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A MOBILE KNOWLEDGE MANAGEMENT SYSTEM FOR POULTRY FARMS.

A PROJECT REPORT SUBMITTED TO THE SCHOOL OF COMPUTING AND INFORMATICS TECHNOLOGY FOR THE STUDY LEADING TO THE AWARD OF A BACHELOR'S DEGREE IN INFORMATION SYSTEMS, MAKERERE UNIVERSITY.

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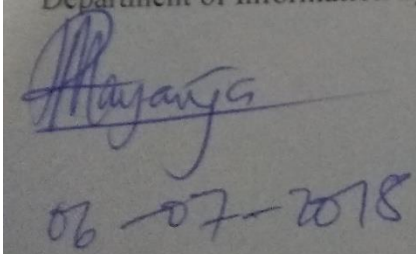

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Table of Contents

THE LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

App	-	Application.
DB	-	Database.
DFD	-	Data Flow Diagram.
FAQs	-	Frequently Asked Questions
GHz	-	Giga Hertz
GUI	-	Graphical User Interface
HDD	-	Hard Disk Drive
IT	-	Information Technology
IDE	-	Integrated Development Environment.
NARO	-	National Agricultural Research Organization.
NAADS	-	National Agricultural Advisory Services.
MAAIF	-	Ministry of Agriculture, Animal Industry and Fisheries.
OO	-	Object Oriented.
OS	-	Operating System.
RAM	-	Random Access Memory.
SQLite	-	Structured Query Language Lite.
SRD	-	Software Requirements Document.
UML	-	Unified Modelling Language.
URL	-	Uniform Resource Locator
USB	-	Universal Serial Bus.
XML	-	Extensible Markup Language.

ABSTRACT

This report document about a mobile knowledge management system for poultry farms contains various sections which explains the processes that were taken from the very beginning of the project from data collection process to the testing and implementation of the mobile application.

The document also explains the problem which is, the lack of access to the appropriate information about poultry farming to which we came up with a mobile knowledge management system to provide the relevant information to these poultry farmers.

It addresses all the functionalities performed by this application and these include; enabling farmers have access to relevant information based on the poultry farmers' needs, providing notifications about different tasks that are to be done based on a particular period of time, providing the major poultry farming guidelines required to be known by every farmer so as to achieve in this practice of rearing poultry birds and enabling poultry farmers have access to appropriate online knowledge sources to acquire more information and solutions. It continues to elaborate on how the designs were made, the implementation of the mobile application, the tests that were done and the schedule that was followed during the execution of this project.

CHAPTER 1. INTRODUCTION

The dynamic growth of mobile communications technology has increased and created more opportunities for economic growth, social empowerment, and grassroots innovation in developing countries. One of the areas with the greatest potential impact is in the contribution that mobile applications can make to agricultural and rural development (ARD), by providing access to information, markets, and services to millions of rural inhabitants. ICTs are not effectively communicated to farmers especially in rural areas although access to modern information technology is largely available. This study examined the relevance of using ICT in poultry farming in Uganda.

1.1 BACKGROUND TO THE PROBLEM

In most developing countries, Agriculture is the main economic activity accounting for large shares of employment and output. In Uganda over 80 percent of the households and 85 percent of the people live in rural areas and most of these largely depend on Agriculture as their main source of income (Gollin & Rogerson, 2010). The main focus in this study was on the need of poultry farming information and the use of ICTs to enhance access to information by the poultry farmers in Uganda.

Information and communication have always mattered in agriculture, ever since people started growing crops, rearing animals, and fishing. However, Farmers have always sought information from each other such as information to answer questions relating to; sources of good quality poultry feeds and drugs, how to effectively manage the poultry farm records, current market information about poultry products among other issues. Farmers do not usually get appropriate answers to questions arising from their concerns, even though the same issues arise season after season and year after year (The International Bank for Reconstruction and Development & The World Bank, 2011).

According to Maidu (2012) mobile communications technology has rapidly become the world's most common way of transmitting voice, data, and services in the developing world. Given this dramatic change, mobile applications in particular hold significant potential for advancing development. They could provide the most affordable ways for millions of people to access information, markets, finance, and governance systems previously unavailable to them.

The main focus in this study was on the need of poultry farming information and the use of ICTs to enhance access to this information by the poultry farmers in Uganda.

1.2 PROBLEM STATEMENT

In Poultry farming, many people today who engage in this practice of rearing poultry birds always face different challenges which usually arise inform of questions that need solutions and this is as a result of lack of access to the appropriate information about poultry farming. Many of these poultry farmers usually find difficulty in finding solutions to their problems. This means that many of them end up not solving their problems and some acquire knowledge and get solutions that are not relevant to their questions and as a result, this has left many poultry farmers helpless.

1.3 AIMS AND OBJECTIVES

1.3.1 MAIN OBJECTIVE

To develop a mobile knowledge management system for poultry farms which enables poultry farmers have access to appropriate information based on their questions, provide notifications about certain tasks that need to be done and also provide appropriate poultry farming guidelines.

1.3.2 SPECIFIC OBJECTIVES

Below are the specific objectives that guided in achieving the main objective.

i. To Identify the sources of agricultural information and Investigate agricultural information needs of poultry farmers in Uganda.
ii. To perform an analysis of the collected data in order to clean, transform and visualize the available data.
iii. To develop the data collection tools used during the process of collection of data in the field.
iv. To design the different models used during the development of the mobile application system.
v. To develop the mobile application and test it so as to check for any existing errors and remove them.

1.4 THE SCOPE

The study focused on how different poultry farmers in the different parts of the central region of Uganda manage their farm records, how they access poultry farming information and even solutions to their questions and also the way they determine the strategy to use while rearing different types of poultry birds. The study didn't focus on the farmers who deal in crop production, fish farming and livestock rearing.

1.5 RESEARCH SIGNIFICANCE

With Improved access to appropriate poultry farming information, poultry farmers are able to make timely decision makings and ignore disastrous decisions which could have reduced on their produce and increased on the costs incurred. In the long run, this increases on the government revenue through taxation on the produce as well as improving on the welfare of poultry farmers.

CHAPTER 2. LITERATURE REVIEW

Uganda has the requisite policy framework for modernizing agriculture and eradicating poverty in place and the onus is on scientists to provide environmentally sound technology options to ensure policy implementation. In the survey about ICT uses for inclusive agricultural value chains by (National Agricultural Advisory Services, 2013) it was predicted that Uganda would in the coming years be in position to access all agriculture services through the internet using their mobile phone applications. This practice is observed in a number of sectors in the country and would therefore be very useful in enhancing poultry farming in the different communities in the country.

2.1 INFORMATION NEEDS OF POULTRY FARMERS

No one can categorically claim to know all the information needs of farmers especially in an information dependent industry like poultry farming where there are new and rather complex problems facing farmers every day (National Agriculture Research Organization, 2015). Information needs of the poultry farmers are issues to deal with market prices about poultry produces' such as eggs and poultry birds, access to improved and better-quality breeds, ways of how to prevent outbreak of different diseases that affect poultry birds, the different types of food and mixtures that are supposed to be given to different types of poultry birds, and also the tips needed to yield profits from poultry farming.

Kaoma (2017) further states that the information needs of poultry farmers can be grouped into three headings which include; Poultry Farming Inputs, Marketing and Extension Education by Poultry Farmers.

Milly (2017) believes that today poultry farmers face many challenges as a result of their ignorance failing to employee better mechanisms that are required to improve on the production of these local hens and broilers. As a result, they end up making high amounts of losses and sometimes yields low profits after putting in much effort.

2.2 ICT REQUIREMENTS BY POULTRY FARMERS

These farmers require devices such as Mobile Phones which are smart phones that can support the use of Mobile applications which can be used to capture, read and store data. However, further components such as the Internet, communication networks and regulatory systems (to provide data security and standard systems for codes) are essential to complement the input and output devices. In the study about a ICT framework to enhance poultry faming in Uganda, National Agriculture Research Organization. (2015) established three most effective ways through which ICT can enhance poultry production and these include; Mobile phones, internet and workshops.

2.3 SOURCES OF INFORMATION USED BY POULTRY FARMERS TODAY

A study on the sources of poultry information by National Agricultural Advisory Services (2013) reveals that books, workshops, newspapers and Internet are the most commonly used sources of information by poultry farmers which must somehow be managed well. Some of these farmers who have no access to many of these sources have got middlemen who always update them with the information in the market place which is usually costly on the side of these farmers. However, with the evolution of ICT, recent studies reveal that many people have resorted to the use of smart phones as the more effective and preferential way in the dissemination of farming information to the poultry farmers. (Mbidde, 2015).

2.4 LITERATURE ABOUT THE EXISTING MOBILE APPLICATIONS

There are a number of existing mobile apps that have been developed to boost the agricultural sector with an aim of increasing on the market of the produces by linking farmers and buyers, ease access to information by different farmers, as well as providing information about the weather or changes in climate.

However, the existing apps such as MyFarm, epoultry, AgriMarket mainly focus on connecting farmers and buyers of poultry produce. According to Ministry of Agriculture, Animal Industry and Fisheries (2016), it released a report that included the different agricultural activities that have benefited from the use of ICT in agriculture as well as those that are still lagging behind and among these was the poultry farming industry. This implies that there is still a gap of not using ICT to boost the poultry farming in Uganda yet it is considered to be relatively one of the most preferred agricultural practices today as compared to the crop, livestock and fish farming activities.

2.5 STRENGTHS OF OUR POULTRY FARM MANAGEMENT MOBILE APP

The Mobile Knowledge Based Poultry App provides appropriate information about the different categories of questions that are mostly asked by the poultry farmers and this is done through searching using key words entered by the farmer. It also provides notifications about different periodic activities that are to be done by the farmer on particular days as well as provide different guidelines that a successful farmer needs, to highly gain in this practice of rearing poultry birds. The Information provided by this application is offline and doesn't require internet connections. However, incase a poultry farmer wants to acquire more knowledge, the application provides a possibility of browsing to online sources.

CHAPTER 3. METHODOLOGY

3.1 INTRODUCTION

This chapter comprises of the research methods that were used, the research techniques, tools, sampling strategy, data quality control techniques, method for measurement of variables, analysis, designing, implementing and testing methods that were used in the study.

3.2 THE RESEARCH METHOD

The Research method that was used in this study was the Quantitative method. This is because with this method, we were able to use the survey method which involves the use of interview guides during the data collection process. And with this method, we were able to derive data in a numerical form from which we made statistical tests and then derived statements about this data.

3.3 THE STUDY POPULATION

The study was conducted on the poultry farms that are located within the different parts of the central region of the country. This is because, this region has got districts where large poultry farms have been highly established and this is mainly because of the availability of enough space (land) in these areas and also because of the short proximity to the country's capital city which has got a larger market with potential buyers. (National Agricultural Advisory Services, 2013).

3.4 THE DATA COLLECTION METHODS

During the process of gathering the information from the people in the target population, we used the following data collection methods namely; interviewing people, observation method as well as reviewing the existing documentation.

3.4.1 The Interview Method. With this method, we interviewed some people in the selected sample and this provided us with sufficient information from the poultry farmers as well as enabled us to have an in-depth understanding of the problem under study. With this method, we used the interview guide, pens and a book as our data collection tools.

3.4.2 The Observation Method. We used this method in some instances because it enabled us to directly see what people exactly do rather than just relying on what they say that they do. It also helped us to gather some information from places where respondents were not willing to provide the information. With this method, we used our natural eyes, and smart phone cameras as the data collection tools.

3.4.3 The document review method. In this method, journals, articles and publications were used as tools in understanding or getting familiar with the existing problem before interviewing the poultry farmers.

3.5 THE SAMPLING TECHNIQUE

According to our study, we used a probability sampling technique and this is because enabled us to use the cluster sampling method which was the most appropriate method to use where the population of poultry farmers was large and widely dispersed.

A total of 5 poultry farm managers were sampled to provide the relevant information about our study topic.

3.6 DATA QUALITY CONTROL

According to our study, we ensured that the instruments that were used in the study were valid and reliable to the relevant study using the content validity approach. With this data quality control approach, we relied on the knowledge of a group of poultry farmers who had to evaluate each question on the interview and provide us with an opinion or rating on how well the wording of each question taps into a measuring of a particular construct. The independent ratings of each subject-matter expert were compared and analyzed to determine the degree of content validity that exists for each question.

With ensuring the reliability of the instruments that were used, we used the test re-test method. This is because this method helped us test our data collection instruments on a specific sample of poultry farmers twice with an aim of checking for its consistency.

3.7 THE DATA ANALYSIS TECHNIQUES

According to Pizniack (2010), analysis of data is the process of turning data into information; the process of reviewing, summarizing and organizing isolated facts (data) such that they formulate a meaningful response to a research question.

Before analyzing the collected data, we cleaned it first using two methods and these were Spot-Checking and the Logic checks. We used spot-checking technique because it helped us compare the raw data with the electronically entered data for any data-entry or coding errors made. The Logic checks technique helped us to carefully review the electronically entered data to make sure that the answers to the different questions make sense.

The Analysis of the cleaned data was done using Microsoft Excel, a spreadsheet application developed by Microsoft. We used it to produce the analyzed data in the graphical format.

3.8 THE SYSTEM ANALYSIS AND DESIGN TOOLS

System design is a creative process by which understanding of logic and science is joined with understanding of human needs and wants to conceive and refine artifacts that serve specific human purposes. For our study, the system analysis design was achieved using object-oriented modelling techniques which included sequence diagrams, use cases, activity diagrams and this was because they would best represent the logic of this project as compared to the structured techniques for analysis such as DFDs.

3.9 SYSTEM IMPLEMENTATION, TESTING AND VALIDATION TOOLS

3.9.1 SYSTEM IMPLEMENTATION TOOLS

The implementation of this mobile knowledge-based poultry app was achieved using two programming languages explained below which XML and Java and SQLite as the database management system.

i. XML (Extensible Markup Language). This is a language that we used to develop the user interfaces of the mobile app.
ii. Java. This is the language that we used as the back-end for processing different functionalities of the mobile app.
iii. SQLite. This is a relational database management system used in android for storing data because of its being light. We used it to store usernames, passwords, security hints and the notification data.

3.9.2 SYSTEM TESTING

With the testing of our mobile app, we used different techniques and these include;

i. **Dynamic testing.** With this kind of testing, we tested our mobile application by entering the test data and comparing the output results with the expected output.

This testing was highly used when testing certain sections such as the forgot password section where a user enters the registered security hint and the app displays the appropriate password, the user login section where a user enters a username and password so as to log into the application.

This testing was also used in the storing of the notification tasks to check whether the stored tasks are retrieved based on the specific assigned date.

ii. **Integration testing**. After the successful dynamic testing, we used the integration testing to test the linkages between different activities of the mobile app to check whether they do function as expected. With this testing, we tested the notification section where by a user stores tasks using the SQLite database and these tasks are retrieved and displayed on a different activity based on the arrangement selection, we tested whether a user can be able to navigate from one activity to another based on the user click and it was also done to check whether the online links or URLs provided in the app do function and a user is able to browse to the exact web page or source.

iii. **System testing**. We used this kind of testing to check the functionality of the whole mobile application after integrating all the different activities of the mobile application. This testing technique helped us to check whether a user is able to register his/her credentials, a user is able to login into the application successfully, a user is able to retrieve the forgotten password by entering security hint, a user is able to browse to external online sites just by clicking on the provided URLs and if a user is able to navigate from one activity to another activity within the app.

iv. **User Acceptance Testing.** This testing was done by the poultry farmers to check whether the mobile application performs as expected.

3.9.3 SYSTEM VALIDATION

This refers to the process of ensuring that a mobile application performs as intended in its operational environment.

In the case of our study, the mobile app was validated by the poultry farmers to check whether it meets all the expected requirements. Poultry farmers were given this application for 2 weeks and we collected the feedback as to whether it was helpful to them and if it met their requirements.

CHAPTER 4. THE SYSTEM REQUIREMENTS AND ANALYSIS

This section contains requirements of the Mobile Knowledge Management System and the results of the project analysis.

4.1 GENERAL DESCRIPTION

This section gives the reader an overview of the project, including why it was conceived, what it does, and the types of people who use it. We also list constraints that were faced during development and assumptions we made about how we would proceed.

4.1.1 PRODUCT PERSPECTIVE

In this section, we provide a brief reason why we chose this product which is the Poultry Farm Mobile App and this is because many farmers have seemed to be more attractive to the use of Mobile phones than using laptops and desktops and this is mainly because of the flexibility of these mobile phones. And as a result of this, we decided that instead of developing a desktop application, we develop a mobile application that can be used by even farmers without laptop computers or even desktop computers. In this project, the primary stakeholders are the poultry farmers who are also the end users to benefit from the development of this Mobile App.

4.1.2 PRODUCT FUNCTIONS

This Poultry Farm Mobile App provides knowledge to farmers questions, it also provides tips about how to perform different tasks in the practice of rearing poultry birds and it also notifies farmers about what to do on particular days and time. This Mobile App also provides links to different webpages with relevant poultry farming information.

With this Poultry Farm Mobile App, the users (Poultry Farmers) are able to ask questions and receive responses, they are also able to schedule tasks and get notifications about those tasks, they can also view the guide about the different tasks they need to do so as to gain profits in the practice of rearing poultry birds.

Poultry Farmers' challenges and how they are solved by this app.

This section discusses about the farmers responses of the problems they face and how this mobile app solves those problems. Below are the different problems that were addressed by the poultry keepers and these include;

i. Lack of Information is another problem in the poultry farming system.

This was another big challenge that was addressed by these farmers and since anyone wants to succeed in life in any business is doing, he/she needs to have the right information about that thing. In this case, some of these poultry farmers get information from wrong sources in a way that it doesn't solve their problems.

Solution. This mobile app provides all the relevant information in terms of knowledge both through searching and also navigating through the poultry tips. It is going to also provide options for online webpages where farmers can get to know what's happening in the field of poultry farming.

ii. Shortage of Market for the poultry birds and Eggs.

This problem mainly affects farmers who have no connections to core markets and are ignorant about how they can increase on their market size yet they have a big stock of these birds which are ready for the market.

Ssekitolekko (2018) says that he faces a challenge of small market during non-festive seasons in a way that in such seasons, he sells his birds at a cheaper price so that he can earn some income in order to manage the other younger chicks.

Solution. The mobile app addresses this problem by providing WhatsApp group numbers for poultry farmers where farmers can advertise their produces at no price and it also provides a link to a web application called Kuddu which links farmers to the customers.

iii. Feeds related problem in the poultry farming system.

This problem arises as a result of some poultry farmers lacking knowledge of how to mix the different types of mixtures in the birds' feeds and which type of food is given and not given to the different kinds of poultry birds.

It was hard for me to get the formulas used in mixing the poultry feeds for the different birds at different stages which required me to spend money on specialists to guide me and also lost a number of birds at younger ages due to poor feeding and this was as a result of lack of knowledge in doing certain things. Nimusiima (2018).

Solution. The app provides the different tips on how to add the different ingredients in these feeds and to what extent or measure. It also provides information about the different kinds of food that is given and not given to the different types of poultry birds.

iv. Inappropriate sources of vaccination drugs.

This is another problem faced by these poultry farmers. E.g. Atuhaire (2018) says that she gets the drugs from local retailers who sometimes give her expired drugs that they tend to store in fridges so that they can sell it in the future because of fearing to make losses. This caused over 100 chicks to get blind and die and this resulted into a great loss on her side.

Solution. This app provides information about the precautions and different prescriptions of drugs to use during different stages of vaccination. It also provides links connecting poultry farmers to different genuine suppliers of these drugs.

4.1.3 GENERAL CONSTRAINTS

This Application cannot run on the I-Phones because we used Java which supports android OS. The reason why we chose developing for android phones first is because of their high demand and usage since they are considered to be cheaper than the apple phones.

This App does not run on android phones whose version is below 4.0 because this requires too much programming effort.

4.2 THE SPECIFIC REQUIREMENTS

This section lists the specific requirements of the Mobile Knowledge Management System for Poultry Farms. Requirements are divided into the following sections;

4.2.1 USER REQUIREMENTS.

Based on the users of this Mobile App, the below are their requirements;

i. Security feature. This requires a user to first log in with the username and password so as to enable him/her to proceed with the usage of this app.

4.2.2 SYSTEM REQUIREMENTS

The following below are the brief specifications which describe what this app does;

i. This Mobile App provides knowledge about different questions asked by the Poultry Farmers.
ii. It also enables these farmers have access to only webpages that are relevant to their poultry need.
iii. This app provides notifications to farmers about when they are supposed to do certain tasks e.g. De-worming, Vaccinating.
iv. It provides all the relevant information about the poultry tips farmers need to know and practice in order to gain from this agricultural sector.

4.2.3 INTERFACE REQUIREMENTS

With these requirements, the interfaces of this Mobile app are developed using the XML language and the restrictions for each interface are implemented using the java language. Each interface has a back button so as to ease the navigation between different activities by the users.

4.2.4 SOFTWARE REQUIREMENTS

These include the software that are used on the computers used while developing this Mobile App. Such software includes;

The Operating System: Windows 10 pro, the designing software: Microsoft Visio, the development Software: Android Studio 3.0 and Nox Software which is used as one of the Emulators, the Microsoft Word was used in preparing the documentation.

4.2.5 HARDWARE REQUIREMENTS

These requirements include the following;

A Computer with 4GB RAM and Processor Speed of 2.5GHz, a Smart Phone of android version 4.0 and above, used as an Emulator, a USB used to connect the Smart Phone to the computer during testing of the application.

CHAPTER 5 SYSTEM DESIGN AND IMPLEMENTATION

5.1 THE SYSTEM DESIGN

5.1.1 THE ARCHITECTURAL DESIGN

The diagram below shows how poultry farmers get updates and accessing external sites and systems and how developers update content of the mobile app.

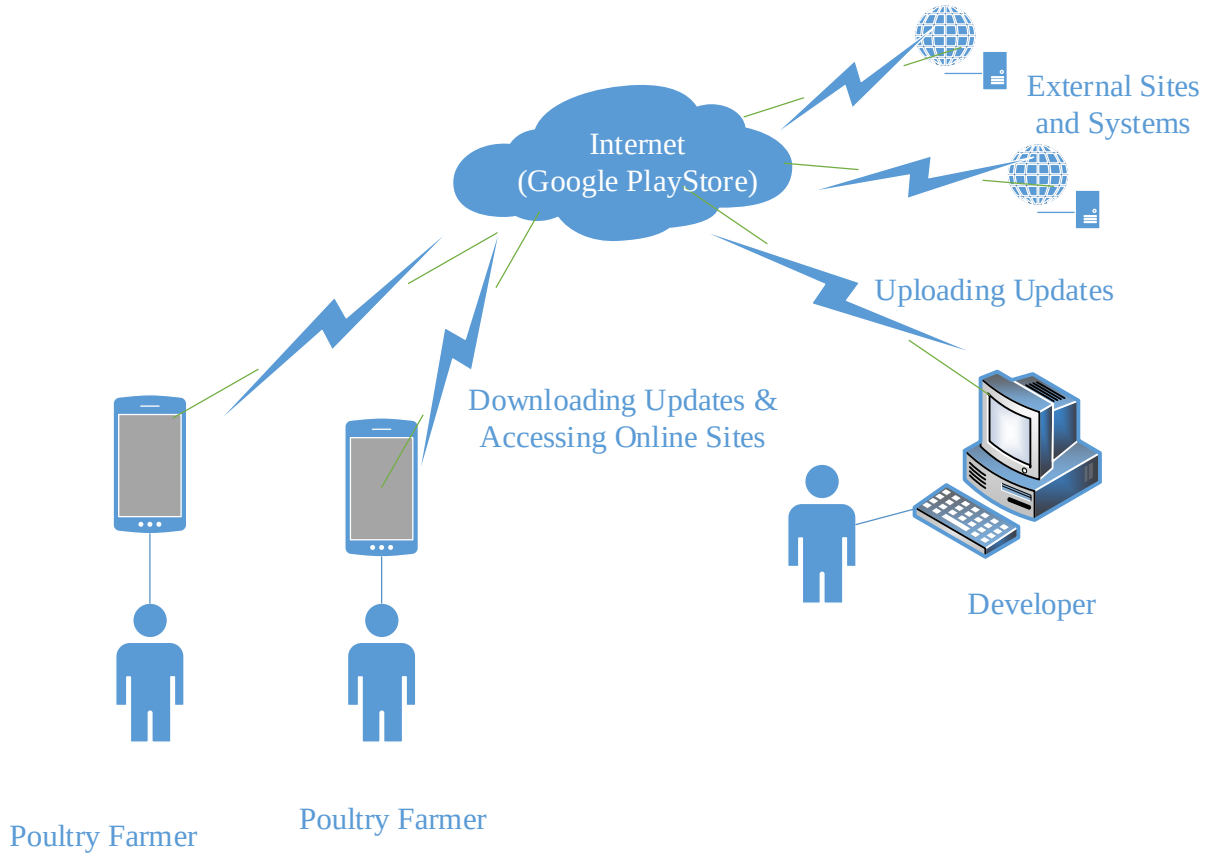


Figure 1. The Architectural Design.

The above diagram explains that a poultry farmer downloads the mobile application from google PlayStore and installs it on his/her mobile device. It also explains that a developer accesses the google PlayStore and make updates to the application which are downloaded and installed by the poultry farmer inform of upgrading the application. The External Sites and systems indicate that a poultry farmer has to first connect to the internet in order to access the online sites and the related sources.

5.1.2 THE USE CASE DIAGRAM

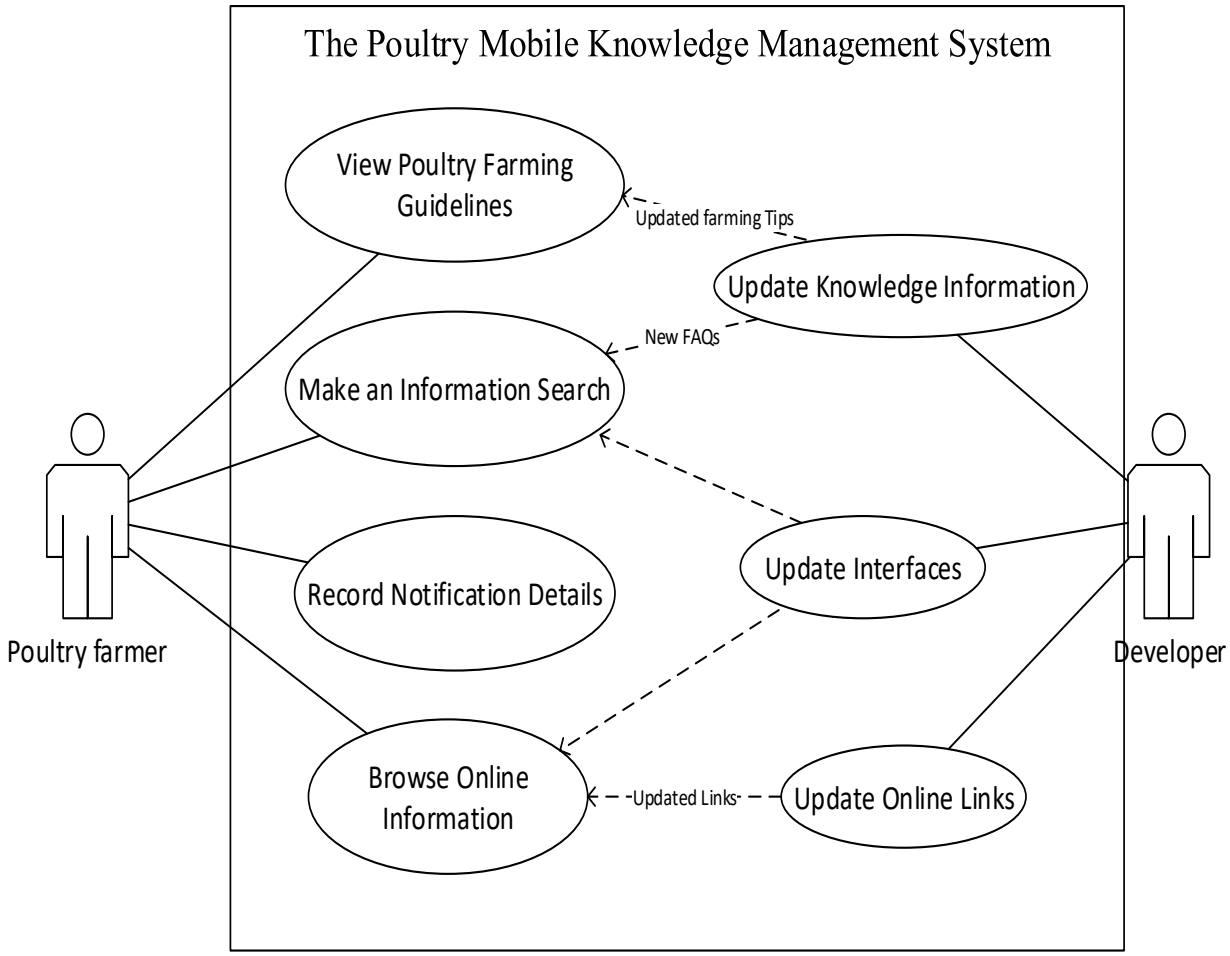


Figure 2. The Use Case Diagram for the Mobile Knowledge Management System

5.1.3 THE SEQUENCE DIAGRAMS

The Sequence diagrams below depicts the sequence of events for the poultry farmer and the developer while interacting with this knowledge base poultry mobile app.

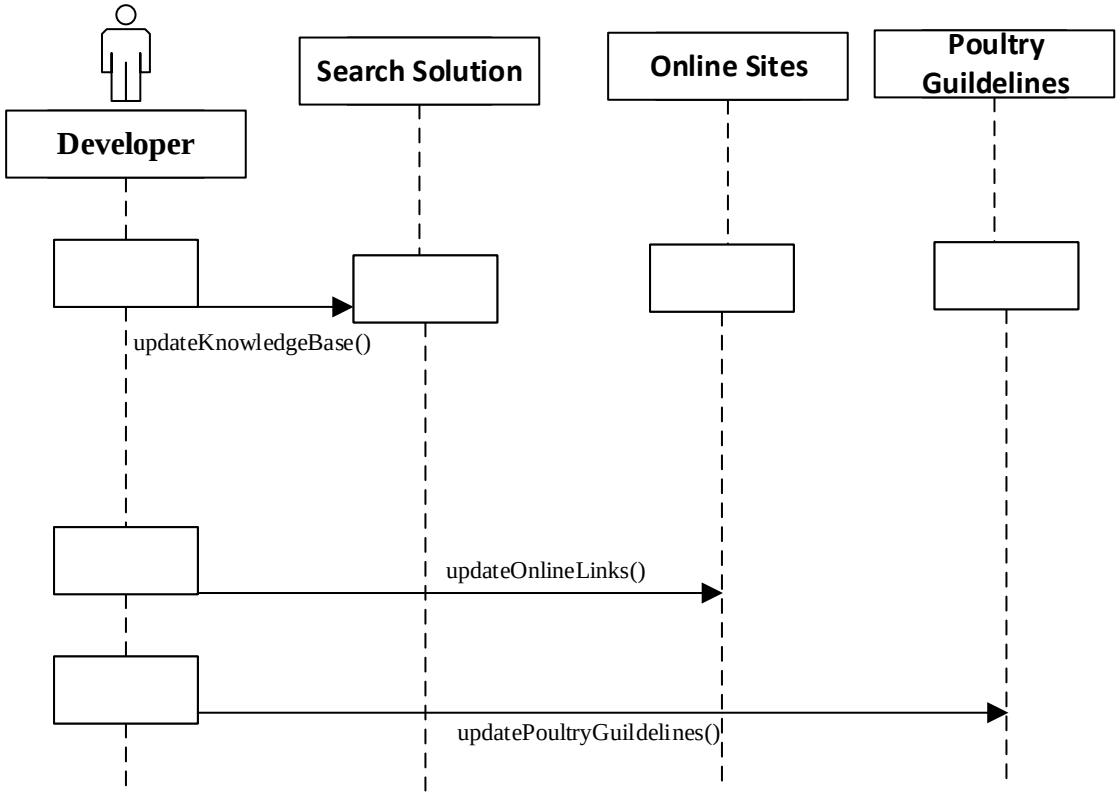


Figure 3. The Sequence Diagram for the Developer

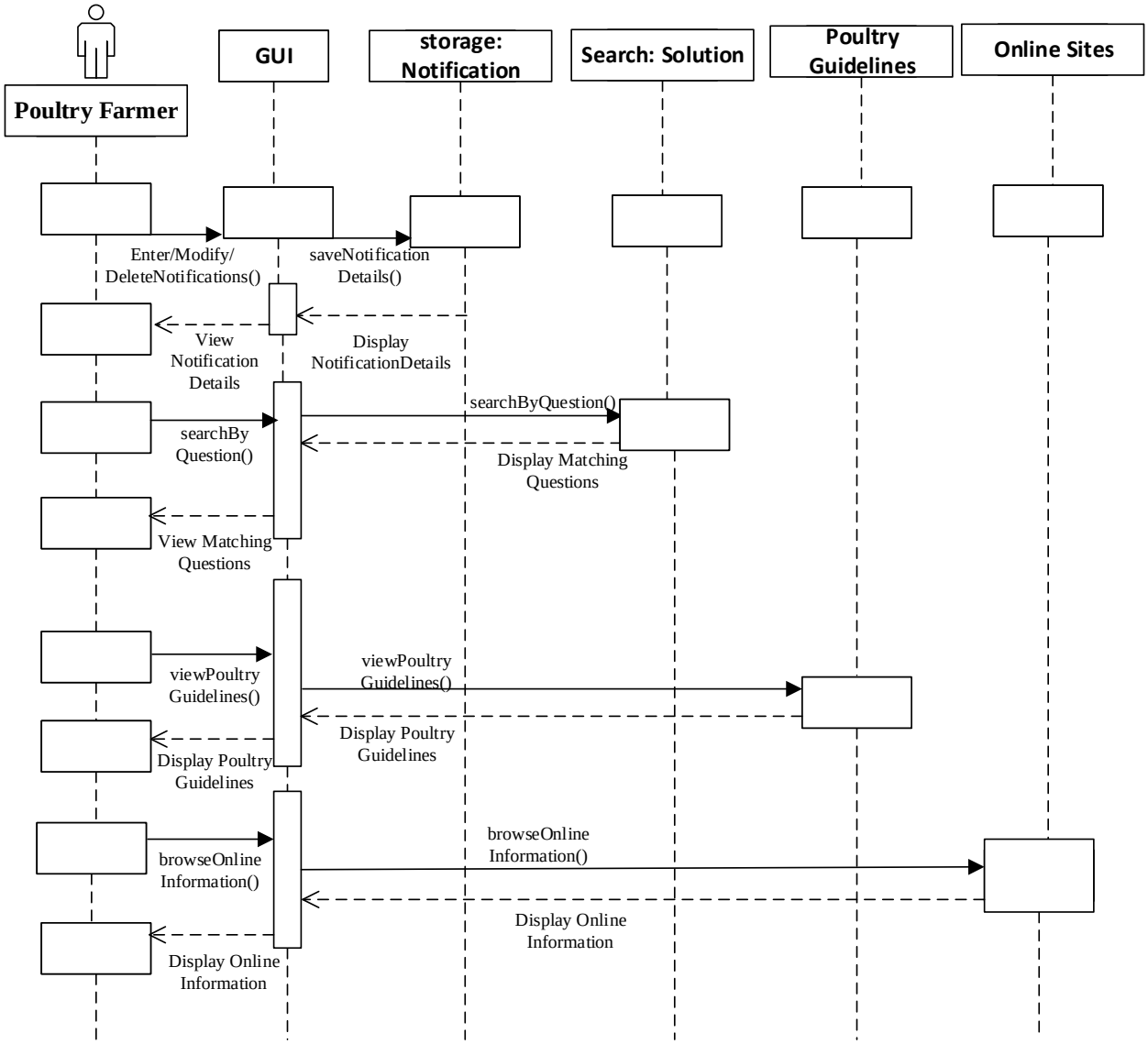


Figure 4. The Sequence Diagram for the Poultry Farmer

5.1.4 THE ACTIVITY DIAGRAM

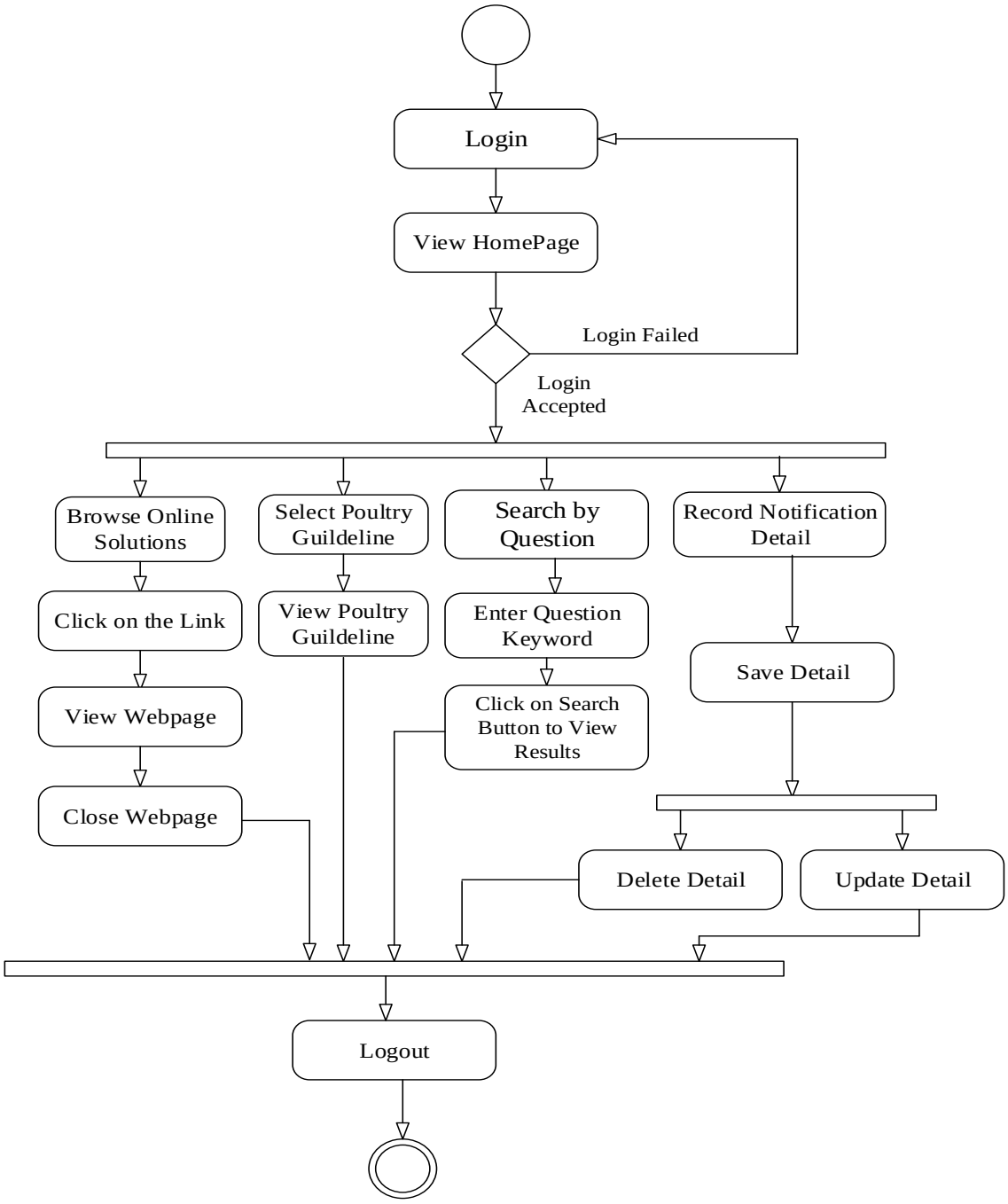


Figure 5. The Activity Diagram for the mobile Knowledge management system

5.2 SYSTEM IMPLEMENTATION

5.2.1 THE USER INTERFACE DESIGN

User Interface is designed according to UI design principles.

The Structure principle. UI is organized in such a way that related things are combined together and unrelated things are separated. For example, mixing of different feeds for the different poultry birds is captured together with guidelines for rearing those particular poultry birds.

The simplicity principle: It is easy to follow the provided interfaces. In the case of any mistake, the application displays error messages. For example, if a user enters an invalid username and password or even clicks the login button with the empty fields for the username and password at the login page, the application displays an error message corresponding to the entry made.

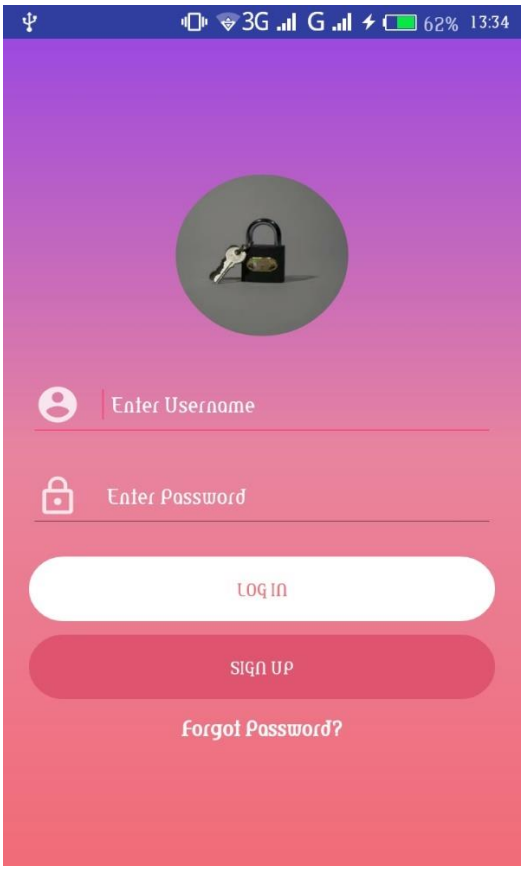
The visibility principle: All the mobile app's functions are available through UI. It does not overwhelm users with too many alternatives. In this case, it has got a navigation side bar by clicking on the top left corner and this helps users to navigate to the different sections of the application.

The feedback principle: Through the system of messages, the design keeps users informed of actions, errors, or exceptions. For example, when a user registers for an account, the application is able to respond with a Toast feedback after when the account has been successfully registered or it has failed.

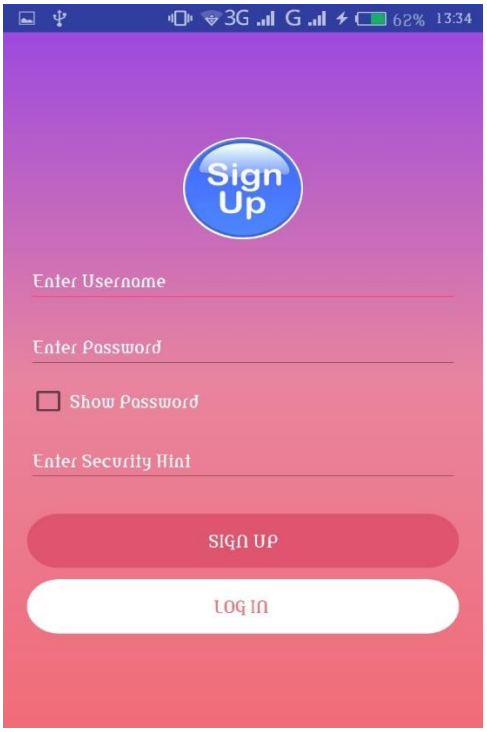
The reuse principle: In design, same names were used to perform the same operations with different objects in order to reduce ambiguity.

5.2.2 THE MOBILE APPLICATION SCREESHOTS

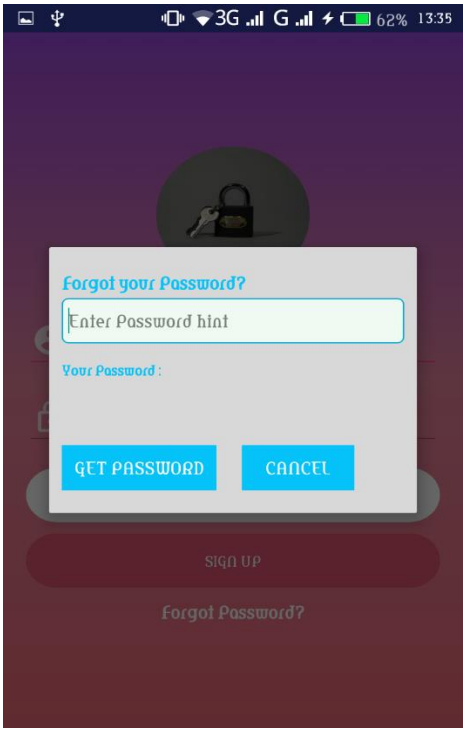
THE MOBILE APPLICATION LOGIN PAGE



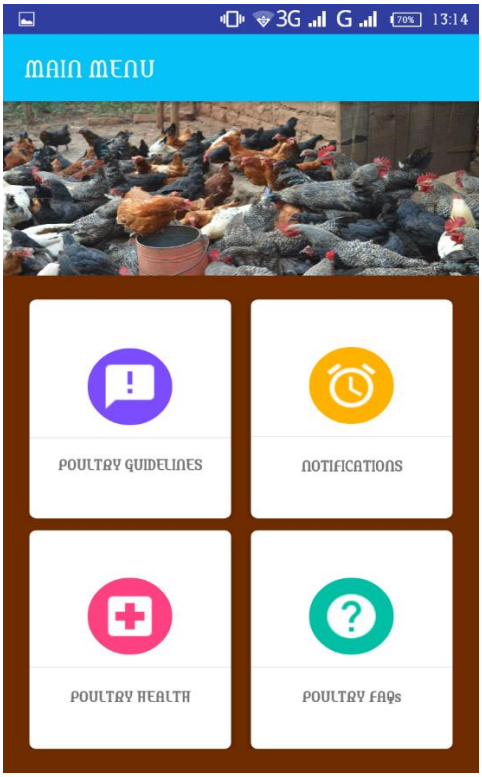
THE REGISTRATION PAGE



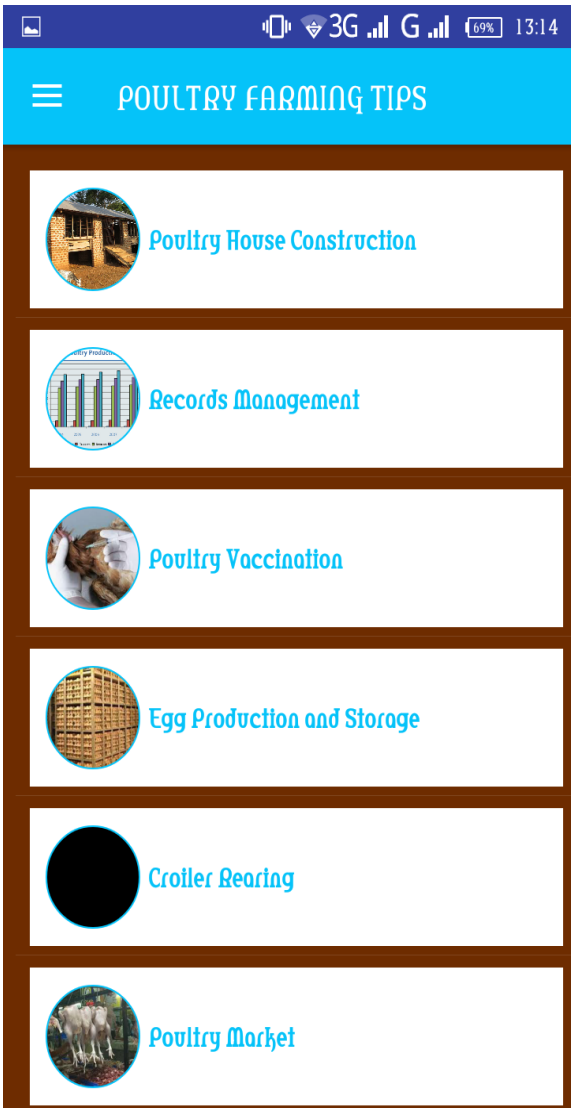
THE FORGOT PASSWORD SECTION



THE HOMEPAGE

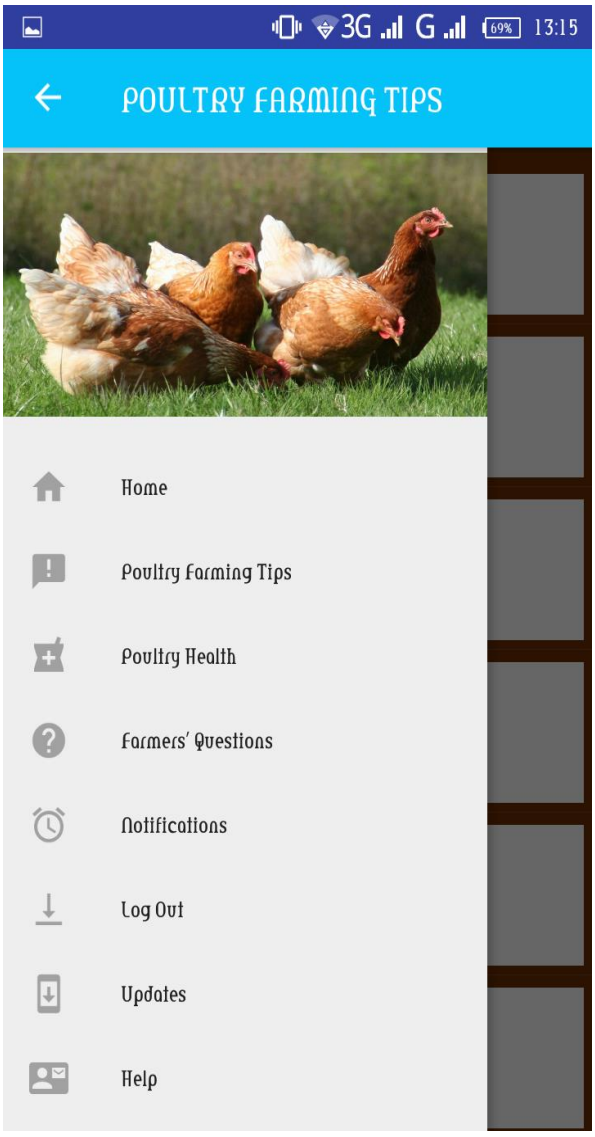


A LISTVIEW FOR POULTRY FARMING GUIDELINES

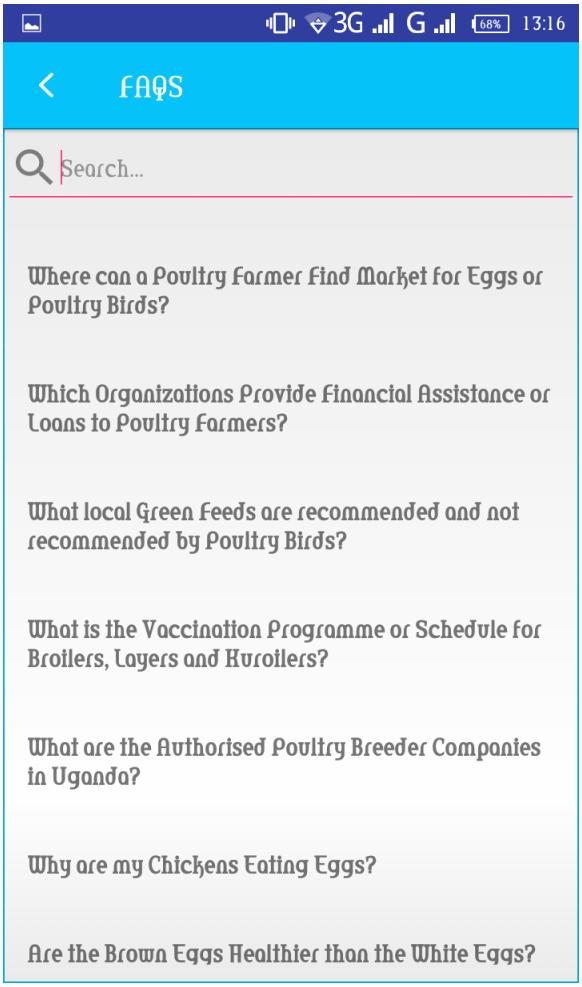


A LISTVIEW FOR POULTRY HEALTH

A NAVIGATION BAR FOR THE APP



THE SEARCH SECTION FOR FREQUENTLY ASKED QUESTIONS



5.2.3 THE CODE SNIPPET

THE XML CODE FOR USER LOGIN

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:paddingLeft="18dp"
    android:paddingRight="18dp"
    android:paddingTop="16dp"
    android:paddingBottom="16dp"
    android:background="@drawable/new_login_gradients">

    <ScrollView
        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="match_parent"
            android:orientation="vertical"
            android:layout_gravity="center_vertical">

            <de.hdodenhof.circleimageview.CircleImageView
                android:layout_width="240dp"
                android:layout_height="120dp"
                android:layout_gravity="center_horizontal"
                android:layout_marginTop="10dp"
                android:src="@drawable/pad" />

            <EditText
                android:id="@+id/et_username"
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:layout_below="@+id/login_title"
                android:layout_marginTop="25dp"
                android:drawableLeft="@drawable/user2"
                android:drawablePadding="15dp"
                android:hint="  Enter Username"
                android:maxLines="1"
                android:textColor="@color/colorwhite"
                android:textColorHint="@color/colorwhite" />

            <EditText
                android:id="@+id/et_password"
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:layout_marginTop="15dp"
                android:width="2dp"
                android:drawableLeft="@drawable/lock"
                android:drawablePadding="15dp"
                android:hint=" Enter Password"
                android:inputType="textPassword"
                android:maxLines="1"
                android:textColor="@color/colorwhite"
                android:textColorHint="@color/colorwhite" />
```

```
        <Button
            android:id="@+id/btn_login"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_centerHorizontal="true"
            android:layout_marginTop="18dp"
            android:background="@drawable/roundedge"
            android:clickable="true"
            android:padding="5dp"
            android:text="LOG IN"
            android:textColor="#f16f7d"
            android:textSize="15sp" />

        <Button
            android:id="@+id/btn_register"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_centerHorizontal="true"
            android:layout_marginTop="10dp"
            android:background="@drawable/bak_signup"
            android:padding="5dp"
            android:text="SIGN UP"
            android:textColor="@color/colorwhite"
            android:textSize="15sp" />


            <TextView
                android:id="@+id/attempt"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_centerHorizontal="true"
                android:layout_gravity="center_horizontal"
                android:layout_marginTop="10dp"
                android:text="Forgot Password?"
                android:textColor="@color/colorwhite"
                android:textSize="18sp"
                android:textStyle="bold" />

        </LinearLayout>

    </ScrollView>
</LinearLayout>
```

THE XML CODE FOR USER REGISTRATION

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:paddingLeft="18dp"
    android:paddingRight="18dp"
    android:paddingTop="16dp"
    android:paddingBottom="16dp"
    android:background="@drawable/new_login_gradients">

    <ScrollView
        android:layout_width="match_parent"
        android:layout_height="match_parent">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="match_parent"
            android:orientation="vertical"
            android:layout_gravity="center_vertical">

            <de.hdodenhof.circleimageview.CircleImageView
                android:layout_width="200dp"
                android:layout_height="90dp"
                android:layout_gravity="center_horizontal"
                android:src="@drawable/signup"
                android:layout_marginTop="10dp" />

            <EditText
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:id="@+id/reg_username"
                android:hint="Enter Username"
                android:textColor="@color/colorwhite"
                android:layout_marginTop="15dp"
                android:inputType="text"
                android:textColorHint="@color/colorwhite" />

            <EditText
                android:layout_width="match_parent"
                android:layout_height="wrap_content"
                android:id="@+id/reg_pass"
                android:hint="Enter Password"
                android:textColor="@color/colorwhite"
                android:layout_marginTop="15dp"
                android:inputType="textPassword"
                android:textColorHint="@color/colorwhite" />

            <CheckBox
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:id="@+id/reg_chkbx"
                android:layout_marginTop="10dp"
                android:text="Show Password"
                android:textSize="18sp"
                android:textColor="@color/colorwhite"
                android:shadowColor="@color/colorwhite" />
```

```
        <EditText
            android:layout_width="match_parent" android:layout_height="wrap_content"
            android:id="@+id/reg_securityhint"
            android:hint="Enter Security Hint"
            android:textColor="@color/colorwhite"
            android:textColorHint="@color/colorwhite"
            android:layout_marginTop="15dp" />

        <Button
            android:layout_width="match_parent" android:layout_height="wrap_content"
            android:id="@+id/reg_btnregister"
            android:layout_marginTop="25dp"
            android:text="SIGN UP" android:textColor="@color/colorwhite"
            android:layout_centerHorizontal="true"
            android:background="@drawable/bak_signup"
            android:textSize="18sp" android:padding="10dp"
            android:layout_gravity="center_horizontal"/>

        <Button
            android:layout_width="match_parent" android:layout_height="wrap_content"
            android:id="@+id/reg_backtologin"
            android:layout_marginTop="10dp"
            android:text="LOG IN " android:textColor="#f16f7d"
            android:layout_centerHorizontal="true"
            android:background="@drawable/roundedge"
            android:textSize="18sp" android:padding="10dp"
            android:layout_gravity="center_horizontal"/>

    </LinearLayout>
</ScrollView>
</LinearLayout>
```

5.3 THE DATA DESIGN

This section describes the basic SQLite database design for storing the login data and the notifications data.

5.3.1 A TABLE DESIGN FOR STORING THE LOGIN DATA

The table below lists the structure of an individual row in the login database table. It shows the field name of each column and then its corresponding data type.

Column Name	**Data type**
- User_ID	Integer (Primary Key)
- User_Name	Text
- Password	Text
- Password_Reminder	Text

5.3.2 A TABLE DESIGN FOR STORING THE NOTIFICATIONS DATA

The table below lists the structure of an individual row in the Notifications database table. It shows the field name of each column and then its corresponding data type.

Column Name	Data type
- _ID	Integer (Primary Key)
- DESCRIPTION	Text
- IS_COMPLETE	Text
- IS_PRIORITY	Text
- DUE_DATE	Text

SQLite Code for Creating User Registration Table

```
public class LDatabaseAdapter {

    static final String DATABASE_NAME = "epoultry.db";
    static final int DATABASE_VERSION = 1;

  static final String CREATE_LOGIN_TABLE = "create table " + "LOGIN"+
           "( " + "ID integer primary key autoincrement," + "USERNAME text," + "PASSWORD text," + "SECURITYHINT text) ";
```

5.3.3 THE XML DATA MODEL OF THE MOBILE KNOWLEDGE BASE POULTRY APPLICATION

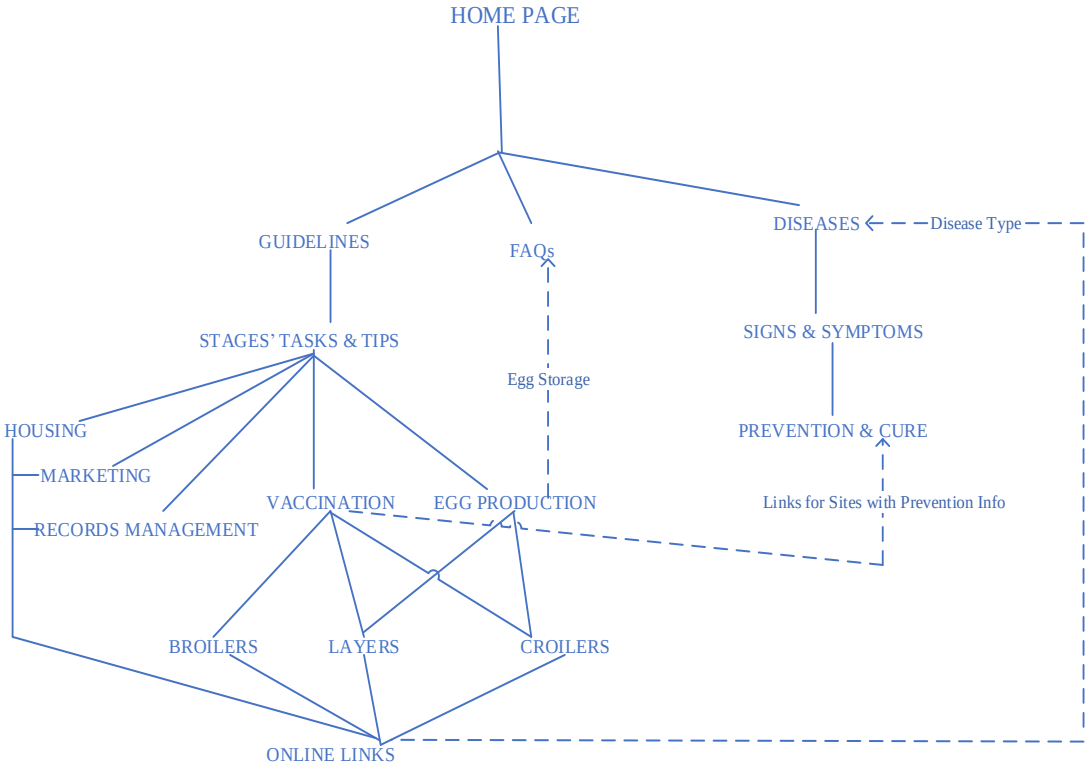


Figure 6. The XML Data Model

For this project, the poultry farming guidelines are stored in a list view where by a user just click on a particular tip and then have a view of the related information about that guideline.

Also, for the Information search, all the data set of the questions that are made available in the app are being arranged in a list view format so that when a user types a particular question in the search bar, there are related questions matching the search keywords of the user's search that are available from which a user can choose from.

The Login details and the Notifications data are stored in a My SQLite database which is an embedded light database.

CHAPTER 6 CHALLENGES AND CONCLUSIONS

This chapter summarizes the conclusions and the proposed future work of the mobile knowledge management system for poultry farms.

6.1 THE FUTURE WORK

This section lists what we would look forward to do or add in the mobile knowledge management system for poultry farms in the future.

i. In the future, we would like to add more FAQs in this application so that it provides all the necessary solutions to the poultry farmers.
ii. In the future, we would also intend to add a functionality of providing information in different languages so that it can be used by different people who understand in different languages.
iii. We would also like to add information about different types of poultry birds such as Ducks, Waterfowl and Turkeys so that the application can be used by different poultry farmers keeping different poultry birds.
iv. In the future, we would also want to make this mobile application be used by poultry farmers in buying and selling of poultry products such as litter, eggs, chicken and many others.

6.2 CHALLENGES FACED IN THE PROJECT

Several Challenges were encountered during the development and the execution process of the mobile Knowledge management system and these include;

i. Time Constrain allocated by the Department of Information Systems. This is because, I.T projects require extensive research especially in the implementation and computation of the functionalities and majorly reaching to the stakeholders in which the allocated time was not enough since we always had lectures to attend to.
ii. Financial Challenges. In this case, it was challenging for us to execute the project as we needed the money for facilitation. For example, Transportation costs which were incurred during the data collection process on the different Poultry farms, Printing Costs and the Costs for Internet Bundles.
iii. Language Barrier was another challenge since some poultry farm managers couldn't speak English and at the same time didn't know Luganda.

6.3 EXPERIENCES AND SKILLS GAINED

In the process of executing our project, we learnt a lot and gained experience in different fields and this opened our minds on what happens when carrying out I.T related projects.

i. During requirements gathering process, we gained experience and skills in communicating with people of different capacities and how to get information from them on the intended topic under study.
ii. This project also helped us to learn how to work and interact as a group to achieve the set goals of a project.
iii. This project has also helped us to learn and advance in our programming skills especially in Java and XML since these are the languages we used in developing our mobile application.

6.4 THE CONCLUSIONS OR SUMMARY

This section explains a summary of what the project has achieved.

i. In this project, we have been able to make a knowledge base where a poultry farmer just types in a keyword and retrieves the appropriate results which provide the relevant information.
ii. We have also included online links in this mobile application where by a poultry farmer is able to click and browse to external sites so that he/she can obtain more information about a certain topic.
iii. In this Mobile Knowledge Management System, a poultry farmer is able to use it to keep tasks that are to be done in the future days and it's the application to provide the notifications about the task to be done when its set time has reached.
iv. This application also provides guidelines needed in poultry farming and these include; guidelines on poultry health, guidelines on how to kept the different poultry birds, how to mix the different poultry feeds, the vaccination given to different poultry birds and their appropriate stages, guidelines provided by other successful poultry farmers and this is done through watching videos and many more poultry farming guidelines.

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APPENDICES

APPENDIX A: TIME FRAMEWORK

	2017					2018				
ACTIVITY	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MARCH**	**APRIL**	**MAY**
Feasibility Study		✓								
Proposal Writing		✓	✓	✓	✓	✓				
Data Collection						✓	✓			
Requirements Document Writing						✓	✓			
System Design							✓	✓		
Coding and Validation							✓	✓	✓	✓
Testing Process								✓	✓	✓
Report Writing										✓
Project Presentation										✓
Closure										✓

APPENDIX B: THE PROJECT BUDGET

ITEM	QUANTITY	TOTAL PRICE (Shs)
Transport		30,000
Stationery		40,000
Airtime	Monthly Subscription	25,000
Meals	Lunch & Breakfast	20,000
Storage Media	1 memory card	35,000
Smart Phone	1	180,000
TOTAL		330,000

APPENDIX C: FIELD PHOTOS

INDICES

Qn 1. What are the essentials that should be considered in constructing a poultry house?

Qn 2. Where can a Poultry farmer find Market for his or her Products?

Qn 3. How to mix chick mash, grower's mash and Layer's mash?

Qn 4. How to mix broiler starter mash and broiler finisher?

Qn 5. How to vaccinate broilers, layers and croilers and after which period of time should it be done?

Qn 6. How to proper manage poultry records by the farmer?

Qn 7. What are the general disease control practices that should be carried out at the farm?

Qn 8. What are the precautions for egg storage and how to increase on the rate of egg production?

Qn 9. What are the proper practices of feeding layers, broilers and croilers?

Qn 10. How much spacing would be needed by the young chicks and the grown-up hens?