

CropCart: An Implementation Approach Where Farms Meet Families

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Abstract- CropCart Management System is a digital platform designed to connect farmers directly with consumers (families) without the involvement of middlemen. In the traditional agricultural system, farmers often receive low prices for their produce, while consumers end up paying higher prices. This happens due to the long supply chain and lack of direct communication between farmers and buyers. The main aim of CropCart is to create a simple and efficient system where farmers can upload their products, set prices, and sell directly to customers. On the other hand, consumers can browse fresh fruits, vegetables, and other farm products, and purchase them easily from nearby farms. This ensures better profit for farmers and fresh, affordable products for customers. The system uses basic digital technologies to manage product listings, orders, and user details. It also improves transparency by providing information about the source of products, which builds trust among users. By reducing intermediaries and simplifying the supply chain, CropCart helps in minimizing wastage and improving efficiency. Overall, CropCart Management System is a step towards smart agriculture and digital transformation, making the farming business more sustainable and beneficial for both farmers and consumers. **Keywords:** Crop Management, Farm Records, Crop Monitoring, Sustainable Farming, Yield Analysis, Agri-Tech.

Keywords: Internet of Things (IoT), Environmental Monitoring, Artificial Intelligence, Sensor Networks, Data Analytics, Smart Systems.

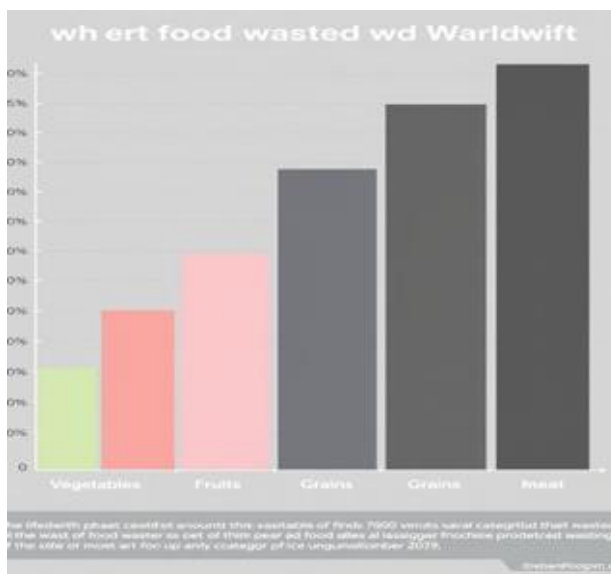


I. INTRODUCTION

The global food supply chain, though advanced in many ways, remains deeply flawed at its core especially when it comes to serving the needs of small-scale farmers and everyday consumers. Around the world, farmers struggle to get fair prices for their hard-earned produce, while families in urban and semi-urban areas often find it difficult to access fresh, affordable fruits and vegetables. What sits in the middle is a network of intermediaries, outdated logistics, and inefficient market systems

that end up creating more harm than good. This is the foundation upon which the CropCart idea was built: a vision to directly connect farms to families, without all the unnecessary roadblocks. Imagine a farmer waking up at dawn, harvesting fresh produce, and being able to sell it that same day directly to a family nearby, without the stress of haggling with middlemen or losing out due to transport delays [Now imagine a mother shopping for groceries online and receiving a basket of vegetables harvested just hours ago, delivered to her doorstep from a farm just a few kilometres away. That's the power of CropCart. It's not just a platform it's a bridge. A bridge that connects supply with demand, growers with eaters, and rural with urban. This concept addresses two of the most important issues in the agricultural world today: food accessibility and farmer profitability. The global food supply chain, though technologically advanced in many aspects, still faces significant challenges when it comes to efficiency, fairness, and accessibility. A major issue lies in the imbalance between farmers' earnings and consumer costs. While consumers often pay high prices for

agricultural products, farmers receive only a small portion of that amount due to the involvement of multiple intermediaries such as wholesalers, distributors, and retailers. In many traditional agricultural systems, farmers depend heavily on local markets and middlemen to sell their produce. These intermediaries control pricing, leading to situations where farmers are forced to sell their crops at lower rates, especially during peak harvest seasons. At the same time, consumers in urban and semi-urban areas struggle to access fresh, high-quality, and affordable food, as products go through long supply chains before reaching them.



Another major challenge is the lack of transparency in the agricultural market. Farmers often do not have access to real-time pricing information, while consumers are unaware of the origin and quality of the products they purchase. Additionally, inefficiencies in transportation and storage result in food wastage, further increasing the gap between supply and demand. With the rise of digital technologies and internet accessibility, there is a growing opportunity to transform the agricultural sector through e-commerce solutions. Digital platforms have already revolutionized industries such as retail, transportation, and banking. Applying similar concepts to agriculture can significantly improve both farmer profitability and consumer satisfaction. This is the foundation upon which the CropCart system is built. CropCart aims to create a

direct connection between farmers and families, eliminating unnecessary intermediaries and reducing inefficiencies in the supply chain. It introduces a farm-to-family model, where agricultural products move directly from the producer to the consumer with minimal delay. Imagine a farmer harvesting fresh vegetables in the morning and listing them on an online platform. A nearby family can view the product, place an order, and receive it within a short time. This reduces storage time, transportation delays, and ensures maximum freshness. At the same time, the farmer earns a fair price for the produce, improving their financial stability. CropCart is not just a technological solution but also a social and economic innovation. It promotes:

- Fair trade practices
- Sustainable agriculture
- Local economic development
- Digital inclusion for farmers

The system leverages web technologies such as PHP, MySQL, HTML, CSS, and JavaScript to create a user-friendly and efficient platform. It integrates essential features like user authentication, product management, order processing, and administrative control. Furthermore, CropCart supports the concept of smart agriculture, where technology is used to improve productivity, reduce waste, and enhance market access. By connecting rural farmers with urban consumers, the platform helps bridge the rural-urban divide and contributes to a more balanced economic system. In conclusion, CropCart represents a modern approach to solving traditional agricultural problems by combining technology, transparency, and direct interaction between producers and consumers. Agriculture has always been the backbone of many economies, especially in countries like India where a large portion of the population depends on farming for their livelihood. Despite its importance, the agricultural sector continues to face several long standing challenges related to pricing, distribution, and accessibility. One of the most critical issues is the imbalance in the food supply chain, where farmers often receive minimal returns for their produce while consumers end up paying significantly higher prices. This gap is mainly caused by the presence of multiple intermediaries, inefficient market structures, and lack of direct communication between producers and consumers.

CropCart is developed as a solution to these challenges by introducing a farm-to-family digital marketplace. The core idea behind CropCart is to enable farmers to sell their products directly to customers through an online platform. This approach ensures that farmers receive fair prices for their produce while customers gain access to fresh, affordable, and high-quality agricultural products. By eliminating unnecessary intermediaries, the system simplifies the supply chain and enhances transparency in transactions. The agricultural sector is undergoing a gradual transformation with the increasing adoption of digital technologies. However, despite this progress, a significant gap still exists between production at the farm level and consumption at the household level. This gap is not just physical but also informational and economic. Farmers often operate in isolation, relying on traditional selling methods, while consumers depend on retail markets without knowing the true source of their food. This disconnect creates inefficiencies that affect pricing, quality, and accessibility.

II. THEORY

2.1 Overview

CropCart is a digital platform designed to connect farmers directly with families or consumers. In the traditional agricultural system, farmers usually sell their crops through middlemen, which reduces their profit and increases the price for consumers. CropCart helps to solve this problem by creating an online marketplace where farmers can sell their fresh produce directly to customers. Through the CropCart platform, farmers can upload details about their crops such as type, quantity, price, and availability. Families or consumers can browse the products, compare prices, and place orders easily. This system ensures that farmers receive a fair price for their produce while customers get fresh and affordable agricultural products. The main aim of CropCart is to reduce the gap between farms and families by using modern technology. It improves transparency in the agricultural supply chain and supports farmers economically. The system can be developed as a web or mobile application and includes modules for farmers, customers, and administrators to manage the entire process efficiently. CropCart is designed as

a comprehensive digital platform that creates a direct and efficient connection between farmers and consumers, aiming to modernize the traditional agricultural supply chain. In the conventional system, agricultural products pass through multiple layers such as wholesalers, distributors, and retailers before reaching the end consumer. This process not only increases the final cost of products but also reduces the share of profit received by farmers. CropCart addresses this issue by providing a centralized online marketplace where farmers can directly showcase and sell their produce to families, thereby ensuring a more transparent and fair trading system. The platform operates through a web-based interface that allows users to interact with the system seamlessly. Farmers can register themselves on the platform and, once verified, gain access to features that enable them to upload detailed information about their products. This includes the type of crop, price, quantity available, harvest date, and product images. By providing such detailed information, the system enhances trust and allows customers to make informed purchasing decisions. 5 The ability to update product details in real-time ensures that the information available to consumers is always accurate and current. On the other hand, customers can explore a wide range of agricultural products listed by different farmers. The system provides an intuitive browsing experience where users can view product details, compare prices, and select items based on their preferences. Once a product is selected, customers can place orders easily through the platform. The order management system ensures that the request is communicated directly to the respective farmer, who can then accept or reject the order based on availability. This direct interaction minimizes delays and improves efficiency in the transaction process.

The platform acts as an e-commerce solution specially designed for the agriculture sector. Farmers can register themselves on the platform, upload details about their crops and products, and sell them directly to families through a mobile application or website. Customers can browse different agricultural products such as fruits, vegetables, grains, dairy products, and organic items, compare prices, and place orders online from the comfort of their homes.

This direct communication between producers and consumers creates trust and improves the overall efficiency of the agricultural supply chain.

CropCart is not only a business platform but also a social and economic initiative that supports farmers by providing them with better market access. Many farmers face challenges such as unstable market prices, delayed payments, and product wastage due to lack of buyers. By using CropCart, farmers gain access to a wider customer base and can sell their products at fair prices without depending entirely on local markets. This helps in increasing their income and improving their standard of living. At the same time, families benefit by receiving fresh, healthy, and high-quality farm products at reasonable prices. The implementation approach of CropCart mainly focuses on digital transformation in agriculture. With the growth of internet services, smartphones, and digital payment systems, it has become easier to connect rural farmers with urban consumers. CropCart uses modern technologies such as web applications, mobile apps, cloud databases, and online payment gateways to create a smooth and secure shopping experience. Farmers can update product availability in real time, while customers can track orders, make digital payments, and receive delivery updates instantly.

Another important aspect of CropCart is supply chain management. The system helps in reducing food wastage and improving delivery efficiency. In traditional systems, agricultural products pass through multiple stages before reaching consumers, which often affects freshness and quality. CropCart shortens this process by enabling direct delivery from farms to homes. This ensures that products remain fresh and nutritious while reducing transportation and storage costs.

CropCart also promotes sustainable agriculture and supports local farming communities. By encouraging consumers to buy directly from nearby farmers, the platform strengthens local economies and promotes the consumption of fresh local produce. It can also motivate farmers to adopt organic and eco-friendly farming practices because customers increasingly prefer healthy and chemical-free food products.

The platform can include several advanced features such as multilingual support, GPS-based delivery tracking, AI-based crop recommendations, customer reviews, and smart inventory management. These features improve user experience and make the platform more efficient and scalable. CropCart can further expand into areas such as wholesale supply, restaurant partnerships, and export opportunities, creating a larger agricultural ecosystem.

In today's digital era, CropCart represents an innovative approach that combines agriculture with technology to solve real-world problems faced by farmers and consumers. It bridges the gap between rural production and urban demand by creating a reliable and transparent marketplace. The system contributes to economic growth, supports rural development, and encourages the adoption of smart agricultural practices. Overall, CropCart is a powerful implementation approach where farms truly meet families through technology, convenience, and direct connectivity.

2.2 Problem Statement

The agricultural sector faces several challenges in connecting farmers directly with consumers. In the traditional supply chain system, agricultural products pass through multiple intermediaries such as wholesalers, distributors, and retailers before reaching families. Due to the involvement of these middlemen, farmers often receive low prices for their produce, while consumers pay higher market prices. This creates an imbalance in profit distribution and reduces the economic growth of farming communities.

Farmers also face difficulties such as limited market access, lack of transparent pricing, delayed payments, product wastage, and insufficient storage and transportation facilities. Small-scale farmers especially struggle to reach a larger customer base because they mainly depend on local markets. At the same time, consumers face problems in obtaining fresh, healthy, and affordable farm products directly from trusted sources.

In rural areas, limited digital awareness, poor internet connectivity, and lack of technical infrastructure

further increase the gap between farms and families. Existing agricultural marketing systems do not provide efficient communication, real-time product availability, or direct interaction between producers and consumers. As a result, there is inefficiency in supply chain management, higher operational costs, and reduced product freshness.

Therefore, there is a need for a digital platform that directly connects farmers with families, ensures transparent pricing, reduces dependency on intermediaries, minimizes food wastage, and improves the overall agricultural supply chain. CropCart is proposed as an implementation approach that uses modern technology to provide farmers with direct market access while enabling consumers to purchase fresh farm products conveniently through an online system. The platform aims to create a sustainable, efficient, and user-friendly farm-to-family marketplace that benefits both farmers and consumers.

Product wastage is also a major challenge in the agricultural sector. Fruits, vegetables, dairy products, and other perishable goods require proper storage and timely transportation. However, due to inefficient logistics systems, inadequate cold storage facilities, and delays in market distribution, a significant amount of agricultural produce gets spoiled before reaching consumers. This not only causes financial losses for farmers but also affects food availability and increases overall supply chain costs.

III. SYSTEM ARCHITECTURE

3.1 Overview

The system architecture of CropCart is designed to provide a structured and efficient framework that enables direct interaction between farmers and families through a digital platform. The architecture defines how different components of the system communicate, process data, and perform operations to ensure smooth functioning of the application. CropCart follows a technology-driven architecture that integrates users, databases, servers, payment systems, and delivery services into a unified agricultural marketplace.

The primary objective of the system architecture is to create a reliable and scalable environment where farmers can easily manage agricultural products and consumers can conveniently purchase fresh farm produce online. The architecture ensures proper coordination between all modules of the system while maintaining data security, operational efficiency, and user satisfaction.

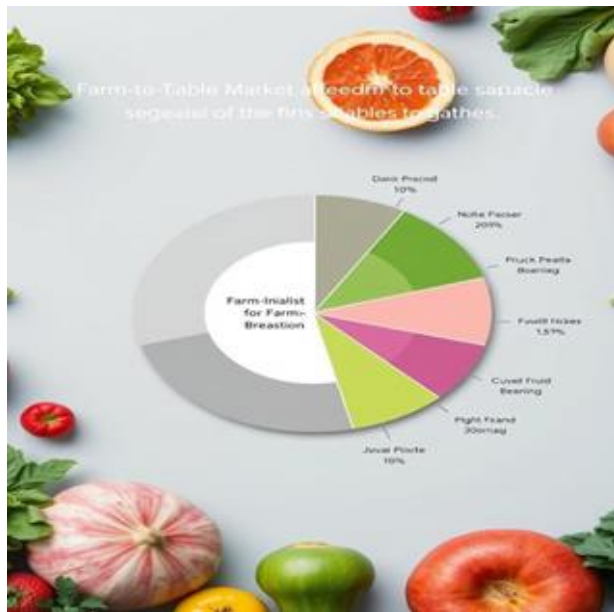
CropCart mainly follows a multi-layered architecture approach in which each layer performs a specific function. The first layer is the presentation layer, which acts as the user interface for farmers, customers, and administrators. Through this layer, users interact with the system using mobile applications or web platforms. Farmers can upload product details, manage inventory, and monitor orders, while customers can browse products, place orders, and make payments. The interface is designed to be simple, interactive, and user-friendly to support users with different levels of technical knowledge.

The second layer is the application or business logic layer, which acts as the core processing unit of the system. This layer handles all operations and decision-making processes within CropCart. It processes customer requests, verifies product availability, manages user authentication, handles order placement, and coordinates payment and delivery operations. The business logic layer ensures smooth communication between the front-end interface and the database system. It also manages notifications, transaction validation, and system rules required for proper platform functionality.

The database layer forms another important component of the architecture. It stores all information related to farmers, customers, products, transactions, inventory, and delivery details. The database system ensures secure storage and fast retrieval of data whenever users interact with the platform. Proper database management helps maintain consistency, accuracy, and real-time synchronization of information across the system. An essential part of the CropCart architecture is the payment integration module. This module allows customers to perform secure online transactions

using digital payment methods such as UPI, debit cards, credit cards, and mobile wallets. Secure payment gateways are integrated into the system to protect financial information and ensure smooth transaction processing.

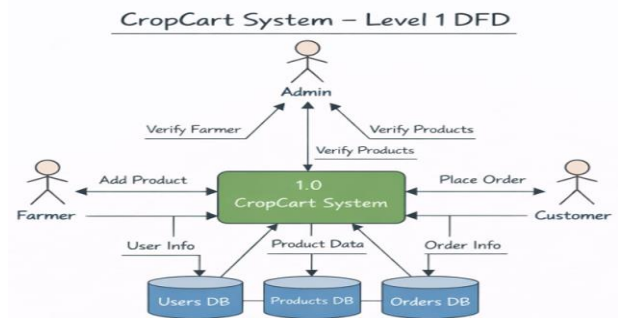
The delivery and logistics component is also an important part of the architecture. This module manages product transportation from farms to families. It handles delivery scheduling, route management, and order tracking to ensure timely delivery of fresh agricultural products. The integration of real-time tracking systems improves customer trust and enhances operational efficiency. Security mechanisms are integrated throughout the system architecture to protect user data and maintain system reliability. Authentication systems, encrypted passwords, secure payment protocols, and access control methods are used to prevent unauthorized access and ensure data privacy. These security features are necessary to build trust among users and maintain the integrity of the platform.



Overall, the system architecture of CropCart creates a well-organized and integrated digital ecosystem that supports direct farm-to-family interaction. By combining front-end applications, backend processing, secure databases, payment systems, and logistics management, the architecture ensures efficient communication, transparency, and smooth

operation of the agricultural marketplace. This technological framework plays a significant role in modernizing agricultural marketing systems and promoting digital transformation in agriculture.

3.2 System Architecture



The given diagram represents the Level 1 Data Flow Diagram (DFD) of the CropCart system. A Data Flow Diagram is a graphical representation used to describe how information moves within a system. It explains the interaction between users, processes, and databases and shows how data is collected, processed, stored, and transferred from one component to another. In the CropCart system, the architecture is designed to create a direct digital connection between farmers and families through an organized and efficient online platform.

The architecture mainly focuses on improving agricultural marketing by eliminating unnecessary intermediaries and creating a transparent communication system between producers and consumers. The CropCart system acts as a central processing platform where all activities such as product management, user management, order processing, and database operations are handled in an integrated manner. The system architecture ensures smooth communication between farmers, customers, administrators, and storage systems while maintaining operational efficiency and data security.

At the center of the architecture is the CropCart System, which acts as the core processing unit of the entire platform. This central system receives requests

from farmers, customers, and administrators and processes them according to the business logic of the application. It manages all system functionalities including product uploads, customer orders, product verification, order management, and data storage. The CropCart system acts as an intermediary communication layer between users and databases, ensuring proper coordination and real-time information flow.

The Farmer is one of the major external entities in the architecture. Farmers use the system to add agricultural products such as fruits, vegetables, grains, and dairy products. Through the digital interface, farmers can upload product details including product name, quantity, pricing, quality information, and availability status. This information is transmitted to the CropCart system, where it is processed and stored in the Products Database. The farmer module allows producers to directly participate in digital commerce without depending completely on traditional marketplaces and intermediaries.

The architecture also includes the Customer entity, representing families or buyers who purchase agricultural products from the platform. Customers interact with the system by browsing available products, selecting required items, and placing orders online. The CropCart system processes customer requests, verifies product availability, calculates pricing, and stores order-related information in the Orders Database. This digital interaction provides convenience to customers by enabling online purchasing and home delivery of fresh agricultural products.

An important component of the system architecture is the Admin Module. The administrator is responsible for controlling and monitoring the activities within the system. The admin verifies farmers and products before they become available on the platform. This verification process is important because it helps maintain product quality, prevents fraudulent activities, and builds trust between farmers and customers. The administrator also monitors order processing, manages user

accounts, and ensures the smooth functioning of the entire platform.

The architecture contains multiple databases to store and manage system information efficiently. The Users Database (Users DB) stores information related to farmers, customers, and administrators. This database contains user details such as names, contact information, login credentials, and account records. It supports authentication and user management functions within the system.

The Products Database (Products DB) stores all information related to agricultural products uploaded by farmers. It contains product names, prices, quantities, descriptions, categories, and stock availability. Whenever customers browse products or place orders, the CropCart system retrieves product details from this database. The separation of product data into a dedicated database improves data organization and retrieval efficiency.

The Orders Database (Orders DB) stores all order-related information generated through customer purchases. This includes customer order details, order status, transaction records, payment information, and delivery details. The Orders Database helps track and manage all purchasing activities within the platform. It ensures that customer orders are processed accurately and delivery operations are properly coordinated.

The data flow within the architecture follows a systematic process. Initially, farmers upload product information into the system. The CropCart system receives this information and stores it in the Products Database after admin verification. Customers then browse the available products and place orders through the platform. The system processes these orders and stores order information in the Orders Database. User-related information is simultaneously managed within the Users Database. The administrator supervises all activities to maintain system reliability and operational transparency.

The architecture is designed using a centralized processing model, where the CropCart system acts as the main communication hub connecting all entities and databases. This design improves system

coordination and ensures efficient management of agricultural transactions. By separating user data, product data, and order data into different databases, the system achieves better scalability, organized data storage, and faster information retrieval.

Another important theoretical aspect of this architecture is its support for digital transformation in agriculture. The system integrates e-commerce concepts, database management systems, online communication, and digital transaction processing into the agricultural domain. It creates a modern agricultural ecosystem where technology helps farmers increase market access and consumers receive better purchasing experiences.

The architecture also supports transparency and traceability. Customers can identify product sources, while farmers gain direct access to consumers without relying entirely on intermediaries. The admin verification process increases trust and ensures quality control within the system. Additionally, the digital storage of user, product, and order information enables proper record maintenance and business analysis.

Security and data management are also important theoretical considerations within the system architecture. User authentication mechanisms, secure database storage, and controlled administrative access help protect sensitive information and maintain the integrity of transactions. The architecture can further be enhanced using cloud computing, Artificial Intelligence, and real-time analytics to improve scalability and system performance.

Overall, the system architecture of CropCart represents a structured digital framework that integrates farmers, customers, administrators, and databases into a single agricultural marketplace. The architecture supports efficient communication, organized data management, secure transactions, and direct farm-to-family connectivity. By combining agricultural operations with modern digital technologies, CropCart provides an effective implementation approach for improving agricultural marketing systems and promoting sustainable digital agriculture.

3.3 Features

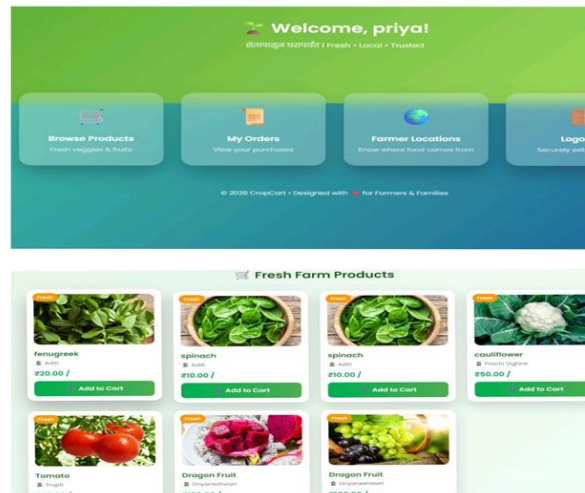


Figure 4 Chest Disease Detection System Output

The CropCart system is designed as a digital agricultural marketplace that connects farmers directly with families through an online platform. The features of the system are developed to improve agricultural marketing, simplify online purchasing, increase farmer profitability, and provide customers with fresh and affordable farm products. The platform combines modern e-commerce technology with agricultural services to create a smart and efficient farm-to-family ecosystem.

One of the major features of CropCart is its user-friendly interface. The system provides a simple and attractive dashboard that allows users to navigate different services easily. The interface is designed to support both farmers and customers, including users with limited technical knowledge. The dashboard organizes all functionalities such as product browsing, order management, farmer information, and account settings in a structured manner. A user-friendly environment improves accessibility and encourages more people to adopt digital agricultural platforms.

Another important feature of CropCart is the product browsing and management system. Farmers can upload agricultural products such as vegetables, fruits, grains, and dairy items into the platform. Product details including images, pricing, quantity, and descriptions are displayed in an organized

format. Customers can browse products, compare prices, and select items according to their requirements. This feature creates an online marketplace where agricultural products are presented similarly to modern e-commerce platforms.

The system also includes an Add to Cart functionality, which allows customers to select multiple products before placing an order. This feature improves customer convenience by enabling users to manage their purchases efficiently. Customers can review selected products, modify quantities, and proceed to checkout through a smooth purchasing process. The cart management feature simplifies online shopping and improves the overall user experience.

CropCart provides a My Orders module, which helps customers track and manage their purchase history. Through this feature, users can view current orders, previous transactions, delivery status, and product details. Order tracking increases transparency within the system and helps customers monitor the progress of their purchases. This feature also improves customer trust and satisfaction by providing real-time order information.

One of the unique features of CropCart is the Farmer Location and Identification system. The platform displays farmer names and locations along with products, allowing customers to know where their food products originate. This direct visibility increases transparency and strengthens the connection between farmers and families. Customers gain confidence regarding product quality and authenticity, while local farmers receive recognition for their produce.

The system architecture also supports transparent pricing mechanisms. Product prices are clearly displayed to customers without hidden charges. Farmers have the freedom to set fair prices for their products, while customers can compare prices and make informed purchasing decisions. Transparent pricing reduces exploitation by intermediaries and creates a balanced marketplace for both producers and consumers.

CropCart includes a fresh product identification feature, where products are marked as fresh or locally produced. This helps customers identify healthy and high-quality farm products easily. Since modern consumers increasingly prefer organic and fresh produce, this feature supports better customer decision-making and promotes healthier food consumption.

The platform also provides secure user account management through login and logout features. Authentication mechanisms help protect user information and maintain secure access to the system. Secure account management is important for maintaining privacy, protecting transaction details, and preventing unauthorized access.

Another major feature is the system's support for digital agriculture and e-commerce operations. CropCart integrates technologies such as online product management, electronic ordering systems, digital communication, and database management into agricultural business processes. This digital transformation modernizes traditional farming markets and creates new business opportunities for farmers.

The platform can also support online payment integration, allowing customers to make secure digital transactions through methods such as UPI, debit cards, credit cards, and mobile wallets. Digital payment systems improve transaction speed, reduce dependency on cash handling, and increase operational efficiency within the marketplace.

The CropCart system additionally supports scalability and future expansion. Advanced technologies such as Artificial Intelligence, Machine Learning, GPS tracking, and cloud computing can be integrated into the platform to improve system performance. Future enhancements may include smart product recommendations, multilingual support, automated inventory management, customer reviews, and real-time delivery tracking.

The feature set of CropCart also contributes to better supply chain management. By directly connecting farmers with consumers, the platform reduces transportation delays and minimizes food wastage.

Fresh agricultural products can reach customers more quickly, improving product quality and reducing storage-related losses.

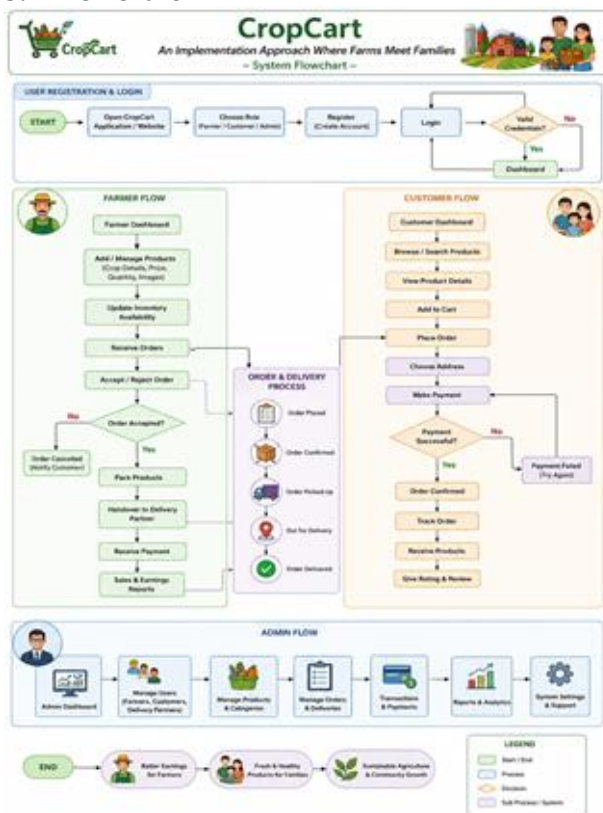
Overall, the features of CropCart create a comprehensive digital ecosystem that supports efficient communication, transparent business operations, and direct farm-to-family interaction. The system combines agricultural services with modern technology to improve customer convenience, increase farmer income, and promote sustainable agricultural development. Through its various functionalities, CropCart represents a modern implementation approach that transforms traditional agricultural marketing into a smart and technology-driven platform.

management, customer purchasing, delivery handling, payment processing, and administrative monitoring into a single ecosystem.

The system flowchart represents the complete operational workflow of the CropCart application. It explains how users interact with the system, how products are managed, how orders are processed, and how deliveries are completed successfully. The architecture demonstrates an organized flow of information between different modules such as farmer flow, customer flow, order and delivery process, and admin management.

The system flowchart represents the complete workflow and operational structure of CropCart. It explains how different users interact with the platform and how information flows through the system from product listing to final delivery. The flowchart is divided into several major sections including User Registration and Login, Farmer Flow, Customer Flow, Order and Delivery Process, and Admin Flow. Each module performs a specific function and collectively contributes to the successful operation of the system.

3.4 Flowchart



IV. EXPERIMENTAL SETUP AND RESULTS

The experimental setup of CropCart was designed to analyze the effectiveness, performance, and practical implementation of the proposed digital agricultural marketplace. The purpose of the experimental setup was to evaluate how efficiently the system connects farmers with families, manages agricultural products, processes customer orders, and improves the traditional agricultural supply chain through the use of modern technology. The setup focused on testing the various modules of the system under simulated real-world conditions to ensure proper functionality, security, usability, and operational efficiency.

The CropCart system is a digital agricultural marketplace designed to directly connect farmers with customers through an online platform. The main objective of this system is to eliminate unnecessary middlemen, provide fair pricing to farmers, and ensure fresh agricultural products reach families efficiently. The platform integrates farmer

The CropCart platform was implemented as an online system consisting of three primary users: farmers, customers, and administrators. Each user was provided with specific functionalities according to their role within the system. Farmers were allowed to register and upload agricultural products, customers could browse and purchase products online, and administrators managed product

verification and monitored system activities. The experimental environment was created to test the communication and interaction between these users and the central CropCart system.

The system architecture used during experimentation included a presentation layer, application layer, and database layer. The presentation layer provided the user interface through web or mobile applications, enabling users to interact with the system easily. The application layer processed user requests, managed business logic, handled order processing, and coordinated communication between different modules. The database layer stored user information, product details, order records, and transaction data securely. These layers worked together to ensure smooth system operation and efficient data management.

The experimental setup involved the use of modern software technologies and database systems. The front-end interface was designed using web technologies to provide an interactive and user-friendly experience. Backend technologies were used to process data, manage user authentication, and handle order processing operations. Database systems such as MySQL or MongoDB were used for storing and retrieving information related to users, products, and orders. Secure authentication mechanisms and password encryption techniques were included to maintain system security and data privacy.

During the experimental process, sample agricultural products such as fruits, vegetables, grains, and dairy items were uploaded into the platform by farmers. Customers used the system to browse products, compare prices, add items to the cart, and place orders. The admin module verified farmer accounts and approved products before they became visible to customers. This verification process helped maintain product quality and system transparency.

The experimentation also included testing of the order processing system. When customers placed orders, the CropCart system verified product availability, updated inventory levels, stored order information in the database, and initiated the delivery process. The payment integration system

was also evaluated by testing secure digital transaction methods such as UPI, debit cards, and online payment gateways. Order tracking and notification features were tested to ensure proper communication between customers and the platform.

Several testing methodologies were applied during the experimental setup. Functional testing was performed to verify that each module operated correctly according to system requirements. Integration testing ensured smooth communication between modules such as product management, payment processing, and database systems. System testing evaluated the overall performance, reliability, and stability of the platform. User acceptance testing was also conducted to analyze customer convenience and farmer usability.

4.2 Results

The implementation and testing of CropCart produced positive results in improving the connection between farmers and families through a digital platform.

One of the major results observed was the successful direct interaction between farmers and customers. Farmers were able to upload products and receive customer orders without depending on intermediaries. This improved communication and increased transparency within the agricultural supply chain.

The system demonstrated efficient product management and inventory handling. Farmers could easily update product details such as quantity, pricing, and availability, while customers could browse products in real time. The database system effectively stored and retrieved user, product, and order information without significant delays.

The customer ordering process was found to be simple and user-friendly. Customers successfully browsed products, added items to the cart, placed orders, and tracked deliveries through the platform. The online ordering system improved convenience and reduced the need for physical market visits.

The payment integration module functioned effectively by supporting secure digital transactions.

Customers were able to complete payments using digital payment methods, and transaction details were stored securely within the system.

The experimental results also showed a reduction in product wastage and delivery delays. Since the system enabled direct farm-to-family delivery, agricultural products reached customers more quickly and maintained better freshness and quality. Performance testing indicated that the system handled multiple users and transactions efficiently. The platform provided stable performance, organized database management, and smooth navigation between modules.

The admin module successfully verified products and users, helping maintain product quality and system security. Authentication mechanisms protected user data and prevented unauthorized access.

4.3 Observed Outcomes

The following outcomes were observed during experimentation:

- Increased farmer accessibility to larger markets
- Improved customer satisfaction through fresh product delivery
- Faster order processing and transaction management
- Better transparency in pricing and communication
- Reduced dependency on middlemen
- Efficient product inventory management
- Secure and reliable user authentication
- Improved operational efficiency in agricultural marketing

4.4 Results and Observations

The implementation of CropCart successfully demonstrates how a digital platform can directly connect farmers with families and improve the agricultural supply chain system. The platform provides an efficient online marketplace where farmers can register, upload products, manage orders, and sell agricultural produce directly to consumers without the involvement of unnecessary intermediaries.

The system resulted in improved communication between farmers and customers, transparent pricing, and faster product distribution. Farmers were able to reach a larger customer base and receive better profits for their products. Consumers benefited from fresh farm products, reasonable prices, and convenient home delivery services.

The implementation also showed improvements in:

- Reduction of middlemen dependency
- Faster order processing and delivery
- Better inventory and product management
- Increased accessibility to fresh agricultural products
- Secure and simple digital payment methods
- Improved customer satisfaction through direct purchasing

The platform successfully created a farm-to-family digital ecosystem that supports both economic and technological growth in the agricultural sector.

Observation

During the implementation and analysis of CropCart, several important observations were identified:

1. Increased Farmer Profitability

It was observed that direct selling helped farmers earn higher profits compared to traditional market systems. Farmers received fair prices because commission charges from intermediaries were reduced.

2. Improved Product Freshness

Since products were delivered directly from farms to consumers, the freshness and quality of fruits, vegetables, and other agricultural items improved significantly.

3. Better Consumer Convenience

Customers preferred the online ordering system because it saved time and provided easy access to farm products from home. Features like online payment and order tracking increased user satisfaction.

4. Reduction in Product Wastage

The shorter supply chain reduced delays in transportation and storage, resulting in lower post-harvest losses and less food wastage.

5. Need for Digital Awareness

It was observed that some farmers faced difficulties using smartphones, mobile applications, and online systems due to limited digital literacy. Training and guidance are necessary for effective platform usage.

6. Dependence on Internet Connectivity

The platform's performance depends heavily on internet availability and technical infrastructure. Poor connectivity in rural areas affected real-time updates and communication.

7. Importance of Logistics Management

Efficient delivery and transportation systems were found to be essential for maintaining product quality and ensuring timely deliveries to customers.

8. Positive Impact on Local Agriculture

CropCart encouraged consumers to purchase directly from local farmers, which supported rural economic development and promoted local agricultural businesses.

9. User Trust and Transparency

The direct interaction between farmers and consumers increased trust regarding product quality, pricing, and payment security.

10. Scope for Future Improvement

The observations showed that integrating advanced technologies such as AI-based recommendations, multilingual support, and smart inventory management could further improve the efficiency and scalability of the system.

4.5 Discussion & Conclusion

CropCart represents a modern and technology-driven approach to improving the agricultural supply chain by directly connecting farmers with families. The system is designed to reduce the gap between producers and consumers while solving many problems faced in traditional agricultural marketing

systems. The discussion of CropCart mainly focuses on its effectiveness, benefits, implementation challenges, and its impact on farmers, consumers, and the agricultural economy.

The traditional agricultural market structure involves multiple intermediaries such as wholesalers, distributors, and retailers. These intermediaries often increase the final price of products while farmers receive only a small share of the profit. CropCart addresses this issue by introducing a direct farm-to-family model where farmers can sell products directly to consumers through a digital platform. This approach increases transparency in pricing and allows farmers to earn better profits while consumers gain access to fresh and affordable products.

One of the major strengths of CropCart is its ability to provide wider market access to farmers. In many rural areas, farmers are restricted to local markets where demand and pricing opportunities are limited. Through CropCart, farmers can reach customers from different cities and regions using online services. This digital connectivity helps small and medium-scale farmers compete in larger markets without requiring physical market infrastructure.

The platform also improves convenience for families and consumers. In today's fast-moving lifestyle, many people prefer online shopping and home delivery services. CropCart allows customers to browse agricultural products, compare prices, place orders, and make online payments from their homes. This not only saves time but also ensures the availability of fresh farm products directly from producers. Consumers may also gain confidence in product quality because the system promotes transparency and direct communication with farmers.

Another important discussion point is the role of CropCart in reducing food wastage. Traditional agricultural supply chains often involve long transportation routes and delays in storage and distribution. These issues reduce product freshness and increase spoilage, especially for perishable items such as fruits and vegetables. CropCart shortens the supply chain by enabling direct delivery from farms to homes, which helps maintain freshness and minimize post-harvest losses.

The implementation of CropCart also supports the digital transformation of agriculture. The integration of technologies such as mobile applications, cloud databases, GPS tracking, online payment gateways, and inventory management systems modernizes traditional farming practices. Farmers can manage product listings, monitor orders, and receive payments digitally, while consumers can track deliveries and provide feedback through the platform.

However, the discussion of CropCart also includes several challenges and limitations. One major challenge is digital literacy among farmers. Many farmers in rural areas may not be familiar with smartphones, mobile applications, or online payment systems. Training and awareness programs are necessary to help farmers effectively use the platform. Additionally, poor internet connectivity and limited technical infrastructure in some rural regions may affect the smooth functioning of the system.

Logistics and delivery management are also critical concerns in implementing CropCart. Agricultural products, especially fresh produce, require proper packaging, storage, and transportation. Delays in delivery may affect product quality and customer satisfaction. Therefore, efficient supply chain and transportation systems are essential for the success of the platform.

Trust and security are other important aspects of discussion. Consumers need assurance regarding product quality, freshness, and secure payment methods. Similarly, farmers require protection from fake orders, delayed payments, or fraudulent activities. CropCart must implement secure authentication systems, transparent payment gateways, and customer review mechanisms to build trust among users.

The platform also has significant economic and social impact. By increasing farmers' income and reducing dependence on intermediaries, CropCart can contribute to rural development and economic stability. It encourages farmers to adopt modern agricultural and business practices while promoting local and sustainable farming. Consumers benefit from healthier food options and fair pricing, creating a balanced and mutually beneficial ecosystem.

In the future, CropCart can be further enhanced by integrating advanced technologies such as Artificial Intelligence (AI), Machine Learning (ML), and data analytics. These technologies can help in demand forecasting, crop recommendations, smart inventory management, and personalized customer experiences. The platform can also include multilingual support and voice-based interfaces to improve accessibility for farmers from different regions.

Overall, the discussion highlights that CropCart is not just an online shopping platform but a complete digital agricultural ecosystem that aims to improve supply chain efficiency, farmer profitability, customer satisfaction, and sustainable agricultural development. Although challenges related to infrastructure, technology adoption, and logistics exist, the implementation of CropCart has strong potential to transform the traditional agricultural market into a smarter, more transparent, and farmer-friendly system.

V. CONCLUSION

CropCart is an innovative and technology-based solution developed to bridge the gap between farmers and families through a direct digital marketplace. The platform aims to transform the traditional agricultural supply chain by reducing the involvement of intermediaries and creating a transparent, efficient, and farmer-friendly system. By connecting producers directly with consumers, CropCart helps farmers receive fair prices for their products while enabling families to access fresh, healthy, and affordable agricultural goods.

The implementation of CropCart highlights the importance of digital transformation in agriculture. Through the use of mobile applications, web platforms, online payment systems, and modern logistics management, the system simplifies the process of buying and selling agricultural products. Farmers gain wider market access, better income opportunities, and improved communication with consumers, while customers benefit from convenience, quality products, and home delivery services.

The CropCart system successfully demonstrates the implementation of a digital platform that connects

farmers directly with consumers (families). The primary objective of the project was to eliminate the dependency on middlemen and create a transparent and efficient agricultural marketplace. This objective has been effectively achieved through the design and development of a user-friendly web-based application. The project also highlights the importance of digital transformation in agriculture, showing how modern web technologies like PHP, MySQL, HTML, CSS, and JavaScript can be used to solve real-world problems. The inclusion of features such as product management, order placement, and order approval ensures smooth interaction between users and improves overall system efficiency. In conclusion, CropCart is a practical, impactful, and scalable solution that addresses key challenges in the agricultural sector. It not only improves the income of farmers but also ensures better accessibility and transparency for consumers, making it a valuable contribution toward the development of a smart and sustainable agricultural ecosystem. Future Scope

1. Mobile Application Development A mobile app can be created to make the system easier to access.
2. Online Payment Integration Digital payment methods such as UPI and online banking can be added.
3. Delivery Tracking System Customers can track their orders in real time.
4. AI-Based Crop Demand Prediction Artificial intelligence can analyze demand and suggest crop production
5. Online Payment Integration: Add UPI payment for secure transactions.

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