Smart Agricultural Management System for Small-Scale Farmers in India

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Abstract -
Agriculture can be defined as the science or practice of farming, including the growing of crops and the rearing of animals. Agriculture is one of the most important sectors in India 's economy and could benefit tremendously with the application of information communication technology. Due to tremendous advances during the last decade, information technology is today affecting all the spheres of human life. We can exploit these advances to design a cost-effective system to provide expert advice to farmers and the general public. This project focuses on how information communication technology can be used to better improve agriculture in India. This will be done by implementing an online electronic Agro-commerce system, a livestock and vegetable farming information repository, buying and customer overview implementation , showing crop distribution in different farming areas of India and an electronic records management system for local cooperatives and associations. Online marketplaces connect farmers directly with buyers, enabling them to sell their products without intermediaries.

Keywords: Agriculture, Farmers, Agri Products, Online Marketplace etc.

1. INTRODUCTION

The importance of farming to India and its citizens cannot be over emphasized. However the majority of the India n farmers face a number of related problems.

Firstly and foremost Indian farms are run by ordinary people with little information on farming and farming trends. Farming techniques are passed on from generation to generation and some of these methods are outdated and not very effective. This creates problems with the technical aspect of the day to day operations of the farm. When a disease breaks out on either the livestock or crops, most farmers tend to wait for advice from local experts from the ministry of agriculture and livestock. But these experts do tend to take long and the problem may have escalated before the information is made available.

Secondly, farmers in Indian luck the marketing opportunity to market their products. This implies that the general public who are the would be buyers do not know which farmer is producing which product and this leads to low sells and profits for the farmers. This has led to the farmers creating informal markets such as Roadside shops and local Commercial shows which only come once in a year. A good example is the agriculture and commercial show which happens in August in Nagpur.

Thirdly, the government of India does give subsidized fertilizers and inputs to the farmers. Farmers are required to register with a local cooperative. Unfortunately, the farmer's records at these cooperatives are saved manually in books.

This gives raise to corrupt activities as some farmers are tempted to register twice with different cooperatives so as to get double these inputs. This implies that some farmers do not get the much-needed inputs.

The agriculture sector plays a pivotal role in global food production, supplying essential crops and livestock products that sustain human life. Agriculture is the primary source of food production. It provides the raw materials for various food products, from grains and vegetables to meat and dairy. Farmers face various risks including weather-related challenges and market fluctuations. Farmers need reliable channels to connect with customers, whether they are selling crops, livestock products, or other products. Digital platforms have transformed the way farmer-customer interactions occur in the agriculture sector.

Online marketplaces connect farmers directly with buyers, enabling them to sell their products without intermediaries.

2. OBJECTIVE

Aim:
Our goal is to show how a digital platform can help farmers and consumers in agriculture communicate easily. This project focuses on how information communication technology can be used to better improve agriculture in India.

Objective:

- Enable farmers to reach a wider market, reduce dependency on brokers, and gain control over pricing and sales.
- Reduce the involvement of brokers and intermediaries, which will lower costs and improve transparency in pricing and demand.
- Farmer–Tech system are to help booster India's agriculture capability with the use of information communication technology.

3. SYSTEM ARCHITECTURE

A system architecture is a conceptual model using which we can define the structure and behaviour of that system. It is a formal representation of a system. Depending on the context, system architecture can be used to refer to either a model to describe the system or a method used to build the system. Building a proper system architecture helps in analysis of the project, especially in the early stages.

An overview of our model is shown in the figure given below. Our model consists of Road accident data that upon data pre-processing will form a dataset. Data pre-processing is one of the most important task in data mining. It deals with handling missing values or removing attributes and makes it a structured form of data in order to perform analysis on it.

The dataset obtained will now be subjected to various data mining techniques. Clustering will be performed on the given dataset. The main aim of performing clustering is to divide the data into different clusters or groups such that the objects within a group are similar to each other whereas objects in other clusters are different from each other.[19]. There are several clustering algorithms available: Hierarchical clustering technique like Ward method, single linkage, complete linkage etc, K means and latest class clustering (LCC).Other clustering algorithms like K-modes clustering is an enhanced version of K means clustering.

The clusters are then subjected to other algorithms like Association rule mining and trend analysis. Association rule mining is a very popular data mining technique that extracts interesting and hidden relations between various attributes in a large dataset. Association rule mining produces a set of rules that define underlying patterns in the dataset. The associativity is known by the frequency of their occurrence together in the dataset.

The trend analysis is performed to determine the upcoming trends based on the total count of accidents for each cluster. The trends analysis can also be applied on the entire dataset as well as the clusters. The trends can show a positive or negative trend for the future based on the current and past trends. There can be difference in trends for various clusters as there might be different factors dominant in causing accidents for that particular cluster. This trend will help us analyse the extent to which the measures taken across

the years to reduce accidents has contributed in reducing the accident rate.
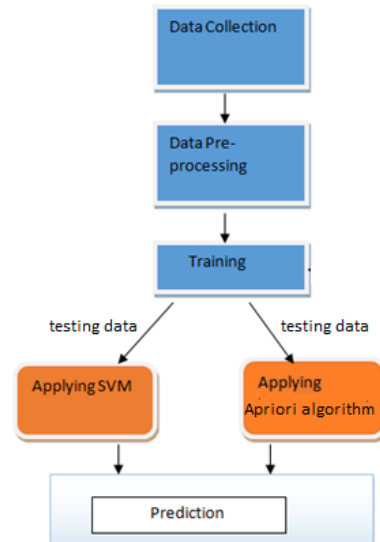

Figure 1. System architecture

4. MODULES

This project includes following modules and is listed below:

- User website
- Admin panel
- Seller Panel (Dashboard)
- Customer Login

Admin Panel :

- Seller Module

- Seller Order
- Shipment
- Payments

Seller Panel :

- Products
- Catalog
- Gallery
- Order
- Payments
- Shipments

Customer Login (Front Page):

- Feature Products
- New Arrival
- New Category
- Latest Products

User Account :

- Cart
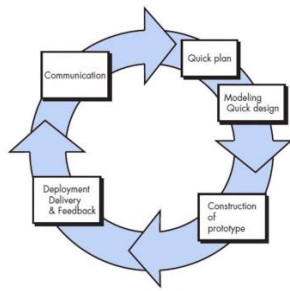- Orders
- Wishlist
- Payments and Billing.

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Figure 2. Software Development Life Cycle

5. FLOWCHART
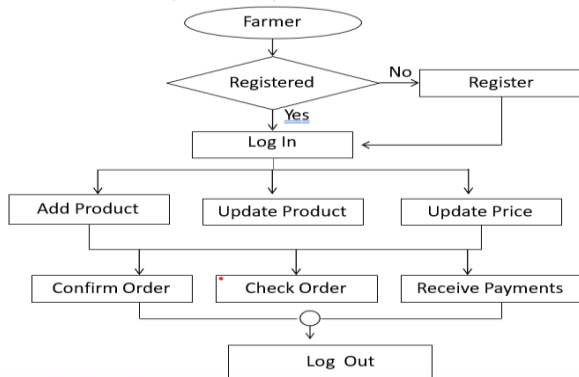
- **Seller (Farmers)**

Figure 3. Flow –Chart Diagram Seller (Farmers)
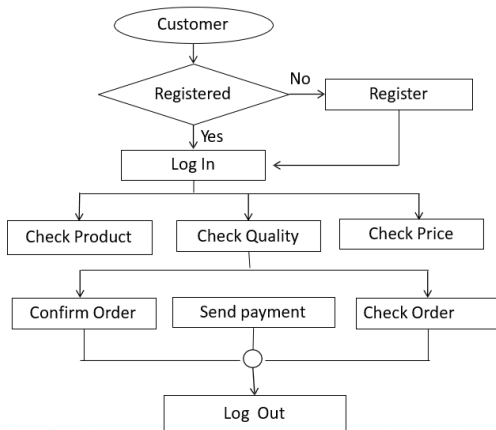
- **Buyer (Customers) :**

Figure 4. Flow –Chart Diagram Buyer (Customers)

6. IMPLEMENTATION AND RESULTS
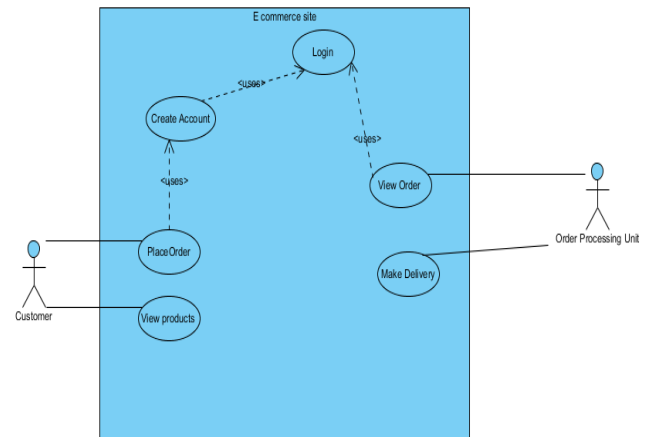
- **Use Case Diagram**

Figure 5. E commerce use case

- Above Figure shows the electronic commerce module use case diagram. The diagram module shows the how the different actors of the system interact with each other.
- The customer can view products on offer and who is offering those products, place orders on that product by creating an account and then login into the system.
- The other actor in the system is the order processing unit which checks for orders from the customer and makes a delivery of products.

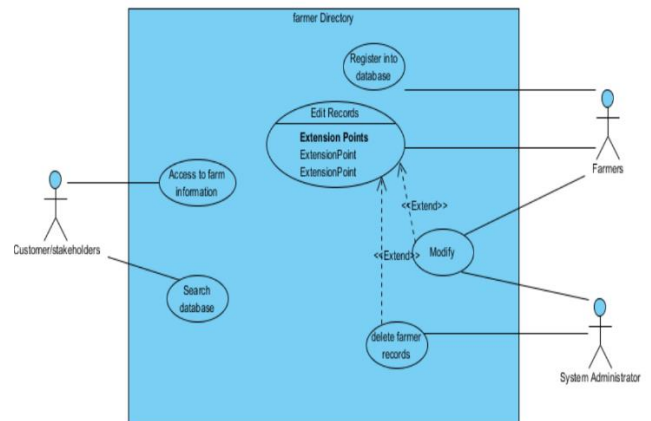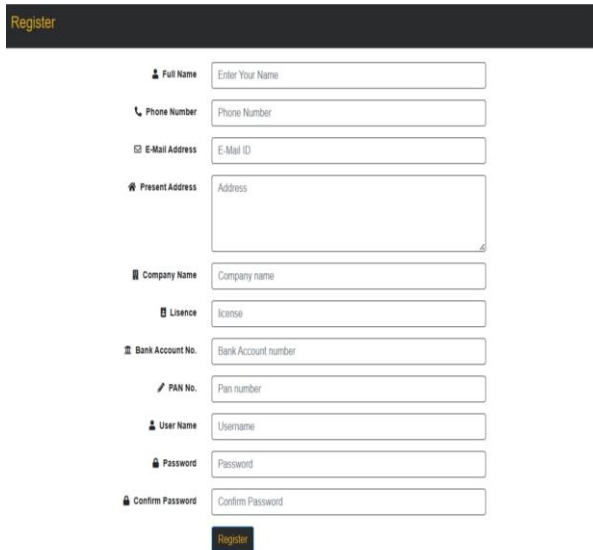- **Farmer Directory Use case**

Figure 6. Farmer directory use case

The figure above shows how the different actors interact in the famer directory module. The different actors in the system include the farmers, system administrator, and the general public.
- The general public have access to a front end database that shows the names of farms and what products are produced plus the contact information.

- The other actors are the system administrator and the farmers. These actors have rights to modify, delete and update records.
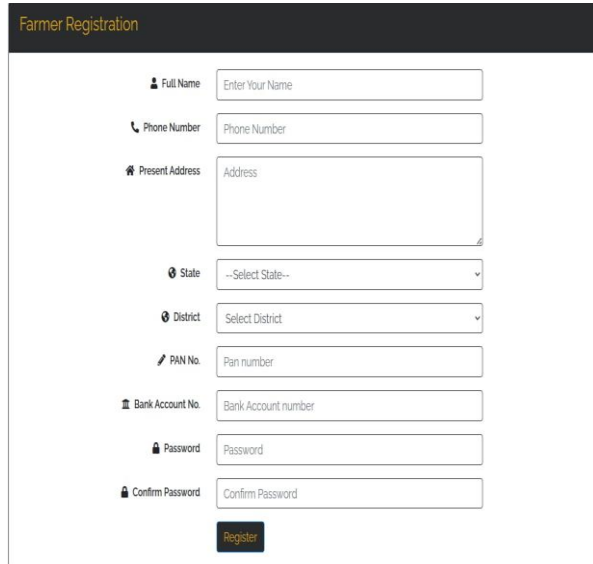
- **Output Obtain :**

Figure 7. user_Registration_module

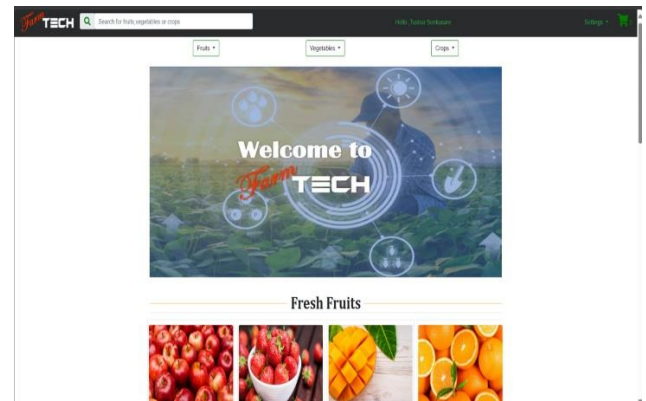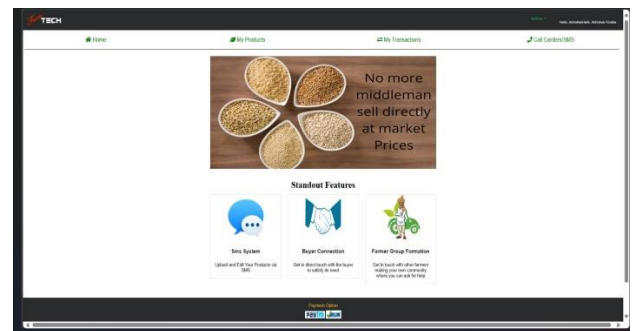Figure 8. Framer Registration _module

Figure 9. Home_page

Figure 10 Features display

To wrap it up, making a special online market where farmers and customers meet is a big step forward for farming.

This new way of doing things helps farmers and customers connect directly, fixing old problems in farming and making things better for everyone in the farming world.

Based on the purpose of development of website for Marketplace Agricultural Product, it can be concluded as follows.

1. Platform for Marketplace Agricultural Product facilitate Farmers to market their products quickly and efficiently.

2. Platform for Marketplace Agricultural Product facilitate Buyers who are looking for agriculture products that are sold.

3. Transactions between Buyers and Farmers become easier and faster.

4. Communities who use such a platform for Agri-Marketplace Agricultural Product can see products sold by Farmers wherever they are located, so they can reach more Buyers.

5. Platform for Marketplace Agricultural Product has an easy bargaining feature and has a review of the products purchased.

6. If information is put online farmers that are in the rural areas will no longer have to wait for agriculturalists and expert to visit them with information, instead small devices like phones will be used to gather this information faster.

7. An improvement in information dissemination and management is thus imperative.

The framework for an information technology-based agriculture information dissemination system is thus proposed.

7. CONCLUSION

The development of a smart agricultural e-commerce marketplace for small-scale farmers in India holds significant promise for transforming the agricultural sector. By leveraging digital technologies, such as mobile apps, IoT devices, and data analytics, this platform can empower farmers with access to markets, information, and financial services. Through partnerships with government agencies, NGOs, and private companies, it can address challenges such as access to markets, fair pricing, and logistics. Ultimately, by fostering transparency, efficiency, and inclusivity in agricultural value chains, the platform has the potential to enhance the livelihoods of small-scale farmers and contribute to sustainable agricultural development in India.

8. FUTURE SCOPE

Future works on this project will include a language translation of the best farming methods.

These languages will include Bemba and Nyanja to help the local community better understand the services that the application provides.

Other components that will be added in the future will include marking of tip tanks locations on a google map for easy access by the local farmers.

Future works will also include a messaging system that will be used by the farmers and the agriculture experts to exchange information in real time between themselves using a USSD communication system which is a free service.

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