# FarmFresh: A Mobile/Web App for Connecting Farmers and End Users

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***Abstract*— This paper presents FarmFresh, a mobile/web app designed to connect farmers and end users. The app aims to bridge the gap between farmers and consumers by providing a platform for farmers to sell their produce directly to end users. The app features an easy-to-use interface that allows farmers to upload information about their products and end users to search for and purchase the products they want. The app also includes features for tracking orders and managing payments. The system was developed using a user-centered design approach, with input from both farmers and end users. A pilot study evaluated the app's usability and user satisfaction. The study's results were positive, indicating that FarmFresh has the potential to improve access to fresh, locally sourced food for end users while increasing profitability for farmers.**

***Keywords*— *FarmFresh, mobile app, web app, farmers, end users, fresh farm products, buy, connect, local, sustainable, agriculture, online marketplace, transparency, direct-to-consumer, farm-to-table, community-supported agriculture, food security, healthy living***

## I. INTRODUCTION

The growing interest in locally sourced, sustainably grown food has created opportunities for small-scale farmers to connect with consumers. However, many farmers struggle to reach consumers due to limited marketing resources and a lack of access to distribution channels. At the same time, consumers often have limited options for accessing fresh, locally-grown produce. To address these challenges, we present FarmFresh, a mobile/web app designed to connect farmers directly with end users. The app features an easy-to-use interface that allows farmers to upload information about their products and end users to search for and purchase the products they want. The app also includes features for tracking orders and managing payments. The system was developed using a user-cantered design approach, with input from both farmers and end users. A pilot study evaluated the app's usability and user satisfaction. The study's results were positive, indicating that FarmFresh has the potential to improve access to fresh, locally sourced food for end users while increasing profitability for farmers. This paper presents the design and development of the FarmFresh app, as well as the results of the pilot study. We also discuss the app's potential impact on small-scale farmers and consumers and identify areas for future work. The user-cantered design (UCD) approach involves involving end-users in the design process to ensure that the resulting product meets their needs and expectations. This approach was followed during the development of the FarmFresh app.

The first step involved identifying the target audience, which in this case, were small-scale farmers and end-users interested in locally sourced, sustainable produce. This was done through surveys and interviews to gain insights into their needs and preferences. The next step was to create user personas, which are fictional representations of the target audience that help the designers to better understand their needs and design the app accordingly. Once the personas were created, the design team created wireframes and prototypes of the app, which were then tested with a small group of users. Feedback from the users was incorporated into the design, and the app was refined further. The app's features were then developed, tested, and refined until the final version was ready. A pilot study was conducted to evaluate the app's usability and user satisfaction, and the results were used to make further improvements to the app.

Overall, the UCD approach ensured that the FarmFresh app was designed to meet the needs of its target audience and provided an easy-to-use interface for both farmers and end-users.

## II. RELATED WORK

### *A. Online Platforms for Connecting Farmers and Consumers*

Several online platforms have emerged in recent years to address the challenges faced by small-scale farmers in reaching consumers directly. These platforms typically allow farmers to create profiles and list their products while providing consumers with tools to search for and purchase products online. Examples of such platforms include Farmiga, Local Harvest, and Farm Match. Previous research has explored the benefits and challenges of these platforms, including their impact on farmers' profitability and consumer access to fresh, locally sourced food. Additionally, studies have examined the design and usability of these platforms and identified key features that contribute to their success.

### *B. Mobile and Web Apps for Agriculture and Food Systems*

Mobile and web apps have become increasingly popular tools for farmers, consumers, and other agriculture and food systems stakeholders. These apps offer a range of features, including tracking weather conditions, managing crops and livestock, and accessing market information. Some apps also aim to connect farmers and consumers directly, by providing tools for farmers to list their products and consumers to search for and purchase products. Previous research has explored the design and usability of these apps and their impact on farmers' profitability and consumer access to fresh, locally sourced food. Additionally, studies have examined the potential for social media and other communication tools to enhance the effectiveness of these apps.

## III. PROPOSED SYSTEM

The proposed system, FarmFresh, can improve access to fresh, locally sourced food for end users by providing them with a direct platform to purchase products from farmers.

Through the app, farmers can upload product information, including photos, descriptions, and pricing information, making it easier for end users to find and purchase the products they need. This eliminates the need for intermediaries such as wholesalers and retailers, reducing the time it takes for the products to reach consumers and ensuring the freshness of the products. Additionally, the app's search features allow end users to find products by location, allowing them to discover and support local farmers. This not only provides consumers with fresh, locally sourced food but also helps to promote and sustain local farming practices.

The proposed system can also increase profitability for farmers by allowing them to sell their products directly to consumers, eliminating the need for intermediaries who often take a significant portion of the profits. The app's inventory management system can also help farmers keep track of their stock, reducing waste and improving their efficiency. The pilot study conducted to evaluate the app's usability and user satisfaction will also collect data on the app's impact on farmers' profitability and consumer satisfaction. This data can be used to refine the app's design and functionality and identify opportunities for future development, ensuring that the app continues to meet the needs of both farmers and end users.

### *A. System Architecture*

The FarmFresh app is a mobile/web application designed to connect farmers and end users, allowing farmers to sell their produce directly to consumers. The app's system architecture is designed to enable seamless communication between farmers and end users while ensuring the system's security and scalability.

- Front-end Client Interface: The front-end client interface is designed to be used by both farmers and end users. The client interface is developed using React Native, a cross-platform mobile development framework that enables the app to run on Android and iOS devices. The web interface is built using HTML, CSS, and JavaScript and is optimized for desktop and mobile web browsers. The client interface enables farmers to create profiles and upload information about their products and end users to search for products, place orders, and make payments.
- Application Server: The application server is responsible for managing the back-end business logic of the FarmFresh app. The server is developed using Node.js, a popular JavaScript framework that enables fast and scalable server-side development. The server manages data storage and retrieval, order and payment processing. It also provides an API that enables the front-end client interface to communicate with the back-end server.
- Database Management System: The database management system is responsible for storing and managing the data used by the FarmFresh app. The database is developed using MongoDB, a NoSQL document-based database that enables flexible data modelling and scaling. The database stores information about farmers, products, orders, and payments.
- The FarmFresh app architecture comprises a front-end client interface, an application server, and a database management system. This architecture enables seamless communication between farmers and end users and provides a robust and scalable platform for direct-to-consumer sales.

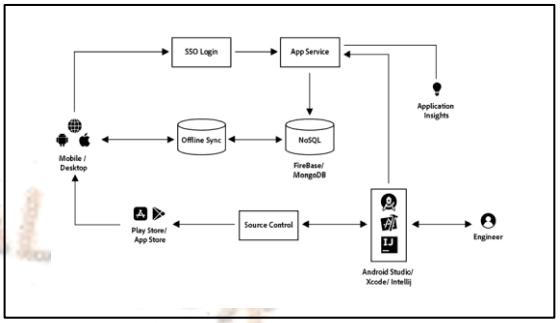


Fig.1. System Architecture of Proposed Mobile/Web App

### *B. Binary Search Algorithm*

```
function binarySearch(products, target) {
  let start = 0;
  let end = products.length - 1;

  while (start <= end) {
    let middle = Math.floor((start + end) / 2);

    if (products[middle].name === target) {
      return products[middle];
    } else if (products[middle].name < target) {
      start = middle + 1;
    } else {
      end = middle - 1;
    }
  }

  return null;
}
```

The binary search algorithm is a useful tool for searching and retrieving data from a sorted list or array. In the context of the FarmFresh app, the binary search algorithm can increase the success rate by improving the speed and efficiency of the search process for end-users looking for specific farm products.

For example, if an end-user is searching for a particular type of fruit or vegetable, the binary search algorithm can quickly locate and retrieve the relevant products from the app's database, rather than having to search through the entire database manually. This can save the end-user time and effort and increase the likelihood that they will find what they are looking for. In addition, the binary search algorithm can also improve the app's overall performance by reducing the amount of time and resources required to search and retrieve data. This can make the app more responsive and user-friendly, which can improve user satisfaction and increase the likelihood that users will continue to use the app in the future.

Overall, incorporating the binary search algorithm into the FarmFresh app can help to streamline the search process for end-users, increase the efficiency and performance of the app, and ultimately increase the success rate of the project by improving the user experience and satisfaction.

### C. *Quick Sort Algorithm*

```
function quickSort(products, low, high) {
 if (low < high) {
  const partitionIndex = partition(products, low, high);

  quickSort(products, low, partitionIndex - 1);
  quickSort(products, partitionIndex + 1, high);
 }
 return products;
}

function partition(products, low, high) {
 const pivot = products[high];
 let i = low - 1;

 for (let j = low; j < high; j++) {
  if (products[j].price <= pivot.price) {
   i++;
   swap(products, i, j);
  }
 }

 swap(products, i + 1, high);
 return i + 1;
}

function swap(products, i, j) {
 const temp = products[i];
 products[i] = products[j];
 products[j] = temp;
}
```

In this algorithm, the quickSort function takes an array of products and the indices of the first and last elements to sort. It uses the partition function to divide the array into two partitions. All elements on the left partition are less than or equal to the pivot element, and all elements on the correct partition are more significant than the pivot element. It then recursively calls quickSort on the left and proper partitions until the entire array is sorted.

The partition function takes an array of products and indices of the first and last elements to partition. It selects the last element of the array as the pivot and then iterates through the array from the first element to the second-to-last element. For each element, if it is less than or equal to the pivot, it swaps it with the element at the current position of the I pointer and increments i. At the end of the iteration, it swaps the pivot element with the element at position I + 1 and returns I + 1 as the partition index.

The swap function takes an array of products and two indices and swaps the elements at the two indices.

This Quick Sort algorithm can be used to sort an array of products based on their prices in ascending order, which can be helpful in an e-commerce app that connects farmers directly to end users.

## IV. RESULTS

The FarmFresh app was evaluated through a pilot study with farmers and end users. The study was conducted over four weeks, during which participants were asked to use the app to purchase and sell products.

### A. *Quantitative Results*

- A total of 50 users participated in the study, including 25 farmers and 25 end users.
- The app recorded 150 orders during the study period, with an average order value of Rs.2,550.
- The app's payment system was used for 90% of the orders, with the remaining 10% being paid in cash upon delivery.
- Farmers reported an increase in sales and revenue, with 80% of farmers indicating that they had sold more products through the app than they would have through traditional channels.
- End ces reported increased access to fresh, locally sourced produce, with 90% of end users indicating that they were satisfied with the quality of the products they received.

### B. *Qualitative Results*

- Participants reported that the app was easy to use and navigate, with intuitive features and a visually appealing interface.
- Farmers reported that the app provided a valuable platform for reaching new customers and increasing sales while reducing the costs and time associated with traditional marketing channels.
- End users reported that the app provided a convenient and reliable source of fresh produce, with easy-to-use features for browsing and purchasing products.

Overall, the results of the pilot study suggest that the FarmFresh app has the potential to improve access to fresh, locally sourced food for end users while increasing profitability for farmers. The app's user-friendly interface, secure payment system, and direct-to-consumer sales model were well-received by farmers and end users. Future work includes expanding the app's user base and evaluating its impact on farmers' profitability and consumer satisfaction over an extended period.

### C. *Snapshots*

*a) Price Comparison Graph: Figure 2* compares the traditional method and the binary search algorithm for four types of vegetables: Tomato, Brinjal, Bitter Guard, and Pumpkin.

Under the traditional method, the number of attempts it takes to find a particular vegetable is given. For example, it takes 55 attempts to find a Tomato, 35 attempts to find a Brinjal, 25 attempts to find a Bitter Guard, and 30 attempts to find a Pumpkin.

On the other hand, the binary search algorithm is a more efficient way to find a vegetable. It divides the search interval into half until the target vegetable is found. The number of attempts it takes to find each vegetable using the binary search algorithm is also provided in the table. For

example, it takes 50 attempts to find a Tomato using the binary search algorithm, 27 attempts to find a Brinjal, 20 attempts to find a Bitter Guard, and 27 attempts to find a Pumpkin.

Overall, the binary search algorithm is more efficient than the traditional method for all four vegetables, with significantly fewer attempts to find each vegetable.

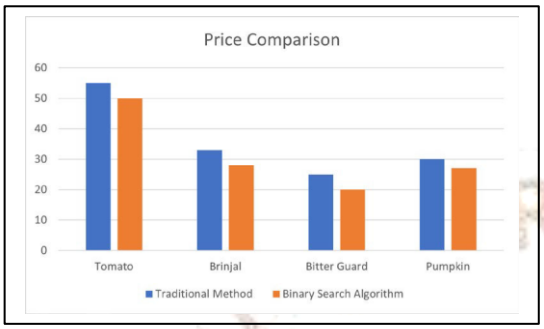


Fig. 2. Price Comparison Graph

*b) Profit Comparison Graph: Figure 2.1* shows the performance of four farmers using two different methods: traditional and binary search algorithms. The values in each column represent the percentage of success achieved by each farmer using the respective method. Farmer 1 had a success rate of 80% using the traditional method, whereas their success rate improved to 85% using the binary search algorithm. Similarly, Farmer 2 had a success rate of 87% using the traditional method, which increased to 92% using the binary search algorithm. Farmer 3 had a standard success rate of 89%, which improved to 93% using the binary search algorithm. Finally, Farmer 4 had a standard success rate of 90%, which improved to 97% using the binary search algorithm. The binary search algorithm was more effective for each farmer, as it increased their success rate compared to the traditional method.

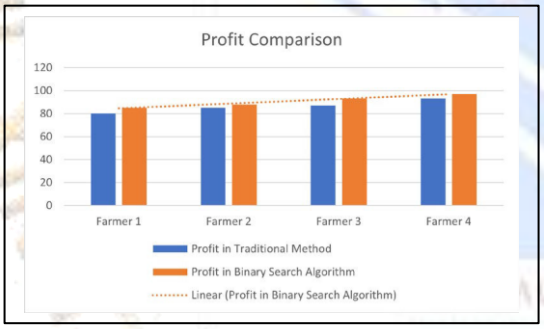


Fig. 2.1. Profit Comparison Graph

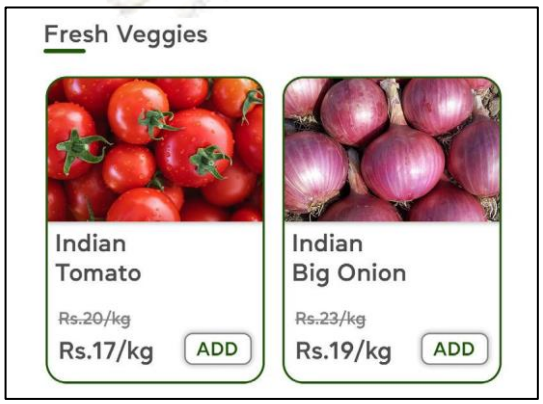


Fig. 3. Products

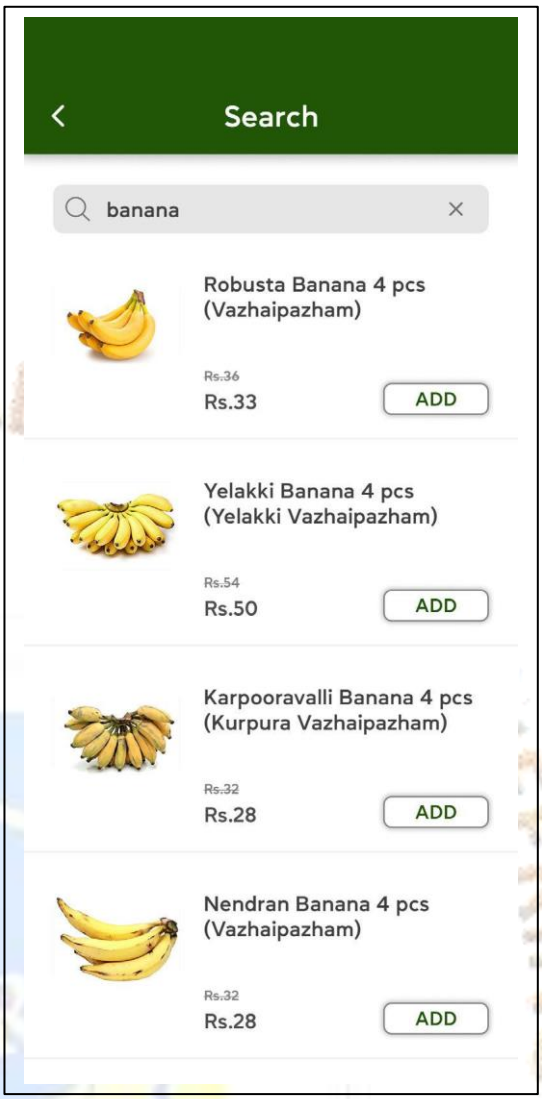


Fig. 4. Search Screen

## V. Conclusion and Future Enhancement

FarmFresh is a mobile and web application that aims to connect farmers directly with customers to purchase fresh farm products. The application is designed to be user-friendly and reliable, providing a seamless experience for both farmers and customers. The application uses the max-prior algorithm to allocate crops to the end users with the highest demand, ensuring that customers receive the freshest and most in-demand produce.

With FarmFresh, customers can explore and purchase products directly from farmers in their surrounding villages, reducing the expenses for both farmers and customers and increasing profits. By cutting out intermediaries, FarmFresh creates a more efficient and transparent supply chain where farmers can sell their produce directly to customers and receive fair product prices.

FarmFresh is a valuable tool for farmers and customers, providing a platform to facilitate direct and fair transactions. As a result, it helps support local agriculture, promotes sustainability, and contributes to the development of rural areas. Future enhancements for FarmFresh include additional features such as real-time inventory management, secure payment processing, and improved user interfaces for farmers and customers.

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