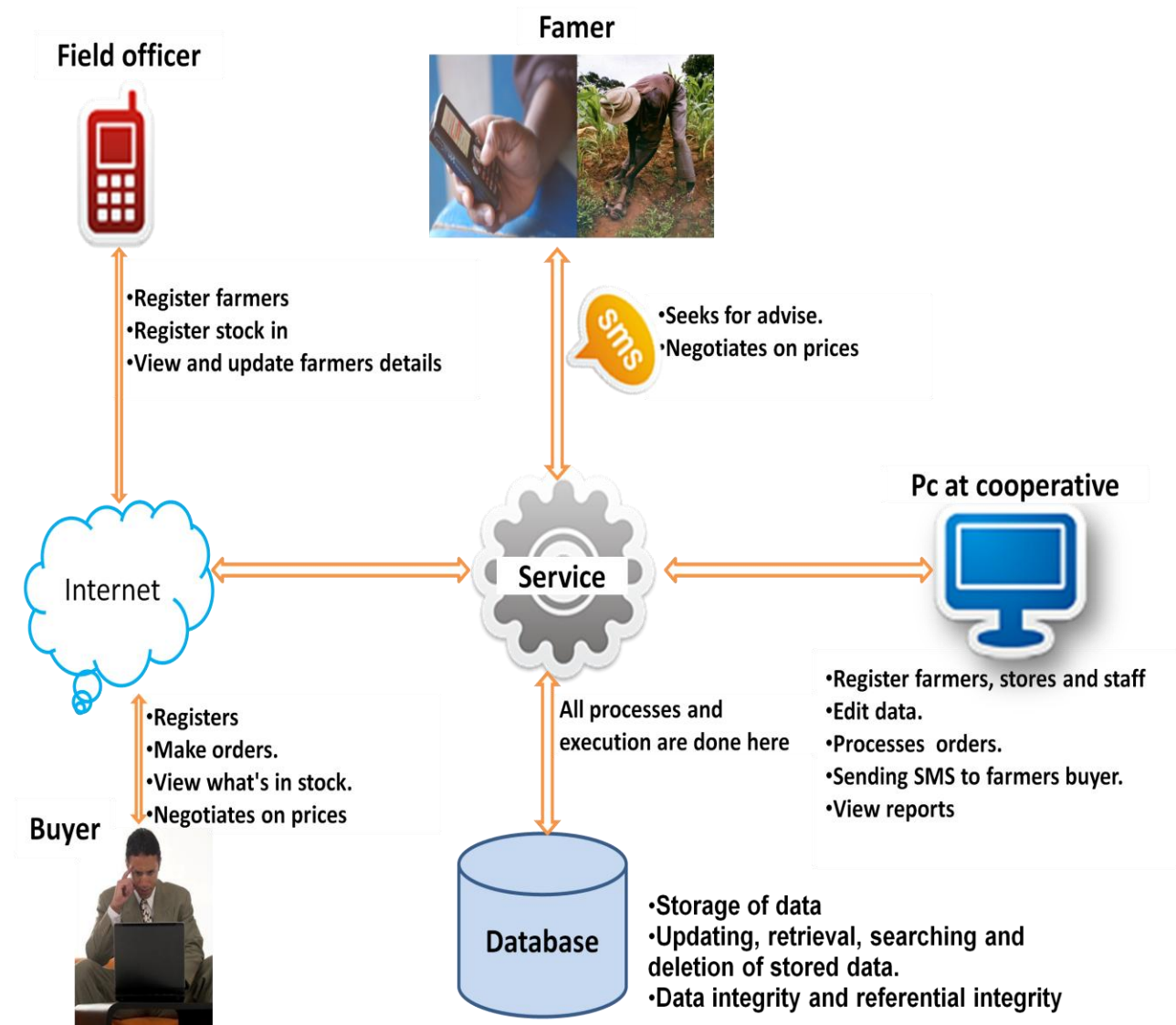


Figure 1: System architecture

### 4.7.2 Context Diagram

The context diagram below is an overview of the system showing system boundaries, external entities interacting with the system and major information flows between the entities and the system. It depicts the system being studied as it relates to other systems, the business and outside world, that is, the interfaces flowing to and from the external entities.

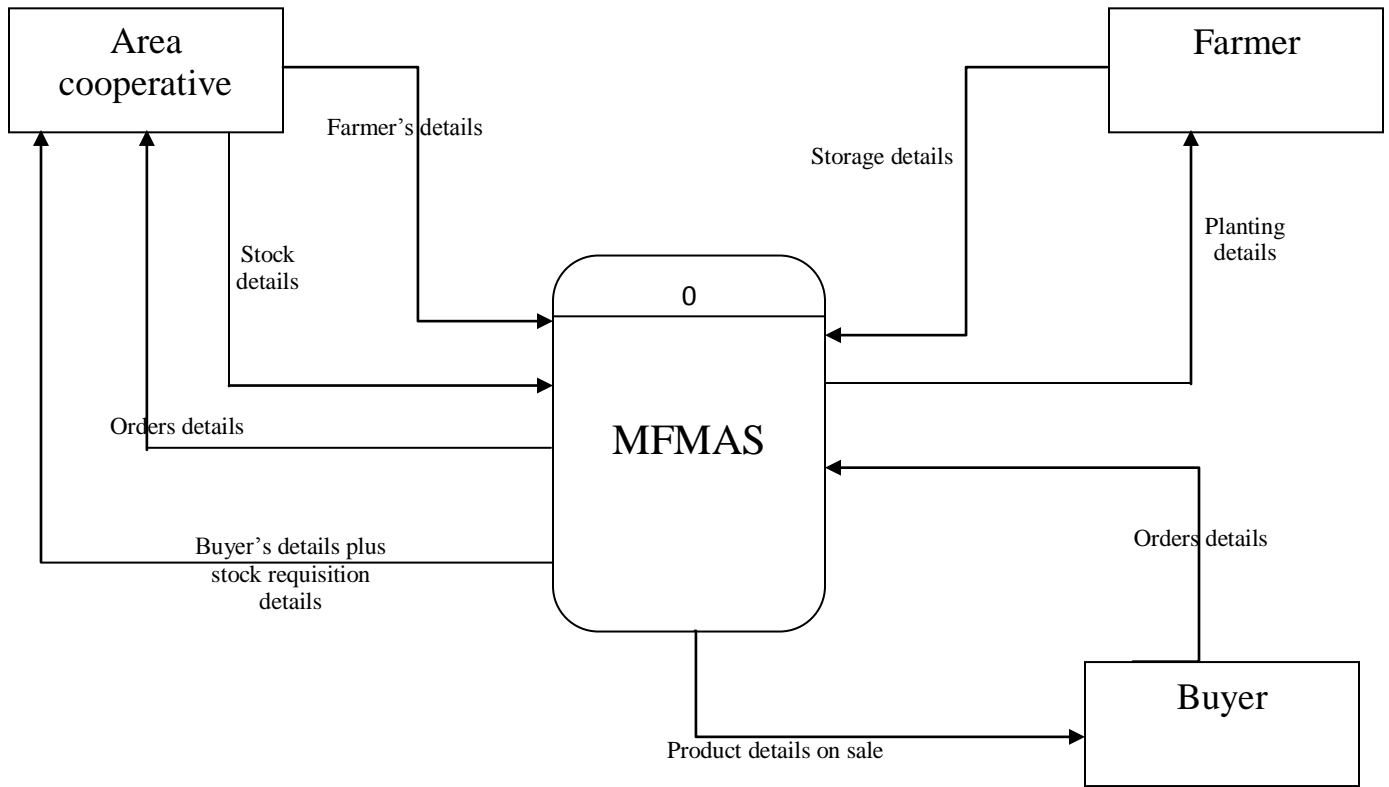
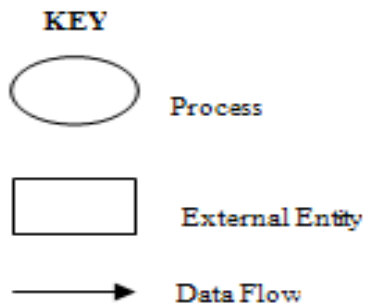


Figure 2: Context Diagram



### 4.7.3 Data Flow Diagram

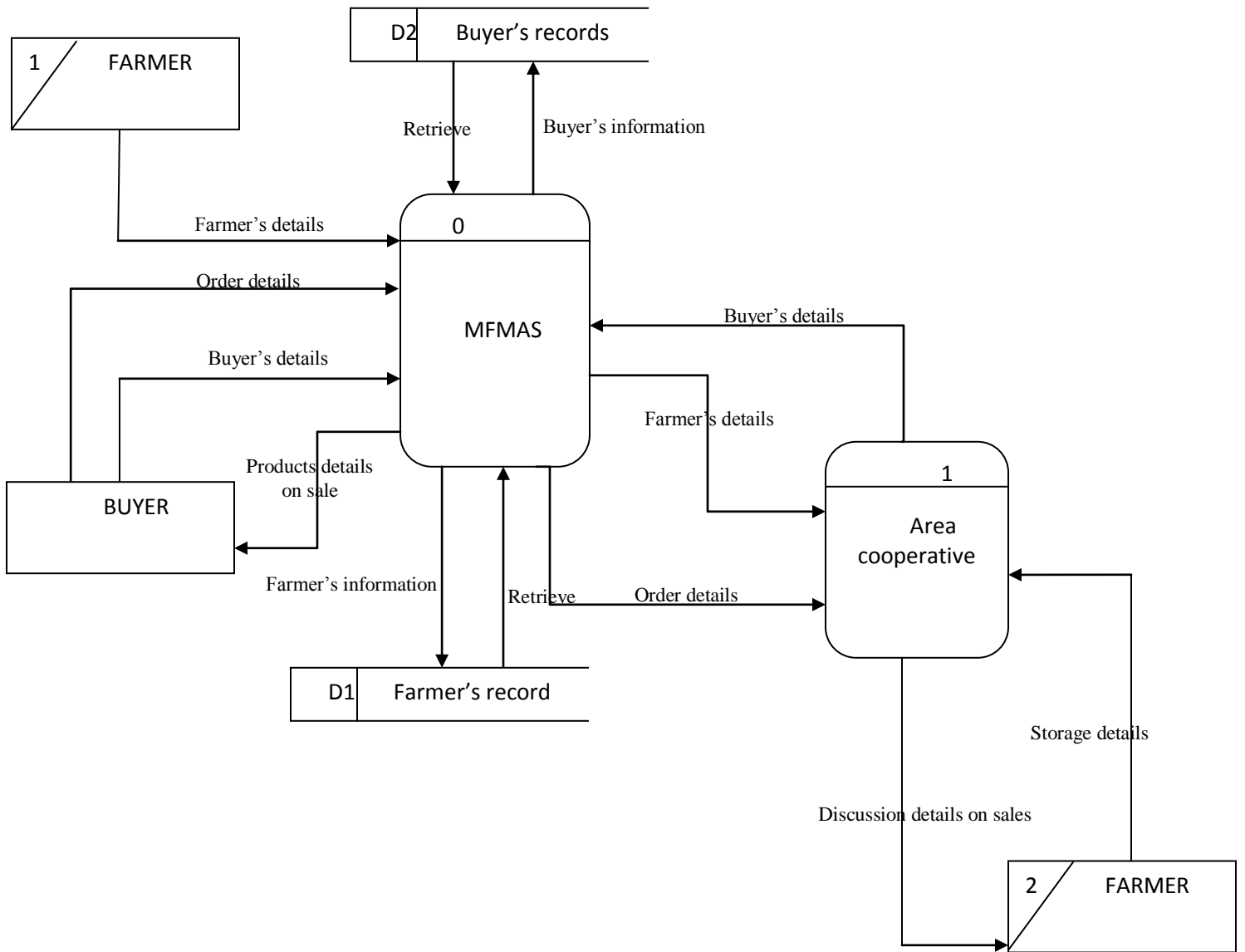


Figure 3: Data Flow Diagram

#### 4.7.4 Data Dictionary

<b>External Entities</b>		
Farmer	Is a person who grows crops for both consumption and commercial purpose.	
Buyer	Is a person who makes orders	
<b>Processes</b>		
<b>Process</b>	<b>Process id</b>	<b>Description</b>
MFMAS	0	Controls co-ordinates activities about the cooperative.
Area cooperative	1	Co-ordinates the farmers and buyers.
<b>Data stores</b>		
Buyer's records	It's where buyer's records are kept.	
Farmer's record	It's where farmer's records are kept.	

**Table 3: Data Dictionary**

## 4.8 Data modeling

Data modeling is the analysis of data objects that are used in a business or other context and identification of the relationships among these data objects.

### 4.8.1 Conceptual data model

#### I. Identification of Entities and their attributes

	Entity Name	Description	Attributes
1	Staff	Store details of a person who coordinates the activities at the cooperative.	<ul style="list-style-type: none"><li>– StaffID</li><li>– Name,</li><li>– Gender</li><li>– PhoneNo</li><li>– Photo</li><li>– InDate</li><li>– NOKName</li><li>– NOKGender</li><li>– NOKContact</li><li>– UserName</li><li>– Password</li><li>– AccessLevels</li><li>– Blocked</li></ul>
2	Farmer	Store details of a person who grows crops for consumption and commercial use.	<ul style="list-style-type: none"><li>– farmerID</li><li>– Name</li><li>– Gender</li><li>– District</li><li>– Village</li><li>– PhoneNo</li><li>– InDate</li><li>– NOKName</li><li>– NOKGender</li><li>– NOKPhoneNO</li></ul>

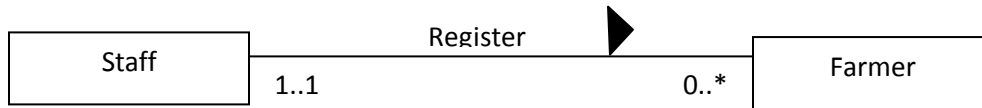
3	Buyer	store information about buyer	<ul style="list-style-type: none"> <li>- BuyerID</li> <li>- Name</li> <li>- Gender</li> <li>- Country</li> <li>- PhoneNo</li> <li>- Email</li> <li>- Delivery_AddressuserID</li> <li>- UserName</li> <li>- Password</li> <li>- Form_Date</li> </ul>
4	Planting	Store details of plants grown by different farmers.	<ul style="list-style-type: none"> <li>- plantID</li> <li>- farmerID</li> <li>- InDate</li> <li>- plant_year_season</li> <li>- plantName</li> <li>- Amount</li> <li>- On_Order</li> </ul>
5	need_for_sotre	Store details of the farmers who are in need of storage for their crops.	<ul style="list-style-type: none"> <li>- NeedID</li> <li>- InDate</li> <li>- farmerID</li> <li>- ProductName</li> </ul>
6	buyer_order	Store details of those buyer who orders for a certain product.	<ul style="list-style-type: none"> <li>- OrderID</li> <li>- BuyerID</li> <li>- Need_Date</li> <li>- ProductName</li> <li>- Quantity</li> <li>- OrderDate</li> <li>- Pay_Amount</li> <li>- Amout_Accepted</li> <li>- Curreny_Type</li> <li>- Order_State</li> </ul>

			<ul style="list-style-type: none"> <li>– Paid_Amount</li> </ul>
7	Store_in	Store details about the products in a store for a given farmer.	<ul style="list-style-type: none"> <li>– StoreID</li> <li>– farmerID</li> <li>– ProductName</li> <li>– InDate</li> <li>– Quantity</li> <li>– Quantity_in</li> <li>– Quantity_Out</li> <li>– Store_Charge_Per_Day</li> <li>– Store_Charge_Amount</li> <li>– Paid</li> <li>– StaffID</li> </ul>
8	buyer_comments	Stores details of buyer's comments on a certain product.	<ul style="list-style-type: none"> <li>– CommentID</li> <li>– BuyerID</li> <li>– C_Date</li> <li>– Comment</li> </ul>
9	store_out	Stores details about farmers stock out	<ul style="list-style-type: none"> <li>– OutID</li> <li>– StoreID</li> <li>– Quantity</li> <li>– Date_out</li> <li>– StaffID</li> </ul>

**Table 4: A table showing the description of entities and their attributes.**

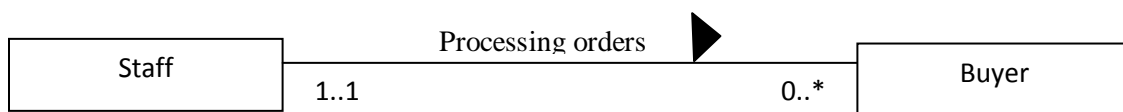
## 4.8.2 Modeling Relationships between entities

1. A staff registers farmers



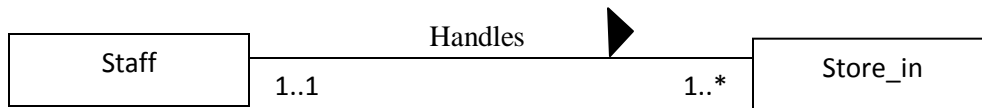
A staff registers at least one farmer and more than one. Therefore the cardinality of this relationship is a 1: M

2. Staff processes order for buyer.



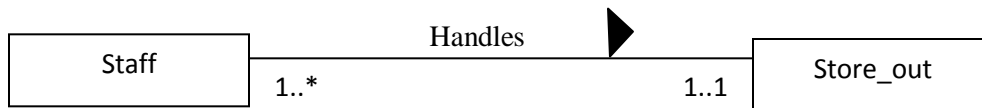
A staff processes orders for one or more buyer. Therefore the cardinality of this relationship is a 1: M.

3. Staff handles store in



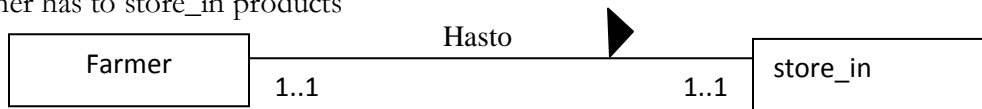
Staff can handle one or more store\_in produce. Therefore the cardinality of this relationship is a 1: M.

4. Staff handles store\_out.



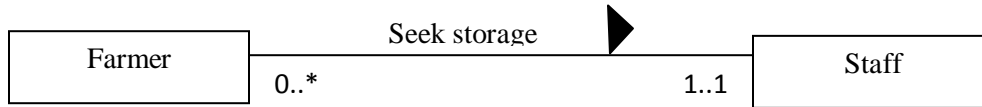
A staff handles store\_out for only one farmer. Therefore the cardinality of this relationship is a 1:1.

5. Farmer has to store\_in products



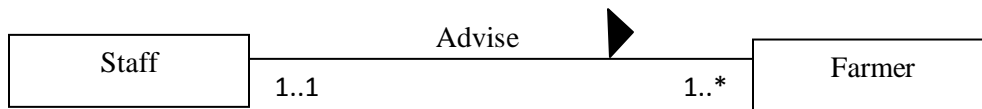
A farmer has to store in his produce. Therefore the cardinality of this relationship is a 1:1.

6. Farmer seek storage from staff



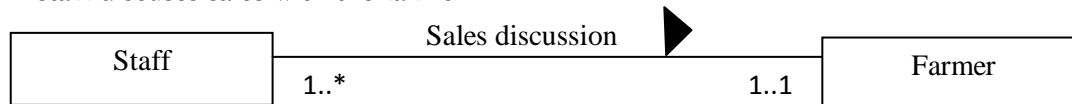
A farmer can seek storage to more than one staff. Therefore the cardinality of this relationship is a 1:M.

7. Staff advise farmer



A staff can give advise to one or more farmers. Therefore the cardinality of this relationship is a 1:M.

8. staff discusses sales with the farmer



A staff discuss sells with the farmer. Therefore the cardinality of this relationship is a 1:1.

### 4.8.3 Entity Relationship Diagram for the proposed MFMS

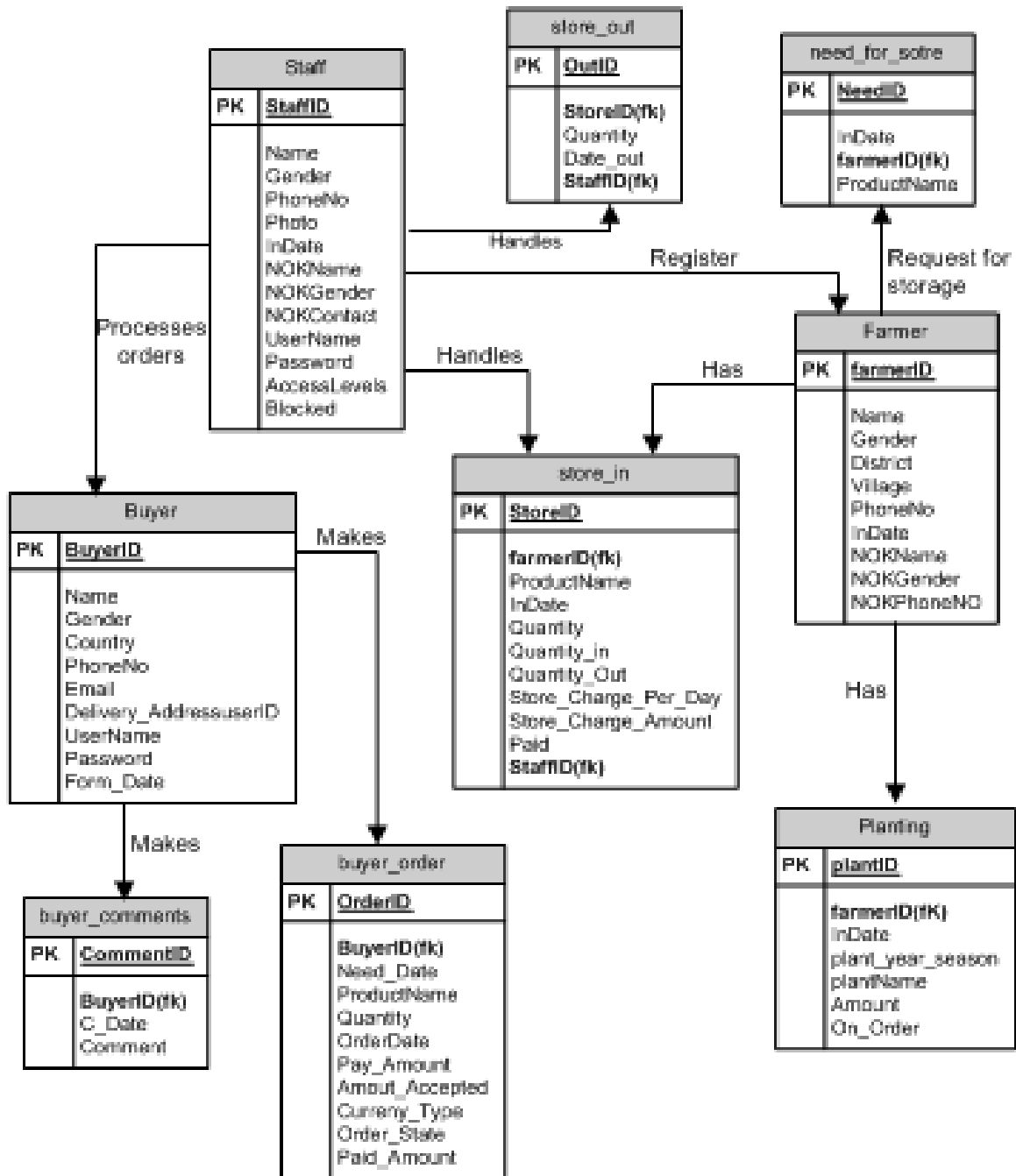


Figure 4: Entity Relationships Diagram

## 4.9 Logical Design

After constructing the entity relational model for the system, the project team mapped this model onto the relational schema to design the structures of the relations to be constructed in the database implementation.

### Staff

Field Name	Data Type	Constraint	Null
StaffID {pk}	varchar(20)	Primary key	No
Name	varchar(70)		No
Gender	varchar(8)		No
PhoneNo	varchar(30)		Yes
Photo	longblob		Yes
InDate	date		No
NOKName	varchar(20)		No
NOKGender	varchar(8)		No
NOKContact	varchar(20)		No
UserName	varchar(20)		Yes
Password	varchar(15)		Yes
AccessLevels	varchar(10)		No
Blocked	varchar(4)		No

**Table 5: Description of the entity Staff**

### Farmer

Field Name	Data Type	Constraint	Null
farmerID	varchar(20)	Primary key	No
Name	varchar(70)		No
Gender	varchar(8)		No
District	varchar(30)		No
Village	varchar(20)		No
PhoneNo	varchar(20)		No
InDate	date		No
NOKName	varchar(20)		Yes
NOKGender	varchar(8)		Yes

NOKPhoneNO	varchar(20)		Yes
------------	-------------	--	-----

**Table 6: Description of the entity Farmer**

**Buyer**

Field Name	Data Type	Constraint	Null
BuyerID	varchar(20)	Primary key	No
Name	varchar(70)		No
Gender	varchar(8)		No
Country	varchar(50)		Yes
PhoneNo	varchar(40)		No
Email	varchar(30)		Yes
Delivery_AddressuserID	varchar(50)		Yes
UserName	varchar(20)		Yes
Password	varchar(20)		Yes
Form_Date	Date		No

**Table 7: Description of the entity Buyer**

**Planting**

Field Name	Data Type	Constraint	Null
plantID	bigint(20)	Primary key	No
farmerID	varchar(20)	Foreign key	No
InDate	date		No
plant_year_season	varchar(20)		No
plantName	varchar(20)		No
Amount	varchar(30)		No
On_Order	varchar(3)		No

**Table 8: Description of the entity planting**

**need\_for\_sotre**

Field Name	Data Type	Constraint	Null
<u>NeedID</u>	int(11)	Primary key	No
InDate	Date		No
farmerID	varchar(20)	Foreign key	No
ProductName	varchar(20)		No

**Table 9: Description of the entity need\_for\_sotre****buyer\_order**

Field Name	Data Type	Constraint	Null
<u>OrderID</u>	varchar(20)	Primary key	No
BuyerID	varchar(20)	Foreign key	No
Need_Date	Date		No
ProductName	varchar(20)		No
Quantity	varchar(30)		No
OrderDate	Date		No
Pay_Amount	Float		Yes
Amout_Accepted	varchar(3)		No
Curreny_Type	varchar(30)		Yes
Order_State	varchar(10)		No
Paid_Amount	Float		Yes

**Table 10: Description of the entity buyer\_order****store\_in**

Field Name	Data Type	Constraint	Null
<u>StoreID</u>	varchar(20)	Primary key	No
farmerID	varchar(20)	Foreign key	No
ProductName	varchar(20)		No
InDate	date		No
Quantity	float		No
Quantity_in	varchar(30)		No
Quantity_Out	float		No
Store_Charge_Per_Day	bigint(20)		No
Store_Charge_Amount	bigint(20)		No

Paid	bigint(20)		No
StaffID	varchar(20)	Foreign key	No

**Table 11: Description of the entity store\_in**

**buyer\_comments**

Field Name	Data Type	Constraint	Null
CommentID	bigint(20)	Primary key	No
BuyerID	varchar(20)	Foreign key	No
C_Date	date		No
Comment	text		No

**Table 12: Description of the entity buyer\_comments**

**store\_out**

Field Name	Data Type	Constraint	Null
OutID	bigint(20)	Primary key	No
StoreID	varchar(20)	Foreign key	No
Quantity	float		No
Date_out	date		No
StaffID	varchar(20)	Foreign key	No

**Table 13: Description of the entity store\_out**

## **Chapter 5**

### **Implementation and testing**

This chapter describes the implementation of the design solution presented in the previous chapter to meet the requirements of the proposed system. The technologies employed are selected according to availability and ease of use.

#### **5.1 System implementation**

##### **5.1.1 Mobile phone implementation**

##### **5.1.2 Desktop application implementation**

### 5.1.3 Buyer's site Implementation

The form below is a starting page with a login on the side of the buyer's website. It is used to enable users to input their authentication details to access the system.



Figure 5: Starting page with a login

On clicking the link for register the form below is seen where the buyer can register him/her self in to the system such that he can access some important information.



Figure 6: Registration form

On clicking the link for order now after the buyer has logged in the form below is shown were he/she can make the orders by specifying the need date, product name and others.



Figure 7: Order form

On clicking the



## 5.2 System Testing and Validation

### 5.2.1 System Testing

### 5.2.2 System Validation

## Chapter 6

### Conclusion, Summary and Recommendations

This section provides a discussion of the summary and the conclusions that were realized in relation to the objectives of the project. The chapter is concluded with recommendations in regard to the project.

#### 6.1 Summary

The project addressed a major problem that is being faced by farmers in Uganda. The Ministry of Agriculture in Uganda is making endeavors to incorporate the use of technology in this digital era to provide better services to farmers and also better management of the area cooperative data in an effective manner. It's with the above background that we designed MFMAS, a mobile based monitoring solution for farmers. It is supposed to provide away on how farmers get to market their produce, storage and planting advise and also provide a convenient way for farmers to be monitored.

#### 6.2 Conclusion

Although Uganda is technologically developing, many farmers' cooperative alliances have not incorporated technology in their operations. Due to increasing numbers of farmers who require attention and the limited staff who are present, the efficiency and effectiveness of these cooperatives heavily hampered. The required efficiency cannot be achieved through manual methods but requires technologically innovations like MFMAS to boast their performance.

#### 6.3 Recommendations

- The system users should be trained on how the system works and how they interact with the system.

- Staff members should be trained on the functionality of the system.
- There should be education on the effective use of passwords this is mainly for the system administrator.
- The users of the system should be educated on good passwords to ensure security of the system, this also prevents un-authorized access of information.
- Staff should be educated on the importance of the system that is increase one on the efficiency and effectiveness of their work and not replace them.
- There should be an online backup this could be daily or weekly to ensure that all the information is retrieved in case of a system breakdown/ failure.

## References

1. Thierry (1999), *Uganda cooperative alliance restructured the cooperative move movement in an attempt to restore the values of vanished cooperative in Uganda*, Milton, 08/04/1999.
2. Thierry (1999), *No more "TOP" FOR" DOWN" Cooperatives in Uganda*, Milton, 02/03/1999.
3. <http://www.ue-acp.org/fr/fiches/dph/058.htm>. Retrieved on 25th-04-2010
4. <http://base.d-p-h.info/fr/fiches/premierdph/fiche-premierdph-4985.html>. Retrieved on 25th-04-2010
5. <http://www.naads.or.ug/naads.php>. Retrieved on 25th-04-2010
6. <http://www.unffe.org/>. Retrieved on 25th-04-2010
7. Gilbert Maiga: *Systems Analysis and Design, Lecture notes for CSC 2202*. Faculty of Computing and Information Technology, Makerere University in Kampala, February 2007.

# Appendices

Appendix A:

Appendix B: