KRISHI BAZAAR: An E-Commerce Application
For Direct Farmer-to-Consumer Trading

Vaishnavi Desai
Computer Science and Technology,
Usha Mittal Institute of Technology,
SNDTWU
Mumbai, India
vaishnavidesai@gmail.com

Isha Ghiria
Computer Science and Technology,
Usha Mittal Institute of Technology,
SNDTWU
Mumbai, India
ishankg99@gmail.com

Twinkle Bagdi
Information Technology,
Usha Mittal Institute of Technology,
SNDTWU
Mumbai, India
twinklebagdi@gmail.com

Sanjay Pawar, SM IEEE
Usha Mittal Institute of Technology,
SNDTWU
Mumbai, India
sanjay.pawar@umit.sndt.ac.in

Abstract—Agriculture is an essential industry in India. With the high number of intermediaries between farmers and consumers, there are several issues - transparency, commission, etc. - that need to be resolved. Krishi Bazaar is proposed with the goal for farmers to directly reach the consumers, removing the middlemen, an e-business initiative that will help the farmers with their yield and marketing, by setting up a store online. The frontend has been developed using Angular, the backend using Node.js, and MongoDB Atlas is used to store the data. Using Krishi Bazaar we found that it will also help maintain transparency in payments. The technology and design used in Krishi Bazaar are user-friendly and easy for all the stakeholders to transact on. Some of the entities used are proposed to be third-party integrations, to ensure cost-effectiveness.

Keywords—E-commerce Platform, Agriculture, Direct Trading, Farmer-to-Consumer, Bidding system, Farmer, Consumer

I. INTRODUCTION

E-commerce has eased the daily life of people, having a huge impact on three of the major shareholders: customers, organizations, and society. It has given customers the ability to gather information about various products and prices. E-commerce sales are increasing by a rate of 22% to 25% each year which indicates a momentous shift in consumer spending online. Agriculture e-commerce is still in its nascent stage where farmers are slowly shifting towards more technologically sound solutions. With the reforms put in place by the Indian Government, bulk buyers can buy produce directly from farmers without the need for intermediaries. This brings up new issues and challenges, the need for farmers to be connected with potential buyers as small-scale consumers have been shifting to e-commerce that deliver them their daily commodities. Farmers are expected to take advantage of all these new developments and need the platform for this purpose.

In this paper [1], it is proposed that farmers can connect with specialists who can give recommendations to maximize the crop yield and its quality. It also provides a complaint box to register grievances directly to the government. KNN algorithm is proposed to analyze the current market situation and SQL and PHP are used for data storage and connectivity respectively. Such modern techniques can be used by our proposed platform to provide the user the ability to explore and do an analysis of the current market situation for better decision-making to sell or purchase the crops.

The problems faced by country dwellers in terms of the educational curve, education hurdles, weak network infrastructure, issues of rural connectivity, etc. are highlighted in this paper [2]. The paper simultaneously also enlightens the potential of the growing rural e-commerce market. The event of the national rural "electric Internet plus agriculture" is proposed and events like the fundamental network facilities, e-commerce talent, "last mile" of the logistics problems and farmers, enterprises, and other aspects of the understanding of the prevailing problems within the development of rural electricity providers are analyzed. The strategies proposed [2] for developing e-commerce in rural areas can be implemented with our system to overcome the problems highlighted.

The main objective of the paper [3] is to assist farmers to ensure greater profitability through direct farming. The portal would guide the farmers to access new farming techniques, compare the present market rate of various products, the overall sale, and therefore the earned profit for the sold products. The paper proposes a way for farmers to sell their products across the country just with the basic knowledge about the way to use this website. The interface would allow viewing various products available and enables users to buy desired products instantly by online payment. Our system provides an implementation strategy to the idea proposed in the paper [3] and proposes modules and features that would enhance the proposed idea.

This paper [5] discusses how Information and Communication Technology (ICT) can assist a semantic web-based architecture to generate agricultural recommendations, using spatial data and agricultural knowledge bases. The cognitive content acts as a domain expert and sends recommendations to the farmers based on climate conditions and geographic data. Such recommendations would be very useful to our system as they would provide the farmer with the necessary aid in growing quality products.

The platform was proposed for the following reasons:

- Larger farmer client base for selling products at a reasonable price.
- Farmers’ markets can offer farmers more profit by selling to food processors, wholesalers, and large grocery companies.
- Products will need less transport, less refrigeration, less handling, and less time in storage.
- New distribution ways that help strengthen civic engagement by decreasing the social distances between urban and rural communities.
- Help local economic opportunities and the health, wellness in financially backward communities.

All these features thus increase the farmer’s economic opportunities and allow for more direct communication.

II. KRISHI BAZAAR PROPOSED SYSTEM ARCHITECTURE

Fig. 1. The architecture of Krishi Bazaar

Fig. 1 explanation: The architecture consists of the frontend, backend, and database. The frontend client will make and get requests from the backend (Krishi Bazaar service) which will reflect changes in the database. The database would contain all the data related to the model including authentication data, product data, consumer and farmer details, etc. The user requests would be processed, and appropriate queries would be made to the datastore in the backend. Using a 3-tier architecture like the one shown in figure 1 would ensure accuracy, modularity, and efficiency within the system.

Fig. 2. Frontend design

Fig. 2 explanation: The Frontend Architecture consists of the authentication, farmer portal, and consumer portal. The farmer portal will contain all functionalities required by farmers, which include adding products to the market, pickup module, shipments module, farmer bidding module, farmer aid module, etc. The consumer portal contains functionalities such as product catalogue, orders, cart, payment, consumer bidding, etc.

Fig. 3. Backend design

Fig. 3 explanation: In the frontend, the client sends HTTP requests to the backend. Such requests are processed by the backend module and then the data is stored or retrieved from the database and passed back to the client.

Fig. 4. Technology stack

Fig. 4 describes the proposed tech stack of the system. With Angular, scalability is achieved due to its great structure and architecture. It is modular and dependency injection is well supported. Thus, it is suitable for scaling. MongoDB Atlas is a cloud solution to host their database. It is suggested for large-scale applications which provide secure and scalable solutions. Node JS being a lightweight server can handle a large number of connections due to its non-blocking IO functionality. This helps handle a large number of server requests.

Fig. 5. Business logic overview

Fig. 5 explanation: The business logic consists of buyers and consumers purchasing groceries from the Krishi Bazaar App. The farmer can set the price according to their decided profit margins. The logistics will take care of transportation and storage of the goods in transit which needs to be included in the farmer module.

The proposed roles in the module would include:
- Farmer – Can access the farmer’s portal. Only a farmer can assume this role.
- Consumer - Can access the consumer’s portal. Farmers and consumers can both assume this role.
- New User - A user who hasn’t yet registered is a new user. The user can view the consumer homepage as well as browse through different products on the market. For using any other functionality, the user has to register.
III. CONTENT CONSTRUCTION

A. Setting up shop

This can be achieved by setting up an identity on the platform by registering as a farmer. The farmer can enter the details required like email address, phone number, name, farmer verification proof, and address and create an identity. The farmer would be able to add/delete a product with its image, name, description, base price, categories, discounts, and the pickup address. Products will be visible to a consumer user along with the farmer brand. The consumers would be able to search and filter the products offered. The system also consists of recommendations for different products based on their purchases and market analysis. The consumers will be able to add products to their cart as well as edit quantities, add the delivery address and proceed for the payment through the payment gateway interface.

B. Logistics

The logistics is responsible for the delivery of products from the source to the destination. The module may be integrated with a third-party service for its cost benefits. For the perishable goods, care is taken for developing the logistics algorithm. One of the ways is to offer/display only those products within a certain range to the customer which have a short shelf life. The farmer gets the information about logistics arrival for pick up and its details such as pickup date, the pickup person, pickup quantity, and the items. It will also be notified if there are any changes in the schedule via SMS, mails, etc. The tracking of the shipments by logistics is also provided to all concerned. Details of each order including the delivery date will be visible, done by the logistics team and would update the status of both pickups for farmers and orders placed by consumers.

C. The bidding system

The bidding system is suitable for bulk buyers who would like to bargain for a certain product. They will be able to bid on a product as well as view other bids. This will help them get products at a better price. The farmer can view bids as well as accept a bid. This will help the farmer sell excess produce or gain a good profit owning to bulk consumers.

D. The feedback mechanism

The consumer can give a rating and review only after having purchased a particular product. These are visible on each item’s page along with the average of all ratings as the item’s average rating. This ensures legitimate feedback from consumers which allows space for improvement on the farmer’s end and helps prospective buyers.

E. Farmer’s Aid

Farmer’s Aid allows farmers to educate themselves on various current trends in the agricultural sector. They should be able to see a variety of information that would help them in making future decisions regarding agriculture [6][7][8]. Currently, recommendations for farmers are supported by at least one interaction between farmers and experts and different experts have different recommendations. Recommendations may be provided to farmers using past agricultural activities with help of information mining concepts and the market trend may be merged with it to supply optimized results from the recommender [4]. Farmer’s aid also generates a report of daily updates, statistics, market analysis, orders, etc., and sends a notification at the end of the day. The module has a lot of scopes and with new emerging technologies, this feature would constantly be updated to help to produce quality products.

F. Market Analysis

The model is able to gather the current market’s analysis such as the monthly sales, distribution of the number of orders across the country, etc. This will help the system in making informed decisions with the data right in front of them.

G. Business model

The proposed business model is that of the standard e-commerce platform. It would include receiving a certain percentage of each transaction that takes place on its platform. Besides that, a nominal sum can be added for star sellers to be a part of the platform if it proves to be feasible. New versions of the module can be updated based on festive seasons, etc. to improve the margins and profits.

IV. EXPECTED OUTCOME

Farmers can put up a product with relevant details on the market and this product becomes available to the consumers. Consumers can buy a certain quantity of the product and place an order based on the discounting and shipping costs. The logistics will pick up the product from the product’s registered address and deliver the product to the given address. Thus, the cycle of offering the product by farmer and the purchase done by the customer is completed, the process of which is explained in the working of each module.
The system successfully fulfills the following:

- Transparent farmer-to-consumer communication through the interface.
- Showcase products to a virtually global customer base.
- Efficient browsing through the products on the portal with a variety of choices and options.
- Standard payment system.
- Standard tracking of orders.
- Bidding system for bulk buyers.
- Analysis of market and statistics of the offered products.
- Tools such as farmer aid for training and educating.
- Customer service and feedback mechanism for consumers to register complaints.

The proposed system has future scope for improvements. It can be deployed after working on certain features and can be hosted by using any hosting tool. The backend can be hosted on services like AWS (Amazon Web Services). The aim is to reach maximum customers which can be achieved by implementing the model as a mobile application, website, Progressive Web Applications, etc. As our customer base is from many localities, by enabling google translate and localization (scope), users can use this application easily without language barriers. By analyzing the market, farmers will be able to improve their brand and the company will be able to target the prospective buyers.

V. FUTURE CHALLENGES AND PROPOSED SOLUTIONS

There are some implementation challenges for future improvements. Farmers operate in the rural areas of India, with power failures and internet unavailability as regular occurrences. This can impact the efficiency of the model. Some farmers might not have adjusted to the digital world and might face problems navigating through the interface. Thus, there is a learning curve present for farmers to adapt to the interface. Besides this, the logistics of picking up produce from the farmers and delivering it to the consumers, while also allowing both to track the movement of goods, needs to be well structured and managed efficiently. Dealing with perishable goods is a significant challenge requiring proper solutions such as, maintaining the quality of goods, minimizing wastage of goods due to degradation of their quality, minimizing the cost for packaging of the goods, minimizing the cost of the transport such as refrigerated trucks required to deliver the goods, implementing an appropriate tailored logistics algorithm so that consumers who don’t need bulk orders can also be served efficiently, etc. need to be addressed and acted upon. Necessary strategies such as enabling the logistics to inform x days prior for pickup, summarized reviews on their products, etc. need to be incorporated. Apart from this, concerns regarding delivery service such as refund policies, return policies, delay in shipments, delay in pickups, and customer service need to be worked upon.

Fig. 7 explanation: As a farmer, the application would provide the user the means to register using relevant details and log in. They would be able to input produce details which entail details of the product and add the product to the market. They can change roles from farmer to consumer to browse the consumer’s portal. In the farmer role, they would be able to keep track of their sales and track their shipments and pickups with a suitable interface provided. Farmers would also be able to make use of the AID feature which would be responsible for suggesting the farmer with agriculture-related news, crop safety, and disease prevention suggestions, market statistics, etc. Farmers would also be able to put their stock for bidding, accept a bid and seal the deal flexibly. As a consumer, the user would be able to authenticate themselves and browse through the different products present in the market, by filtering them according to type, location, price, sub-varieties, etc. They can add necessary products to the cart, make online payments and track their orders. They would also be able to bid on products on the market. The logistics team would be able to update details about the products on the application interface.

Fig. 8 explanation: The consumer places an order which is received and stored in the order database. The farmer will get updated about which of his products are being ordered by who, to maintain transparency. The order will be processed and sent to the logistics team for handling the logistics part. The updates of order tracking status and the pickup status will be notified to the consumer and the farmer respectively. The order will be picked from the farmer and stored in various warehouses in between before it reaches the consumer at the given delivery address. The consumer can then confirm the delivery and the same will be notified to the farmer. Based on the consumer's orders, the consumer will be suggested other products as per their preferences.

Stakeholders for the system would involve:

- Farmers
- Consumers - Bulk buyers and end-users
- Entity implementing the system - government or private organizations and companies
VI. CONCLUSION

Krishi Bazaar with its main motto of “Fresh from Farm to your Doorstep” aims to achieve the goal of providing farmers with better opportunities to showcase their products and receive higher profit margins compared to what they are getting. An architecture has been proposed that reduces the middlemen’s role and its shares beneficial to both farmer and customer. The module has a variety of functionalities such as allowing farmers to upload details, view product statistics, track various shipments and pickups of orders and receive payment online directly on the platform. It also offers the process of bidding for the product. The ease due to online transactions and the availability of choices ensures a wider user reach which assists farmers in increasing their profit margin. Along with these functionalities, it is observed how farmers have a difficult time staying up to date with current affairs. Krishi Bazaar would provide farmers with a safe space to educate themselves on Government schemes and receive the appropriate assistance required. There is growing consumption of consumer-direct applications among farmers. It is the goal of this application to help farmers and have a positive impact on their training and the sale of their products.

REFERENCES


