

Marketplace For Farmers To Sell Their Products With Higher Rates And Ease (Vriksha)

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DOI: 10.47750/pnr.2022.13.510.686

Abstract

India's economy is heavily reliant on agriculture, which is the main source of income for millions of farmers. Despite this, Indian farmers face several challenges such as limited market access, lack of transparency, and inadequate pricing mechanisms. These challenges have resulted in lower rates for their produce, negatively affecting farmers' livelihoods and leading to issues such as depression, anxiety, and suicide. Over the last two decades, approximately 300,000 farmers in India have committed suicide by ingesting pesticides or hanging themselves. According to a 2011 census, the suicide rate among Indian farmers increased by 47%. As agriculture remains the largest employment sector in the country, it is evident that a significant shift is needed to address these problems. In recent years, technology has emerged as a possible solution to these issues. This paper presents the design and development of an app that utilizes advanced technology to simplify the agricultural supply chain and provide a platform for Indian farmers to sell their products directly to buyers at better rates and with greater ease, ultimately improving their livelihoods.

Introduction

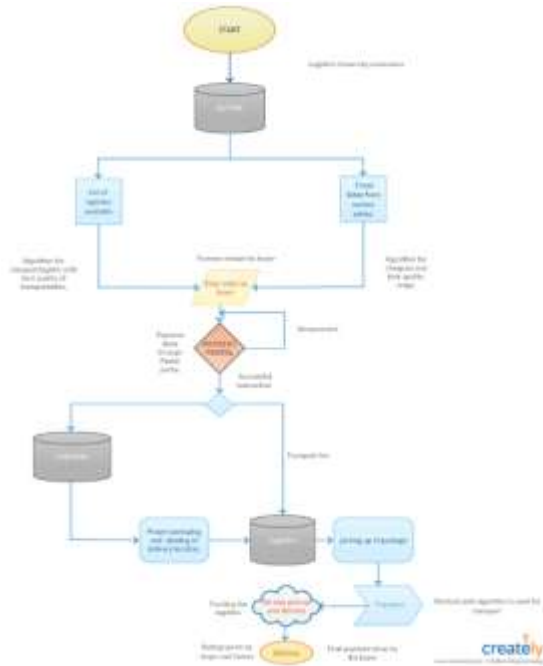
The Indian government's recent passage of two farm bills and the revision of another in September 2020 has sparked protests near New Delhi, drawing attention to issues of farmer welfare and farm market reforms. The main points of contention include the freedom for farmers to sell their produce anywhere in the country, rather than being limited to selling in Agricultural Produce Marketing Committee (APMC) markets closest to their farms. Other issues being debated include the minimum support price (MSP), the promotion of contract farming, and the ability of private entities to hold stocks of farm produce. These issues emphasize the significance of the political economy of agriculture, which has been a formal occupation in India for thousands of years [1][2].

Background

Research has been conducted in recent years on the use of online marketplaces to connect small-scale farmers with consumers and increase their profitability. In India, a 2018 study found that such marketplaces helped farmers access buyers, reduce transaction costs, and increase pricing transparency, although low adoption rates, limited market reach, and lack of internet access remained challenges. Similarly, a 2020 study in Tanzania demonstrated that mobile-based marketplaces reduced post-harvest losses and increased sales, but highlighted issues with financial literacy, infrastructure, and trust in digital transactions as obstacles to wider adoption. These studies suggest that technology-driven marketplaces have potential to benefit farmers, but must overcome unique challenges and be accessible and user-friendly. In the absence of a marketplace, small scale farmers may encounter various challenges in selling their products. These include limited access to buyers, a restricted market reach, pricing transparency issues, and high

transaction costs. Such limitations can hinder farmers' ability to generate profits and contribute to inefficiencies in the agricultural supply chain [3][4][5].

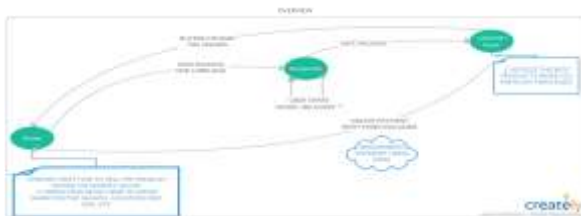
Flowchart



Proposed System

Our goal is to create a marketplace and supply chain platform that addresses the following issues to create a more efficient system than our current one [6].

1. Establishing a reliable marketplace that connects farmers and consumers directly, removing the need for middlemen [7].
2. Implementing a proper grading system that allows users to know the quality of the materials in advance [8].
3. Developing an efficient transportation system for timely delivery [9].
4. Creating a transparent money transaction system to install trust and reliability [10].
5. Incorporating algorithms to enhance the app's usability and user experience



1. Reliable marketplace

- a. Farmer's point of view

The process starts with the farmer signing up for the app by linking their Aadhaar card. After registration, the app prompts the farmer with a few questions, including soil and climate information, as well as permission to access their location. This information is used by the app to predict the maximum potential of the farmer's produce [11][12].

When the farmer wants to sell their product, they can advertise it on the app, along with the price and quantity. The app also provides suggestions on the optimal crops to grow based on the current conditions of the area, and the best time to sell the product to maximize profits [13][14].

b. Consumer's point of view

The app will offer personalized product recommendations to consumers based on their past purchases. When a consumer searches for a product, they will be shown a list of available farmers along with the corresponding price and farmer ratings. The app will also provide the consumer with a list of logistics options tailored to their specific needs. By facilitating direct interaction between farmers and consumers, the app aims to eliminate middlemen and create a more efficient marketplace [15][16].

2. Absence of proper grading system to know the quality of the material beforehand

In the current system, there is a lack of grading of the commodities being marketed, leading to consumer mistrust regarding product quality. To address this issue, a new multilayer grading system is proposed, which differs from conventional grading systems used in existing e-commerce platforms. This system will rate the products based on various aspects such as quality, punctuality, and packaging, while transportation will also be rated. These ratings will help consumers make informed decisions when choosing between products [17].

3. An effective transportation System

To use the proposed transport system, customers can select the transportation service and enter the destination of their package. Once the destination is entered, the cost of the shipment will be displayed. If the customer agrees to the price, the request is sent to nearby logistics personnel, who will transport the item(s) to the destination. Similar to Uber Pool, if there are multiple items being transported, the customer will not know the details of the other shipments. However, the transporters will be able to see the details of all the shipments they will be carrying. This will allow for efficient transportation of multiple items to different locations [18].

Technology Used

1. Machine learning (neural networks)

- The system provides crop recommendations based on the current conditions.
- It also suggests the optimal time to sell the crops for maximum profit.
- Based on the consumer's purchase history, the system provides personalized product suggestions.
- Assist in determining the optimal crop for a specific soil and season.
- Provide recommendations based on previous sales reports and market values to help farmers obtain the best possible price.

Machine learning algorithms that can be used-

- a. **DECISION TREE** - The decision tree algorithm creates a tree-like model of decisions and their potential consequences. At each internal node of the tree, a decision is made based on a specific feature or attribute. The tree branches out based on the possible values of that feature, leading to subsequent internal nodes or leaf nodes where the final prediction classification is made.
- b. **LINEAR REGRESSION** - Linear regression is a supervised learning algorithm used in machine learning to model the relationship between a dependent variable and one or more independent variables. It assumes a linear

relationship between the input variables and the output, aiming to find the best-fitting line or hyperplane that minimizes the difference between the predicted and actual values.

The basic idea behind linear regression is to represent the relationship between the independent variables (features) X and the dependent variable (target) y as a linear equation:

$$y = w_0 + w_1x_1 + w_2x_2 + \dots + w_nx_n + \varepsilon$$

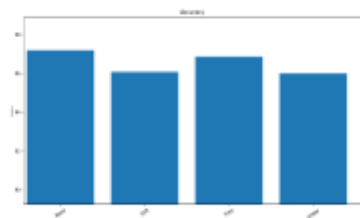
Here, y is the target variable, x_1, x_2, \dots, x_n are the independent variables, $w_0, w_1, w_2, \dots, w_n$ are the coefficients (also known as weights) that determine the contribution of each feature, and ε represents the error term.

c. **RANDOMIZED ALGORITHM** - A randomized algorithm in machine learning refers to an algorithm that incorporates randomness or probabilistic elements in its design and execution. These algorithms introduce randomness to improve efficiency, enable parallelization, or handle large-scale datasets can be categorized into different types based on their specific applications and goals like Randomized Optimization Algorithms, Random Forest, Stochastic Gradient Descent, Random Projection.

Randomized algorithms can provide benefits like faster computation, reduced memory requirements and increased robustness.

d. **SUPPORT VECTOR REGRESSION**- Support Vector Regression (SVR) is a supervised learning algorithm that is used for regression tasks in machine learning. SVR is based on the principles of Support Vector Machines (SVM), which are widely used for classification tasks. The goal of SVR is to find a hyperplane that best fits the training data while maximizing the margin or distance between the hyperplane and the data points. Unlike traditional linear regression, SVR can capture non-linear relationships by using kernel functions that transform the input features into higher-dimensional spaces.

Accuracy Comparison



2. Databases

- Information of all the farmers, Logistics and the consumers Stored.
- This can be used by government for surveys and Accountings.

3. App and web

- App to provide beautiful front end and web for the back end for help in reaching out more people and making the interaction easier.
- The app and web are basically developed in JAVA language with GRADLE.
- GRADLE - Gradle is an open-source build automation tool used primarily for Java and Android development. It automates the process of compiling, testing, and packaging software projects, making it easier to manage dependencies and build complex projects. It supports different project types and can be adapted for different build and automation requirements.

4. Digital payment system

The BHIM app from govt. of India (UPI Based) is great for the payment system and This will allow to make the payment system transparent and corruption free and foolproof.

SYSTEM DESIGN



Conclusion

The system has been designed to be efficient, error-free, and robust, with provisions for future updates. Online shopping has become increasingly popular among customers and entrepreneurs, and the project aims to provide a user-friendly platform that enables easy navigation and data retrieval. Our primary goal is to provide a dynamic online farmers' management system that offers farmers a stable platform to conduct transactions with ease. The Vriksha project has been a highly effective platform that facilitates the buying and selling of agricultural products for farmers with convenience and profitability. By utilizing modern technology and the internet, this initiative has enabled farmers to connect with potential buyers from different parts of the world, eliminating the need for intermediaries or physical markets. In summary, the Vriksha project has been a remarkable accomplishment, delivering numerous benefits to farmers and buyers alike. It has helped farmers to boost their profits, expand their market reach, and enhance their livelihoods. It has also facilitated the establishment of stronger relationships between farmers and buyers eliminating the middlemen, resulting in more sustainable and ethical supply chains.

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