Machinery Information System for Farm Management at Department of Agriculture

A dissertation submitted for the Degree of Master of Information Technology

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Abstract

In Sri Lanka there are more than 300 000[2] of farm machineries in use, but their productivity is not up to the expected level due to lack of management of these machineries. Because of that Sri Lanka losses millions of revenue for a year. To avoid that losses Department of Agriculture(DOA) of Sri Lanka has raised the importance of providing proper ICT solution to increase the production, distribution and use of farm machineries. "Machinery Information System for Farm Management" addressing above mentioned issues in farming machinery sector in Sri Lanka using web base solution. To implement that web base solution, use "firebase" mobile and web application development platform with NOSQL database. With this system farmers can easily find and rent a suitable machinery using web technology. Farming machineries used within the country will registered to system with the help of DOA. System have special administration module for the member of DOA to monitor agricultural machineries in country. With use of those technologies and combine effort system can support to increase agricultural productivity in the country.

Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

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List of Abbreviations

DOA	Department of Agriculture
ICT	Information Communication Technology
KSITM	Kerala State Information Technology Mission
MISFM	Machinery Information System for Farm Management
EER	Extended Entity Relationship
SQL	Structured Query Language

Chapter 1. Introduction

1.1 Sri Lanka as an agricultural country

Sri Lanka is a country civilized before 3000 years ago from that day onwards people live in this country involved in agriculture.. Main purpose of this involvement is to produce their day to day food needs. Sri Lanka has 65610[1] sq. Km of surface area from that 27400 sq. Km used as agricultural lands. 1129694 ha were used as cereal production lands. Many of them were used to rice production which is main consuming food of country. In Sri Lankan agriculture we can identify 6 major sectors. They were Food crops, Plantation crops, Ornamental crops, Livestock, Fisheries, Forestry.

The main food crop of Sri Lanka is rice following corn, fruits and vegetables. Tea, Rubber, Coconut, Sugarcane and Oil palm were the main plantation crops, which helps to bring lots foreign currency to country. Sri Lanka is very famous for tropical ornamental crop market. Most common livestock product in Sri Lanka is cow's milk following chicken meat , pork and beef. Sri Lanka is an island country which is surrounded by Indian ocean this will lead to develop mass fisheries production but still most of them used to local consuming. In Sri Lanka most of labor population work as farmers providing services for above mentioned sectors.

Still most areas of country remains as rural areas which is used for agriculture. But with the emerging of new technology many people were moving to cities for seeking better jobs. As a result countries urban areas grows rapidly and lack of labor in rural areas for work in agriculture industry. The most common answer for that lacking labor problem is introducing new machineries to agricultural industry. This result in rapid increasing of agricultural machines within last few decades.

1.2 Agricultural Machineries in the country

In food crops production main machinery used in Sri Lanka is tractor. Tractor combine with land preparation, seeding, transplanting and processing tools when farmers used in field. Hand tractor is another commonly used machinery in Sri Lankan food crop production. Hand tractor is an economical machinery compared to tractors. Those farmers who cannot afford a tractor used hand tractor. This machinery also flexible in small size fields.

Combine Harvester is used to harvests rice and corn. In plantations still used direct human labor rather than machineries. Large scale livestock farms like Ambewela dairy farm use machineries but most of the livestock farmers in the country still practice old human labor base system in their livestock production. Although there are few agricultural sectors use machineries they also uses small and flexible due to small size land lot, traditional farming methods and level of life of the farmers.

1.3 Current issues in Agricultural Machinery sector and Proposed solution

In Sri Lanka there are more than 300 000[2] of farm machineries in use, but their productivity is not up to the expected level due to lack of management of these machineries. Because of that Sri Lanka losses millions of revenue for a year. To avoid that losses Department of Agriculture(DOA) of Sri Lanka has raised the importance of providing proper ICT solution to increase the production, distribution and use of farm machineries.

From the farmers point of view they don't have a proper system to get the information about the available farming machineries in their area and how to use them to get maximum productivity. Because of this many farmers have to face huge struggle to find proper farming machineries to use in their farms. Without timely ploughing, seeding and harvesting many crops were damaged. This loss will become huge damage to farmers living standards. Farm machinery owners purchase farming equipments as an investment for their lives. Because of lack of management they also find struggles to rent machineries in right time to get the maximum profit. This will also affect in their life standard. Farming equipment producers don't have any method to get clear idea what they were need to produce, what are the equipments on demand. This projects is focus on to build a proper solutions to above mentioned problems using web based platform.

1.4 Aims and Objectives

The Main objective is to increase the productivity of Agriculture in Sri Lanka by building an environment to successfully manage farming machineries used inside Sri Lanka. With this System following benefits were achieved by the stakeholders who involved in agriculture industry in Sri Lanka.

<u>Farmers:</u>

Farmers can quickly find a needed farming machinery to used in their work. With that farmers will be able to plough, seed and harvest their crops on time. As a result of that quality of their crops will increase. This will enhance their level of life and the national Agricultural production.

<u>Farm machinery owners:</u>

System will provide environment to online rent farming machineries. Using that Farm machinery owners can continuously rent their machineries without any time waste. Cause of that usability of that machineries will increases to maximum level. As a result of continuously renting farming machineries Farm machinery owners can get the maximum profit their farming machineries because of that level of their life also increased.

<u>Farming equipment producers:</u>

System has facility to Monitor farming machineries and generate report based on that information. With the support of that Farming equipment producers can clearly identified what equipment to produce, what kind of machineries were need to allocate for a particular region. As a result proper farming machinery production and allocation can be achieved.

Department Of Agriculture:

Using the system DOA can monitor how farming machineries were used throughout the country. They can use those information to manipulate farming machineries to get the maximum productivity of them. Using that they can manage the farming machineries to increase the national Agricultural production without any resource wastage.

1.5 Scope of the Proposed Solution

a. Knowledge Providing Module:

System will provide the information about the farm machineries in using through the Sri Lanka. These information will be categorize among their usability. For each farm machine system will provide technical specification of that farming machine, How to use that farm machine to get the maximum productivity. If some person needs to get future knowledge about that farm machine, system will lead him/her to farm machinery training program conduct by Department of Agriculture.

b. Farmers/ Farm machinery Owners Registering Module:

Each farmers/ farm machinery owner can register to the system by providing their basic information. Farmers need to provide the area they are cultivating, plants they grow in their lands. For farm machinery owners they need to provide the Information about the machineries they owned. Farmer can become a farm machinery owners and vice versa.

c. Farm Machineries Monitoring Module:

Farm machineries were monitoring based on pradheshiya sabha. Each farmer can select the pradheshiya sabha where he/she lived, and search for available machinery to use to do task he or she need to do.

d. Farming Machinery Booking/Renting Module:

After registering their farming machines, farm machinery owners can rent their machines to farmers who needs them. The farmers who needs farming machineries can booked them from the farm machinery owners, using the system.

e. Administrator Module - Pradheshiya Sabha Level:

Agricultural engineer in the govi jana sewa will gained the license to monitor the functioning of the system in the pradeshiya saba level. Using that information he/she can use the system to lead the farming machineries to get the maximum productivity in that area.

f. Administrator Module - National level:

IT unit of Department of Agriculture will gained the license to monitor the functioning of the system in the national level. With that information they can organize the usage of farming machineries to increase the farming outcome of the country.

g. Report Generate Dashboard Module:

System will generate reports base on the requirement of Department of Agriculture to support them on their decision making process.

h. Mobile application module:

Mobile application will be created with above mentioned a,b,c,d,e functionalities to increase the usability of the system. With the help of this application system can easily enhance to track the GPS location of Farming machinery in the future(Out of the scope of this project).

Chapter 2.Litreture Review

In this chapter we are going to discuss about the similar systems that exist on the world what are their key features, focuses and how they will help to enhance the farmers life. First we focus on two major projects that were exist in our neighboring country India. Then we move to analyze the other similar system that were exist in Europe, USA and Australia. Europe, USA and Australia can be identified as major the places which uses technology in large scale industrial farming. Still many countries in Asia and Africa uses old traditional farming approaches due to inexpensive labor and lack of technological knowledge of the farmers.

Many farms in Europe, USA and Australia has high level of farming machinery usage, that individual farm uses hundred of machinery with the aid of few human labor. This will leads them to focus more on machinery management compared to farms in Asia and Africa. Still many Asian and African farms uses large amount of human labor with aid of few most needed farming machineries. But as a result of people moving to new industries, Farming industry in Asia and Africa faces shortage of human labor. Which will result to fulfill that shortage using Farming Machineries. Department of Agriculture is identified that situation and emphasize the need of "Machinery Information System for Farm Management" that can fulfill national level farming machinery management.

2.1)"E-Krishi" Agriculture Portal [3]

"e-Krishi is a novel ICT initiative in the sphere of agricultural trade implemented by the Kerala State Information Technology Mission(KSITM), the apex ICT implementation agency of Kerala working under the Department of Information Technology. The aim of the project is to address the gap in the flow of agricultural information and transaction management. The vision of the project is to establish a community of connected farmer's throughout Kerala who have access to information on market demand, prices, good agricultural practices, quality agricultural inputs, expert advice supported by a technology enabled robust transaction platform that facilitates all their agricultural activities."[2] Above I have abstracted part of an abstract of "e-Krishi Project of Kerala: An Ex-post Evaluation". With that we can clearly identified main objective of the "E-Krishi" is to build connection between stake holders of the Agriculture Industry in Kerala by providing online platform.
System will facilitate the users with following key features.

1. System provides environment to register for each stakeholder with their information.

2.Provide environment to farming ecommerce, e-retailing, e-Agro Trading and e-Marketing.

3. Provide environment to e-Learning and Farm-to-Laboratory facilities.

4.System will Act as central information gatherer and provider.

5.Provide opportunities to companies for the online retailing of Agri-inputs and Agri-commodities by removal of middlemen.

6. System will guide the farmers with the expert knowledge.

This system can be mainly identify as information and stakeholder gathering environment to enhance the level of life of each stakeholder.

2.2)" mKRISHI" mobile base information platform by Tata Consultancy Services[4]

"TCS' mKRISHI platform uses mobile technology to cater to the absolute need of the rural sector. It offers personalized advisor services in voice and visual using communication devises like mobile phones."[4] Here is the abstraction of introduction of the mKRISHI in their website.

With that we can clearly identified main objective of this project is to provide knowledge for the farmers in rural area. mKRISHI is available in three versions : Lite, Regular and Plus. with each version farmers can access different level of information's that they can afford. for

example if farmer had basic mobile phone farmer can register for Lite version to get the information as voice messages. As soon farmer can register for different version and access different level of knowledge. [5]

We can identify following key features

1. System provides environment to register for each stakeholder with their information.
2. Different versions to enhance the usability of the system.
3.Provide facility to gather knowledge using mobile devices.

but compared to "e-KRISHI" , "mKRISHI" is only targeting information providing. System will not act as information gathering portal. System also doesn't provide any online Q & A services.

Both systems mentioned above were not directly similar to the proposing system because proposing system's main focus is on farming machinery management, but it will have an e-learning module which is much similar to "e-KRISHI portal".

2.3)"Tractor Tracker" Service and Repair Records App[6]

"Tractor Tracker" is USA base farm machinery management application available for smart phones. Main focus of this application is to manage the farming machineries own by one farm or farmer. Application will help the farmers to timely manage their farming machineries to increase their productivity and availably of right time. To achieve that developers of that application gather all the technical data of a particular farm machinery, with that information application will guide the farmer through the needed maintenance, repair and upgrades(Fig2.1). This application is available for both android and iOS platforms. Key features of the application:

1. Organize farming Equipment using general information, Capacities and Filter Part Numbers.

2. Categorize farming Equipment, sort them and search their information when needs.

3. Track Farm Equipments Maintenance & Service.

4. Cloud Backup to Safeguard Farm Equipments Data.

5.Provide facility to access information of Farm Equipments from multiple devices.

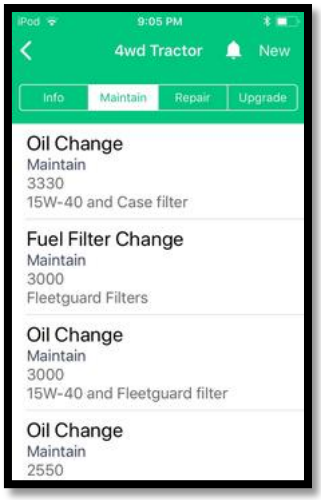

Fig2.1.Screenshot of maintain information of a "Tractor Tracker"

2.4)"TractorPal" Machinery Maintenance Management Application[7]

" TractorPal " is another USA base farm machinery management application available for smart phones. This application has much similar features to "Tractor Tracker". This application also uses to keep track of farming machineries own by one farm or farmer. Using this application farmer can log the farming machineries he/ she used in farming. System allow farmer to Track service and receive reminders (Fig2.2). E-mail facility can used when dealing with spare part buying/selling or when selling the vehicles.

Abstract from the applications web site:

"TractorPal™, the inventory and maintenance agriculture app should be added to your farming apps on your iPhone and Android. TractorPal™ is a great tool for keeping track of your tractor maintenance and keeps inventory records of all your agriculture machines and attachments including all of your cars & trucks maintenance."[6]

Key features of the application:

1.Inventory record keeper for all vehicles including Tractors.

2.Maintenance Manager to record oil changes and other items.

3.View History of farming machineries management.

4. Email Digital Records to anyone that needs.

5. Report generating about the farming equipments.

Fig2.2.Screenshot of maintain information of a "TractorPal"

2.5)"Farmware" Farm Management System[8]

"Farmware" is an Australia based farm management web application for smart phones, tablets and PCs. "Farmware" system has focused to livestock, cropping and storage components management inside an one farm. This application not directly focusing the farming machinery management but it provides basic facility to keep track of them.

Key features of the application:[7]

1.Keep track of mobs and numbers.

2.Maintain animal treatment records.

3.Maintain records of multiple livestock types.

4.Analyse livestock performance including stocking rate analysis.

5.Record grazing on any paddock combination.

6.Maintain paddock usage records.

7.Maintain paddock/crop treatments.

8.Analyse paddock and crop performances.

9.Maintain basic storage inventories.

When comparing Australia base "Farmware" application to USA base applications like " TractorPal " or "Tractor Tracker" it is important to know Australia is one of the largest livestock producers in the world. Cause of that many farming management application on Australia focusing much on livestock base farming management system. "Farmware" also has that biasness towards livestock.

2.6)"eFarmer" professional tractor navigation and precision farming system[9]

"eFarmer navigation application is a GPS guidance system to be used on your Android smartphone and/or tablet (Fig2.3). Checking the display while driving will enable you to perform field operations in parallel and evenly spaced lines. Thus to reduce overlaps and missed spots." [8]

With the above abstraction we can identify the goal of this application is to enhance the on field performances of the farming machinery to their maximum level. This will help farmers to timely complete their task. help save fuel, fertilizer, seed and water when they applying to fields by providing way to use tools without overlapping.

Key features of the application:

1. Creating and managing field boundaries.

2.Application will allow farmers to keep records of their fields, and generate report based on that information.

3.Track the farming machinery using GPS while performing in the field to enhance the performances.

Fig2.3.Screenshot of tractor tracking in field in "efarmer"

When compare this application to other mentioned application like "Tractor Tracker",

"TractorPal" main focus of this application to in field machinery management, rather than managing their maintenance and upgrades.

2.7)Adapting Knowledge and Experience from existing systems to new system

As we identified in Introduction Sri Lanka is a country which has much land usage for daily food crop production. Still farmers in the country uses small amount of farming machineries with higher usage of human labor. Because of that it is important to manage that small number of machineries to reach their maximum productivity level. Machinery Information System for Farm Management at Department of Agriculture (MISFFM at DOA) 's main focus is to guide the Farming Machinery Management at the national level to increase national level productivity. This system not managing faming machinery at one farm as many above mentioned applications, it allows users to keep track of their farming machinery, rent them to those who needs and system also provide environment to share expertise knowledge. System includes several modules to register farmers and their equipments, mange them at national level and generate reports based on that information. System also available on mobile base platform to increase usability. When considering usability of " mKRISHI " and " e-KRISHI " in India, it is important to DOA Sri Lanka to create a program to increase ICT knowledge of farmers, otherwise new system will unable to achieve its final goal. With the experience and knowledge from existing systems, that is how new system going to provide best service to manage farming machineries at Sri Lanka.

2.8)Comparison of Similar System

In below table discussed and compare how functionalities adapting from similar systems to MISFM.

	System/Application name						
key features	E-Krishi	mKRISHI	Tractor Tracker	TractorPal	Farmware	eFarmer	MISFFM
1.Main Objective of the system							
1.1. Build connection between stake holders of the Agriculture Industry							
1.2.Provide knowledge for the stakeholders							
1.3.Manage the farming machineries within one or more farms							
1.4.Manage livestock, cropping and storage component information of one or more farms							
1.5. In field machinery management							
1.6.Guide the Farming Machinery Management at the national level							
2. Provides environment to register for each stakeholder							
3. Provides environment to log farming machineries or items within farm							
4. Availability on Web Based							
5. Availability on Mobile base platform							
6.Availability of Cloud based servises							

Indicated feature is available in the system
Indicated feature is not available in the system

Table2.1.Comparison of similar system.

In this System main focus on build connectivity between stake holders(farmers, DOA and etc) in agricultural industry. But many of similar systems only focus on individual farm management(Table 2.1).

MISFM E-Krishi and mKrishi focus on providing machinery knowledge to farmers because most of the farmers in Asian region are still new to machinery base agriculture. In this phase MISFM not going to target livestock management but in near future system will develop to manage livestock management.

MISFM's main objective is to guide the farming machinery management at national level similar to e-Krishi and mKrishi.

All the systems provide environment to user login and rather than m-Krishi and e-kishi all other similar systems have facility to add machineries or tools that are used by the farmer.

Chapter 3.Methodology

First identifying the problem that cause to proposed need of such a system then go thought the similar system exist on world, now it is time to see how system was design to achieve its primary and secondary level goals.

3.1 Identifying Basic Requirements

As discussed in the introduction chapter key requirement is to build a platform to rent farming machinery among the farmers to increase productivity of farming machinery, to achieve that it is necessary to keep track of farmers and farming machinery.

After gathering requirement, It can identify three major uses of the system Farmer, Administrator and Machinery supplier(Fig 3.1). Farmer can be farming machinery owner, land owner or a labor. Machinery supplier can be either machinery seller or developer. Any farmer who wants to use this system can register to system by providing his/her basic information, if he/she already own farming machinery he/she can add those information at the registration. If any farmer needs to add their machinery information after registration he/she can do it separately, but to do that he/she need to login to the system first. Farmers can rent a machinery using system, to do that he/she needs to check availability. if needed machinery is available he/she can request it from machinery owner. After confirmation that request renting process is completes. At last renting date, time and location were added under that machinery data.

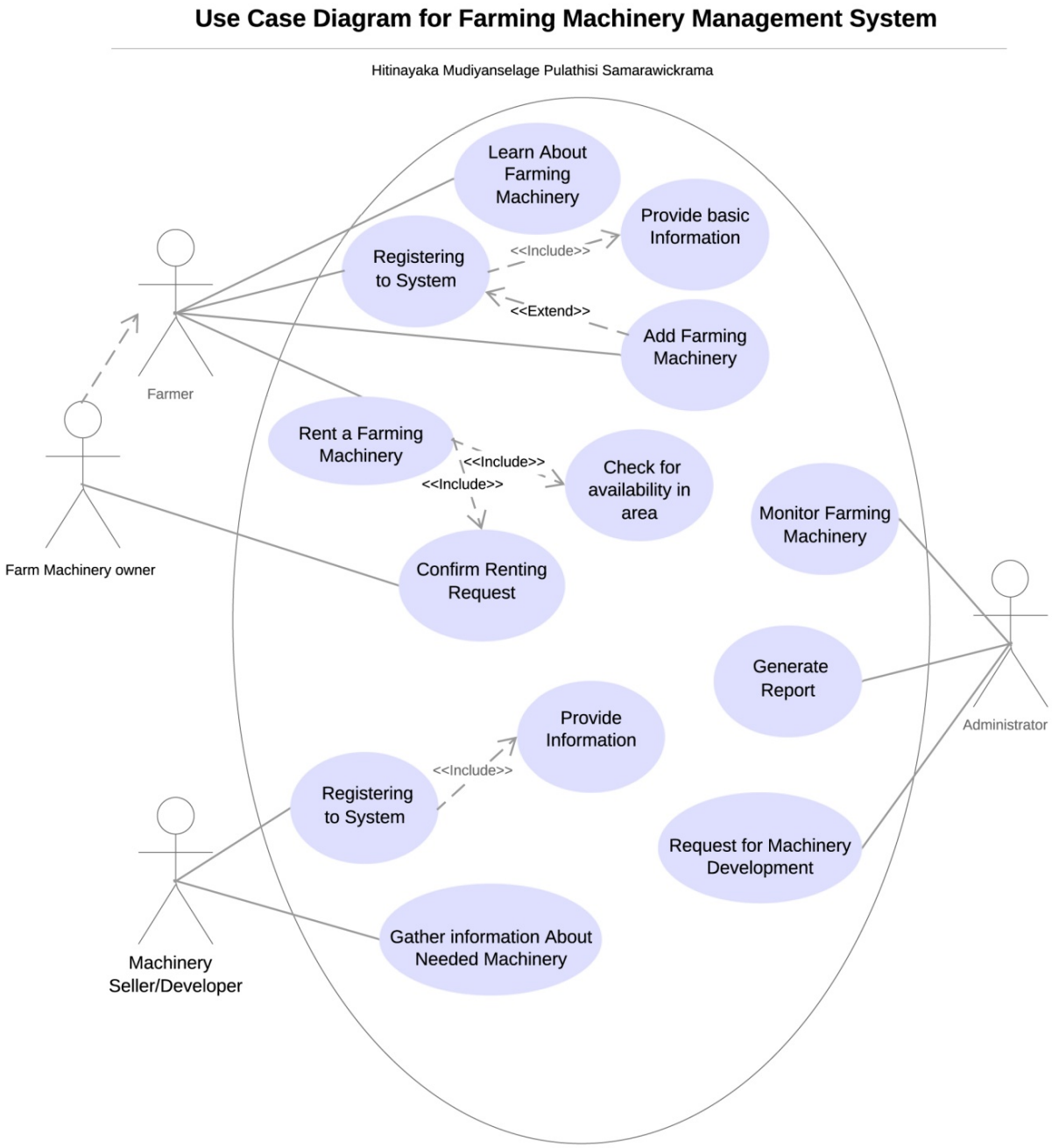

Fig3.1.Use Case Diagram of Farming Machinery Management System

System includes with farming machinery knowledge bank any farmer who needs to learn more about farming machinery can learn them using system. System uses number of administrators who works for DOA. There are two major levels in system administration. Level one is regional govijana sewa level and level two is national level. Administrator can monitor farmers and farming machineries. But for a regional govijana sewa level administrator only have access to the data in his/her region. Administrators can generate reports using the accessed data. In addition to that

administrator can create request machinery development due to demand. These request can used by machinery developer to identify machinery needs of farmers.

3.2 Understanding the needs of database and its structure

When considering database structure system can identify two major entities they were farmers and machinery. Because of system is administrate by number of administrators it is important to keep track of their details and provided access level. Machinery suppliers will supply machinery to farmers who needs them. It is important to note that machinery developer can be a machinery supplier and vice versa. As mentioned above farmer can be machinery owner, land owner or a labor. There might be land owners who have machineries as well. Farmer can rent machineries, renting details were tracked by the system as mentioned above.

Below depict high level EER diagram(Fig 3.2). In this diagram only mentioned entities to make ease of understand. Attribute that belong to each entity or relationship will separately mentioned after the diagram.

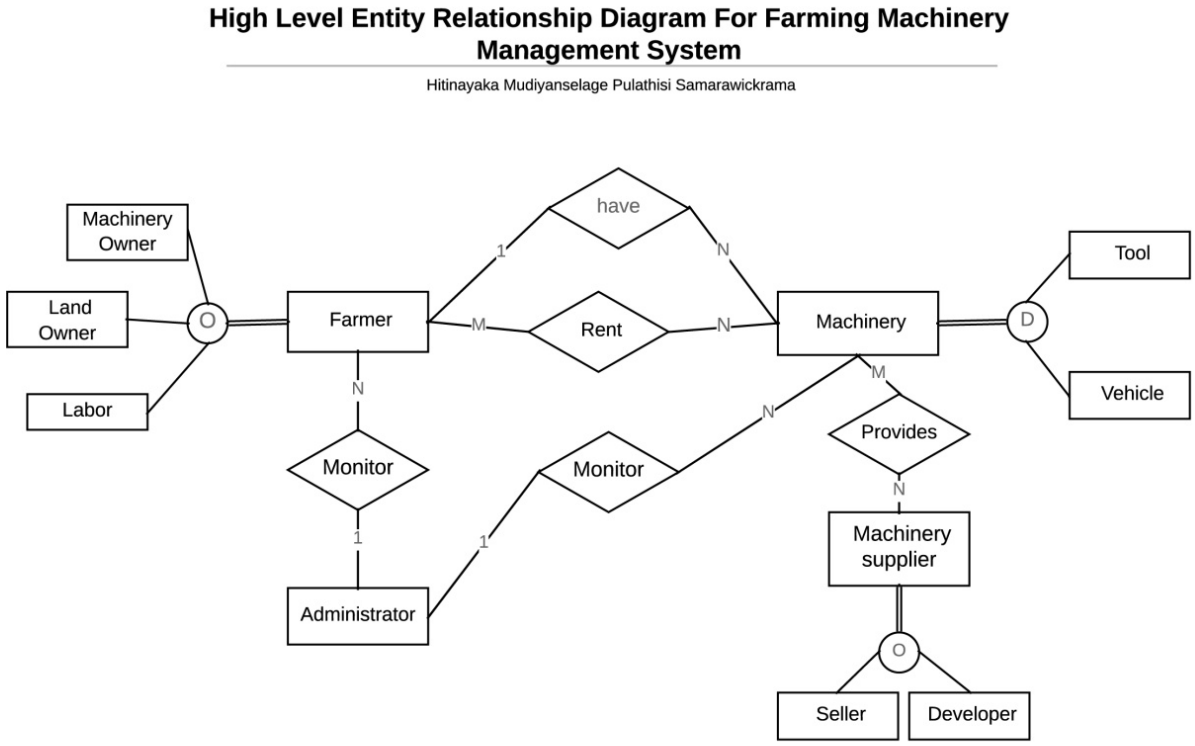

Fig3.2. High Level Entity Relationship Diagram for Farming Machinery Management System

Entity Name	**Attributes**
Farmer	NIC
	Name
	Username

	Password
	Gender
	Contact Information
	DOB
	Address
	Govi Jana Sewa Region
Machinery	Chassis/Serial Number
	Name
	Brand
	Model No
	Width
	Height
	Average Efficiency
Machinery Supplier	Business Registration No
	Company Name
	Contact Information
	Address
Administrator	NIC
	Name
	Username
	Password
	Access level
	Govi Jana Sewa Region(those who have national level access region will mentioned as "Sri Lanka")
Rent	Date
	Time
	Location

3.3 Major Functionalities of the system

Key functionality of this system is rent farming machinery, to do that farming machinery owners needs to add their farming machinery to the system. Administrator must be able to monitor farmers and farming machineries. They also be able to generate reports and send request for machinery development.

Below indicate Class diagram(Fig3.3) of system with the functionalities and attributes currently identified.

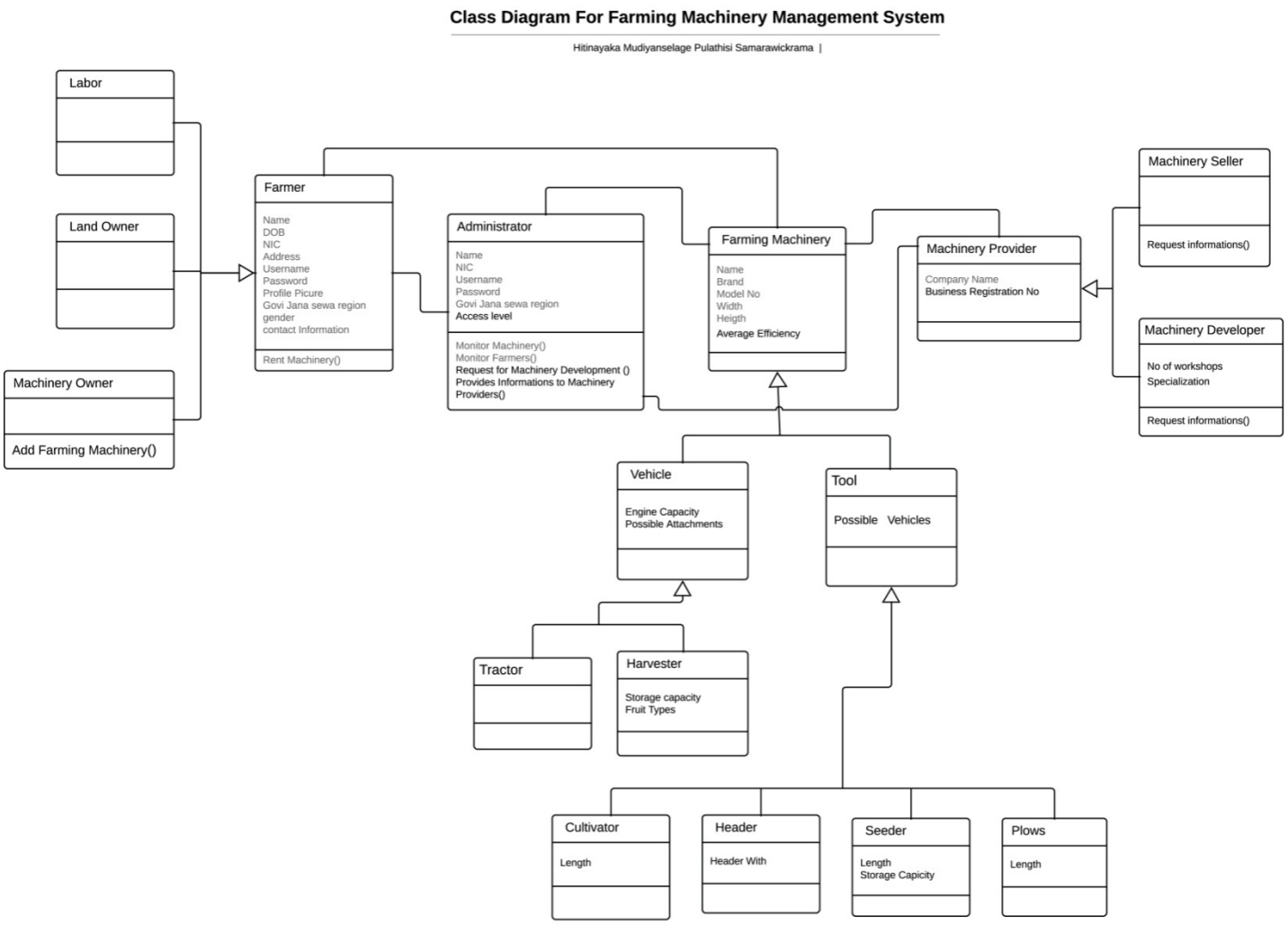

Fig3.3.Class Diagram for Farming Machinery Management System

3.4 Test plane

To make this system quality, acceptable, available web based system developers will follow below mentioned testing steps.

1) Functional Testing

Functional testing will carried throughout the development phase to ensure developers will develop the right product. Developer will check their code by them self. Test cases for functionalities in the system attached under appendix A.

2) Browser Compatibility Testing

Because of system is web based it should ensure that system will work correctly on all the web browsers people are using and each browser systems functionalities were work as expected.

3) Performance Testing

Because of this system is distribute through wide range of people in Sri Lanka system needs to ensure system is work as the same on every device without depending on their performances. In simple term system need to guarantee it is working on least performing computer.

4) Acceptance testing

DOA is the main client for this system because of that DOA will do the acceptance testing. They will go through the system and check whether system is capable to full fill all the requirement they request.

5) Alpha Testing

After completing entire system it will released to selected set of people who represents the all the types of user(DOA, Farmers, Farm machinery owners and etc). With their feedback system will modified to full fill their requirement.

6) Beta Testing

System will released as beta version for much larger set of users to identified further modifications and clarifications.

7) Regression Testing

Because of this system is web base and highly interact with people, need further modification will rise time to time. Because of that regression testing will be done after each modification to the system.

Chapter 4.Evaluation

This chapter discusses how project achieve its objectives in community, technical, administrative, economical and productive perspectives. Before that document go through brief review of proposed objectives.

4.1 Brief review of proposed objectives

The Main objective is to increase the productivity of Agriculture in Sri Lanka by building an environment to successfully manage farming machineries used inside Sri Lanka.

With this system farmers get the ability to quickly find the machinery they need to use in their fields.

Farm machinery owners get facility to rent their machinery to increase productivity of the machinery.

Using the system Department of agriculture (DOA) can monitor and manage the farming machinery usage to increase national level agriculture productivity.

Faming machinery sellers and developer can use this system to gather information what are the machinery that need to supply/ produce to the farmers.

4.2 Evaluation as web base system

System is now on live stream with following major modules that proposed at the start.

a. Knowledge Providing Module : this module is succeed with including much needed knowledge. With the support of DOA knowledge base increase further in the future to support knowledge seekers.

b. Farmers/ Farm machinery Owners Registering Module : Any farmer who needs to use system can easily register to the system by providing there basic information.

c. Farming Machinery Booking/Renting Module: for those who need to rent machinery, can quickly find what they need and rent it online.

d. Administrator Module: Special administrative module is build for the members of DOA. They can use specified usernames and passwords to logging to the system and administrate farming machineries up to the level of permission he/she got.

e. Report Generate Dashboard Module: DOA and farming machinery sellers/developer can use report generating modules to generate reports base on the information they need

F. Mobile application module: This system base on firebase framework which supports across the multiple platforms. Because of that anyone who uses mobile device can access the system without any issue. Building a specific android based application is still under consideration due to this reason.

4.3 Evaluation as community base project

To reach the success of this system, system should be popular among the farming community in Sri Lanka. But to reach that goal there are many challenges to overcome. Only 22.8%[10] of work force in agriculture industry has proper computer literacy from them only few can have the access to a digital device that can use this system. This is become the major challenge when system come to evaluate as community base project. DOA has already starts many projects to increase the computer literacy of the farmers. With that effort, in near future system can reach it community goal to successful management of farming machineries throughout Sri Lanka.

4.4 Evaluation as National Level Farming Machinery Manager

As already mentioned major challenge is the lack of computer literacy of the agricultural workforce. Cause of that system may take few years to reach that goal. But

system is build with strong root to see its final success without any doubt.

When system reach its community goal Members of DOA can easily use this system to monitor and administrate farming machineries in the Sri Lanka. With that Sri Lanka will be able to increase its agricultural productivity.

4.5 As a system that increasing customer base

When system reach its maximum usage, system has to provide service for more than 6 million people (number of farmers in the country). To provide services to such a huge audience system builds on firebase frame work with NO SQL database structure. With that structure, system can reach multiple platforms (web, android, IOS) easily without any specific development.

The system gets ability to expand database capacity without any collision and many other benefits to support large scale system.

With that, system can expand with the requirement without building any specific storage facility at the start. System can simply grow with the size of the audience.

4.6 Effect on National Agriculture

System is still at the introductory level. But many of the young farmers who find better ways to increase their outcome will engage with new system. Many farmers have high necessity to use the system. The only barrier they face is lack of computer literacy. But with their intention sooner they will learn how to use the system and use it to increase the quality and quantity of their production.

Chapter 5. Conclusion

DOA identified lack of farming machinery management in the country leads heavy loss of agricultural outcome. As a result of that DOA raise the demand for a proper system to manage farming machinery throughout the country. This is the major root behind this project. When analyzing the farming machinery sector in Sri Lanka, following issues can be identified in farming machinery usage and management in the Sri Lanka.

1.Lack of knowledge about farming machinery in farmers.

2.There are no place to share(to rent) what they already have.

3.No environment to DOA to mange farming machinery in the country.

To answer these major issues developers proposed system with following major modules.

1.Farming machinery knowledge base : To provide much needed farming machinery knowledge.

2.Farming machinery booking renting facility: To share what farmers already have. With this farmers can increase the productivity of their farming machineries.

3. Administrative module: With this DOA can monitor and manage farming machinery usage in the county. In addition to that they can use this module to generate reports they needs.

With all above mentioned facilities now Sri Lanka can use countries farming machinery with expected productivity level. But still some of the farmers were adapting to use this system. Members of DOA training them to use this system. With their effort and donation in near future Sri Lanka will reach the maximum productivity of farming machinery usage.

Appendices

Appendix A-Test Cases

Test Suite ID: SFMORM01
Test Case ID : CFMORM01
Test Case Summary: To verify that clicking Signup button can sign up new user.
Related Requirement: -
Prerequisites: -
Test Procedure: 1. User should provide Name, User Name, Contact information, NIC No, Email, Password, Confirm Password, Address , GoviJana Sewa Region, DOB And Gender**.**
2.Click Sign Up
Test Data: Sign up details following above order Pulathisi, Pulathisi, 0719810411, 901610290V, hitipul@yahoo.com, 123@123, 123@123,"No 30,Abc Road,dehiwala", dehiwala, 1999.08.01, male
Expected Result:
A message "Please enter valid NIC " should display if user enter value less than or greater than 10 digit.
A message "Invalid password " should display if password and confirm password are miss matched.
If user leave any of the field empty message should display to please enter the value relate to that field.

Actual Result:
If user provides all required information user will sign up and data will added to database.

Status: Success
Remarks:
Created By: Pulathisi Samarawickrama
Date of Creation: 06/20/2019
Executed By: Pulathisi Samarawickrama
Date of Execution: 06/20/2019

Test Environment
OS: Windows Y
Browser: Chrome N

Test Suite ID: SFMORL01
Test Case ID : CFMORL01
Test Case Summary: To verify that clicking Login button can Log user to system.
Related Requirement: -

Prerequisites: User must register to system providing information.

Test Procedure: 1.User should provide NIC that he/she used when registering
2.Enter password
3.Click Login

Test Data: NIC:901610290V
password: 123@123,
Expected Result:
A message " Invalid password " should display if user enter password that doesn't match with NIC he or she provide.
Actual Result:
A message display login success and lead to profile page.
Status: Success
Remarks:
Created By: Pulathisi Samarawickrama
Date of Creation: 06/20/2019
Executed By: Pulathisi Samarawickrama
Date of Execution: 06/20/2019

Test Environment
OS: Windows Y
Browser: Chrome N

Test Suite ID: SFMBR01
Test Case ID : CFMBR01
Test Case Summary: To verify that click rent in renting machinery menu can rent farming machinery
Related Requirement: Farmer will check available machinery list in his/ser region

Prerequisites: User must login to system.

Test Procedure: 1.User enter Serial Number of the machinery need to rent
2.Click on find owner and system should return owner of that machinery .
3.Enter needed date
4.Click on availability system should display availability
5.Then enter start time and end time.
6.Cilick on Rent

Test Data: Serial Number: 4879663
Date:2019/06/30
Expected Result:
A message "Enter Valid serial number" should display if user enter invalid serial number.
If user enter valid serial number and enter on find owner it will return the owner.
A message "Date is not available " should display if user requester day is already booked.

Actual Result:
A message display "Your requested Machinery is : Available On that day" when click on check availability.
A message display "Renting Machinery Sucess" **.**

Status: Success
Remarks:
Created By: Pulathisi Samarawickrama
Date of Creation: 06/20/2019
Executed By: Pulathisi Samarawickrama
Date of Execution: 06/20/2019

Test Environment
OS: Windows Y
Browser: Chrome N

Test Suite ID: SMAM01
Test Case ID : CMAM01
Test Case Summary: To verify that click Add in Add farming machinery popup menu can add machinery to system
Related Requirement:

Prerequisites: User must login to system.

Test Procedure: 1.User enter Serial Number of the machinery he/she going to add
2.Select the type.
3.Enter Brand name, Model No, With, Height and Average Efficiency.
4.Select availability to rent
5.Click on Add.

Test Data: Serial Number: 4879663, Type: Tractor, Bran Name: Tafe . Model No : TF350, Heigth:1 Width 2.89, Average Efficiency: 2 Availability: Yes.

Expected Result:
If user leave any of the field empty message should display to please enter the value relate to that field.

Actual Result:
A message display "Machinery Successfully added " **.**

Status: Success
Remarks:
Created By: Pulathisi Samarawickrama
Date of Creation: 06/20/2019
Executed By: Pulathisi Samarawickrama
Date of Execution: 06/20/2019

Test Environment
OS: Windows Y
Browser: Chrome N

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