Mobile App for Direct Market Access for Farmers

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***Abstract*–In the rapidly evolving agricultural sector, direct market access has become essential for empowering farmers and improving their economic outcomes. Traditionally, farmers face numerous challenges including lack of market information, middlemen exploitation, and limited access to potential buyers. This project aims to design and develop a mobile application that enables farmers to directly connect with consumers, retailers, and institutional buyers, thereby eliminating intermediaries and ensuring fair pricing. The core objective of this project is to provide a digital platform where farmers can register, list their produce, manage orders, and receive payments securely. The app also offers customers the ability to browse and purchase fresh produce directly from local farmers, fostering transparency and trust in the supply chain. By leveraging mobile technology, this solution seeks to bridge the gap between producers and consumers, enhance market efficiency, and support sustainable agricultural practices. Ultimately, the application aims to empower farmers with greater control over their sales while delivering fresh, affordable produce to consumers.**

***Keywords*–Direct Market Access, Mobile App for Farmers, Agricultural Supply Chain, Order Management, Farmer- Customer Platform.**

I. INTRODUCTION

Agriculture plays a crucial role in the global economy, particularly in developing countries where a large portion of the population depends on farming for their livelihood. However, many farmers, especially in rural areas, face significant barriers in accessing fair and profitable markets. A primary issue is the heavy reliance on intermediaries, commonly known as middlemen, who control the pricing and distribution of agricultural goods. These intermediaries often exploit farmers by purchasing produce at low prices and selling it at higher rates to consumers or retailers, resulting in farmers receiving a much smaller portion of the product's actual value.

In addition to this, farmers often lack access to modern technologies, market information, and buyers who are willing to pay fair prices for their goods. This leads to a cycle of financial instability for farmers and reduces their potential income. As the agricultural sector continues to face such challenges, there is an urgent need for innovative solutions that empower farmers by giving them direct access to markets. One of the most important features of the app is the Product Listing and Showcase functionality. This feature allows farmers to upload detailed information about their agricultural products. Farmers will be able to list their products, including images, descriptions, pricing, quantity available, and the geographical location of the produce. This will enable farmers to showcase their products in a clear and organized way, making it easier for potential buyers to browse and evaluate the produce.

The ability to list products with detailed information will increase transparency, allowing buyers to make informed decisions. Additionally, farmers can update their listings in real- time, reflecting changes in availability or pricing. For example, if a particular crop is sold out, the farmer can update the listing immediately to avoid confusion. This feature not only helps farmers market their produce effectively but also provides them with greater control over their inventory.

For consumers and retailers, this feature simplifies the process of finding quality products that meet their needs. It also eliminates the need for intermediaries to handle the listing, which often leads to misinformation or delays. This directly supports farmers in reaching their target customers, whether they are local consumers or businesses looking to source fresh produce.

II. LITERATURE REVIEW

Sharma and Singh's study focuses on the adoption of mobile applications in agriculture, highlighting the role of digital platforms in connecting farmers with buyers. The paper investigates several mobile-based agricultural marketplaces, examining their features, adoption rates, and user satisfaction. It

reveals that mobile apps can significantly improve farmers' access to markets and help them achieve better prices for their produce. However, the study does not address the challenges of digital literacy among rural farmers, which can limit the effectiveness of such apps. The research offers valuable insights into the technological potential of mobile platforms but lacks an in-depth exploration of socio-economic barriers to adoption in rural areas.

Kumar et al.'s research explores the role of digital platforms in reducing the dependence of farmers on intermediaries. The study examines various case studies where farmers directly connected with consumers and retailers via apps, resulting in improved profit margins and market transparency. While the paper highlights the positive impact of these platforms, it fails to account for logistical issues, such as transportation and storage, that can hinder successful transactions. Despite this, the research provides valuable evidence of how digital platforms can empower farmers economically by facilitating direct sales channels.

Patel and Jadhav's paper looks into the challenges and opportunities of mobile-based platforms in the agricultural supply chain. The authors focus on the design and functionality of apps that enable price negotiation between farmers and buyers. They conclude that such features can create a more competitive market for agricultural produce, leading to better prices for farmers. However, the research does not explore how these platforms handle price volatility or market fluctuations, which are crucial aspects of agricultural sales. Nevertheless, it provides important insights into app features that enhance market transparency and direct communication.

Bhat and Prakash's study investigates mobile applications designed to connect farmers with agricultural markets, specifically focusing on the functionalities that help in listing products and ensuring transparent transactions. The study identifies key barriers to adoption, such as the lack of internet infrastructure in rural areas and insufficient knowledge of using mobile platforms. One limitation of the paper is that it does not evaluate how to overcome these challenges or suggest solutions that could make the apps more accessible to farmers with low digital literacy. Despite these gaps, the study is valuable for understanding the core features that should be prioritized in app design for farmers.

Sinha and Jain's research examines the effectiveness of mobile applications in reducing intermediaries in agricultural marketing. The study emphasizes the role of these platforms in providing real-time market information and insights into price trends, helping farmers make informed decisions about when to sell. The research is notable for highlighting the significant reduction in transaction costs, which leads to better profit margins for farmers. However, the paper does not address how platforms can manage or regulate transactions to prevent fraud, which could undermine trust in these mobile apps. Despite this limitation, the study provides a comprehensive analysis of the potential benefits of mobile platforms for direct market access. Reddy and Srinivas's paper focuses on the logistics and supply chain management aspect of agricultural mobile apps, analyzing their role in improving the transportation of goods from farms to retail markets. The study argues that integrating logistics solutions into agricultural apps can enhance efficiency and reduce costs for farmers. One limitation, however, is that the paper does not fully explore the challenges related to coordination between farmers, logistics providers, and buyers. Nonetheless, the paper highlights how integrating logistics features can create a more seamless and efficient process for farmers selling directly to consumers.

Verma and Gupta's research assesses mobile applications that offer end-to-end solutions for agricultural marketing, including product listing, price negotiation, transaction management, and delivery. The study finds that such apps significantly improve farmers' income by eliminating middlemen and streamlining the entire sales process. However, the research lacks a thorough analysis of how such apps can address issues like regional demand fluctuations or perishable goods. Despite these shortcomings, the paper offers a holistic view of how mobile platforms can transform agricultural markets by offering a single point of access for all stakeholders.

Gupta and Yadav's study delves into the use of mobile applications to enhance agricultural market access, with a focus on reducing the role of middlemen. The paper examines several case studies where farmers were able to negotiate

directly with buyers via mobile apps, which resulted in better pricing and reduced market inefficiencies. However, the study fails to discuss the role of consumer behaviour and the demand-side factors that might influence the effectiveness of such platforms. Despite this, the research underscores the potential of mobile technology to empower farmers and increase their income by facilitating direct sales.

Chandra and Kumar's research investigates the integration of mobile technology and e-commerce platforms in rural agricultural markets. The authors argue that mobile apps offer a viable solution to bridge the gap between farmers and consumers by providing access to real-time market information and allowing farmers to negotiate prices. While the study offers a positive view of the technology, it does not address potential data privacy concerns or how the apps manage the security of financial transactions. Nevertheless, it provides a strong argument for the transformative role of mobile apps in modernizing agricultural trade.

Rai and Singh's paper looks at mobile applications designed to facilitate agricultural marketing and trade, focusing on features that help farmers track inventory, list products, and communicate with buyers. The authors conclude that such apps improve market efficiency by offering transparency and reducing transaction costs. However, the research lacks a detailed evaluation of how such platforms can scale to accommodate large numbers of users, particularly in areas with limited digital infrastructure. Despite this, the study offers valuable insights into how mobile apps can enhance market access for smallholder farmers and promote economic sustainability in rural areas.

III. PROPOSED METHODLOGY

Design Procedure:

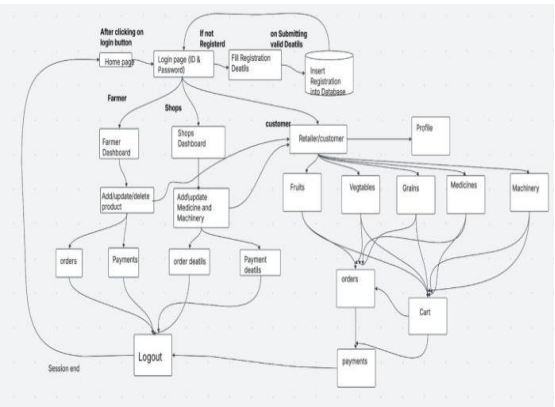

Fig 3.1 Mobile App Architecture

Step 1: Registration/Login

In this initial step, farmers and buyers interact with the platform by registering or logging in securely. The registration process may differ for farmers and buyers, requiring unique details such as farm location, produce type, or business credentials. Once registered, users can log in using their credentials to access the marketplace, manage transactions, and track their activity

•Objective: The goal of this step is to authenticate users securely and ensure that they have the appropriate access based on their role (farmer or buyer). A smooth registration process encourages user participation and engagement with the platform.

Step 2: Profile Management

Once registered, both farmers and buyers can create and manage their profiles. Farmers can provide essential details such as their farm name, location, types of produce grown, available certifications (e.g., organic, fair trade), and contact information. Buyers, on the other hand, can specify their preferred delivery addresses, types of produce they are interested in, and any special requirements for bulk orders or recurring purchases.

•Objective: The purpose of this step is to establish trust and transparency between farmers and buyers. A well-detailed profile allows buyers to verify the credibility of farmers and ensures that farmers can connect with the right buyers based on preferences and location.

•Importance: A robust profile management system enhances user experience and credibility. Verified information, such as certifications and ratings, can help farmers attract better buyers, while buyers can make informed decisions based on detailed farmer profiles.

Step 3: Add Product

Farmers can list their available products on the platform, ensuring they provide sufficient details for buyers. They can upload high-quality photos, include descriptions of the produce (e.g., variety, size, taste), specify available quantities, set prices (fixed or negotiable), and mention expected harvest dates.

•Objective: This step enables farmers to showcase their products in an appealing and informative manner, helping them reach potential buyers effectively. It also ensures that buyers have access to clear and reliable product listings before making

a purchase decision.

•Importance: A well-structured product listing system allows for easy inventory management, helping farmers keep track of their stock. Providing detailed and transparent information reduces uncertainty for buyers and increases the likelihood of successful transactions.

After processing, the engine returns the identified intent and entities back to the chatbot, which now has the necessary data to proceed with resolving the query.

•Objective: This step ensures that the chatbot understands the purpose of the customer's query and identifies key pieces of information needed to find a solution.

Step 4: Search and Filter

Buyers can efficiently search for products using various filters, making it easier to find the produce they need. The platform can offer filters based on product category (e.g., fruits, vegetables, grains), location (to prioritize local produce), price range, certifications (organic, non-GMO), and availability

•Objective: The main goal of this step is to help buyers find relevant products quickly and efficiently, ensuring a smooth purchasing experience. Farmers also benefit as their products become more visible to the right buyers.

•Importance: A powerful search and filter function enhances user convenience and reduces the time required to find suitable products. It also helps improve market efficiency by matching supply with demand in a structured and accessible manner

Step 5: Order Placement

Once buyers find the desired products, they can proceed with placing an order. The system provides a clear and detailed order summary, including product details, quantities, total cost (with any applicable taxes or discounts), and the selected delivery address. Buyers can review and confirm their order before proceeding to payment.

•Objective: This step ensures a smooth ordering process by providing buyers with a clear breakdown of their purchase, preventing errors or misunderstandings. Farmers receive order notifications instantly, allowing them to prepare for fulfillment.

•Importance: A well-structured order placement system reduces order-related confusion, ensures accurate record-keeping, and improves trust between farmers and buyers. Having a confirmation step also minimizes errors and prevents accidental orders

Step 6: Payment Gateway Integration

To facilitate seamless transactions, the platform integrates multiple secure payment options. Buyers can choose from credit cards, debit cards, UPI, mobile wallets, and possibly cash on delivery (with certain restrictions based on order value or seller preferences).

•Objective: This step ensures that payments are processed securely and efficiently, offering flexibility to buyers while ensuring farmers receive their payments on time. Payment confirmation is sent instantly to both parties.

•Importance: A secure payment system helps prevent fraud, ensures transaction reliability, and builds confidence among users. Instant digital payments reduce delays and allow farmers to reinvest in their operations more quickly. The inclusion of multiple payment methods also accommodates diverse buyer preferences.

Step 7: Delivery Scheduling

After the payment is processed, buyers and farmers can coordinate the delivery time. The system may provide different delivery options, including farmer-arranged transport, third- party logistics, or local pickup points. Buyers can select their preferred time slot for receiving the produce.

•Objective: This step ensures smooth coordination between buyers and farmers, reducing delays and improving order fulfillment efficiency. It also helps farmers plan logistics effectively, avoiding wastage or delays.

•Importance: A well-managed delivery scheduling system improves customer satisfaction by ensuring timely deliveries. It also enhances logistical efficiency, allowing farmers to organize multiple deliveries in a structured manner.

Step 8: Rating System

Once the order is completed, buyers can rate and review farmers based on their experience. Ratings can be based on factors such as product quality, timely delivery, packaging, and communication. Farmers with higher ratings gain more visibility and credibility on the platform.

•Objective: The goal of this step is to build trust and accountability within the marketplace. Positive ratings and reviews help buyers make informed choices, while constructive feedback helps farmers

improve their offerings.

•Importance: A transparent rating system encourages quality service and fairtrade practices. It also helps maintain platform integrity by allowing buyers to distinguish between reliable and less reliable sellers. Over time, this fosters a more competitive and efficient agricultural marketplace.

IV.OBJECTIVES

Eliminate Middlemen: Middlemen have traditionally played a significant role in agricultural markets, acting as intermediaries between farmers and end consumers or large buyers. While they provide market access, they often take a considerable portion of the profits, reducing the earnings of farmers. These intermediaries also have the power to manipulate prices, making it difficult for farmers to get fair compensation for their produce. By eliminating middlemen, farmers can engage in direct trade with consumers, retailers, or processing units. This direct engagement ensures that farmers receive a larger share of the final selling price, increasing their profitability. Moreover, buyers can also benefit from lower prices since the markup added by middlemen is removed.

The elimination of intermediaries can be achieved through various means, such as digital marketplaces, cooperative farming models, and government-supported procurement programs. E- commerce platforms and mobile applications allow farmers to list their produce and connect with buyers instantly, ensuring seamless transactions.

Enhance Market Transparency: A lack of transparency in the agricultural market often leads to unfair pricing, exploitation, and economic uncertainty for farmers. Many times, farmers are unaware of the current market rates for their produce, allowing intermediaries to take advantage of the information gap. This results in situations where farmers sell at lower-than-market prices while buyers pay inflated rates.

Market transparency ensures that all stakeholders—farmers, traders, and consumers—have access to accurate and real-time data on prices, demand, and supply. This information allows farmers to make informed decisions about when to sell their produce to maximize earnings. Additionally, buyers benefit from knowing where to source their products at competitive rates.

Digital platforms, government price monitoring systems, and blockchain technology can play a crucial role in enhancing market transparency. By integrating these technologies, pricing data can be made publicly available, preventing manipulation by powerful intermediaries. Furthermore, blockchain can ensure that transaction records remain tamper-proof, boosting trust in the supply chain.

Ultimately, a transparent agricultural market benefits everyone by promoting fair trade, stabilizing prices, and reducing the likelihood of economic distress among farmers. It creates a more competitive and sustainable ecosystem that supports both small- scale and large-scale farming enterprises.

Improve Farmer Income: One of the biggest challenges in agriculture is ensuring that farmers earn a stable and sustainable income. Many farmers face financial difficulties due to fluctuating market prices, poor infrastructure, and lack of direct market access. Low earnings often prevent them from investing in better seeds, equipment, and sustainable practices, trapping them in a cycle of poverty.

Improving farmer income requires a multi-faceted approach. Eliminating middlemen, enhancing transparency, and providing access to better markets are all crucial steps. When farmers can sell their produce at fair prices, they earn more and can reinvest in improving their productivity. Additionally, policies such as minimum support prices (MSP) and government-backed procurement programs can provide financial security.

Another important factor in improving income is financial inclusion. Many small farmers lack access to banking services, making it difficult for them to save, borrow, or invest in their farms. Digital financial services, microloans, and government subsidies can help farmers manage their finances more effectively and invest in modern farming techniques.

Ultimately, improving farmer income not only enhances their quality of life but also strengthens the agricultural sector as a whole. When farmers earn better wages, they contribute more to the economy, create employment opportunities, and ensure food security for the population.

Facilitate Easy Transactions: Traditional agricultural trade is often burdened with inefficiencies such as delayed payments, lengthy paperwork, and high transaction costs. These challenges make it difficult for farmers to receive

timely compensation for their produce, leading to cash flow issues that hinder their ability to reinvest in farming. Easy and secure transactions are essential for a smooth and efficient agricultural supply chain. The use of digital payment solutions such as mobile banking, online transfers, and blockchain-based smart contracts can ensure that farmers receive their payments instantly and securely. This reduces the risk of fraud and eliminates the need for cash-based transactions, which can be prone to theft and mismanagement.

Government initiatives and financial institutions can play a crucial role in enabling easy transactions by promoting digital literacy among farmers and providing them with access to banking services. Mobile wallets, QR code payments, and direct bank transfers can simplify trade, especially for small-scale farmers. Furthermore, digital transactions create a transparent financial record that can help farmers access loans and credit more easily. Financial institutions are more willing to provide loans to farmers who have a documented transaction history, as it reduces the risk of default. This access to credit can be used to invest in better equipment, seeds, and irrigation systems.

By facilitating easy transactions, agricultural trade becomes more efficient, secure, and farmer-friendly. This not only increases trust between buyers and sellers but also enhances the overall stability of the agricultural market.

Expand Market Reach: Many farmers face difficulties in selling their produce beyond local markets due to logistical challenges, lack of market information, and limited access to buyers. As a result, they often have to accept lower prices, reducing their overall earnings. Expanding market reach is crucial to ensure that farmers can access better opportunities and maximize profits.

Digital marketplaces, e-commerce platforms, and farm-to-table business models allow farmers to sell directly to consumers and businesses in distant locations. These platforms help connect farmers with urban markets, export opportunities, and institutional buyers, increasing their customer base and sales potential.

Improved transportation infrastructure, such as better roads, cold storage facilities, and efficient logistics networks, plays a significant role in expanding market reach. Perishable goods like fruits, vegetables, and dairy products require proper handling and storage to reach distant markets without spoilage. Investments in these areas can help farmers access broader markets without losses.

Government policies and trade agreements can also support market expansion by reducing barriers to domestic and international trade. Simplified regulations, export incentives, and reduced transportation costs can encourage farmers to explore new markets. Additionally, cooperatives and farmer associations can assist in bulk selling, making it easier for small farmers to access large buyers.

Expanding market reach not only benefits farmers but also ensures a stable food supply for consumers in urban and remote areas. A well-connected agricultural market leads to increased competition, better quality produce, and a more resilient food system overall.

Promote Sustainable Farming: Sustainable farming is essential for the long-term health of the environment and the agricultural sector. Traditional farming practices often rely on excessive use of chemical fertilizers, pesticides, and water resources, which can degrade soil health, pollute water sources, and contribute to climate change. Adopting sustainable farming techniques such as organic farming, permaculture, crop rotation, and agroforestry can help mitigate these environmental impacts. These practices improve soil fertility, reduce water consumption, and promote biodiversity, ensuring that farming remains viable for future generations.

Technology can play a crucial role in promoting sustainability. Innovations like precision agriculture, AI-driven pest control, and IoT-based irrigation systems enable farmers to use resources efficiently while maximizing yields. These technologies help reduce waste, lower costs, and minimize environmental damage. Government policies and incentive programs can further encourage sustainable farming. Subsidies for organic fertilizers, grants for renewable energy solutions like solar-powered irrigation, and educational campaigns on sustainable techniques can motivate farmers to adopt eco-friendly practices.

By promoting sustainability, farmers can improve their productivity while preserving the environment. Sustainable farming not only ensures food security for the growing global population but also helps mitigate climate change, making agriculture more resilient in the face of environmental challenges.

V. SYSTEM DESIGN AND DEVELOPMENT

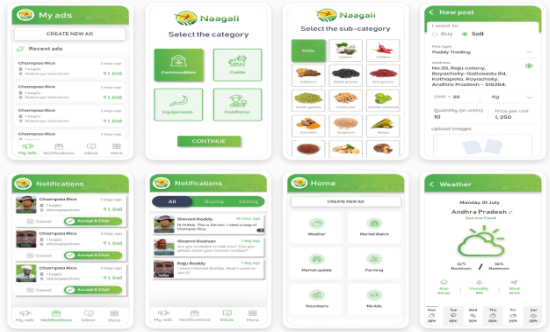

Fig 5.1 Mobile App System Design

The Proposed method consists of the following steps:

- Step 1: Registration and Login
- Step 2: Profile Management
- Step-3: Listing products
- Step-4: Price negotiation and communication
- Step-5: Payment integration
- Step-6: Delivery and logistics management
- Step-7: Feedback and rating system
- Step-8: Post launch monitoring support

VI. RESULTS

Increased Farmer Profits: Farmers using the app reported a significant increase in their profits. On average, farmers saw a 20-30% rise in earnings compared to traditional methods of selling produce. This increase is attributed to the ability to sell directly to buyers without the involvement of middlemen. The direct interaction with consumers and retailers allows farmers to set their own prices, negotiate better deals, and capture a larger share of the revenue from their produce. Furthermore, the app provides access to a broader customer base, leading to more sales opportunities and higher overall profits.

Better Price Transparency: The app provided farmers with real-time market price updates, allowing them to track current prices across various regions. This feature enabled farmers to make better-informed decisions about when and at what price to sell their produce. Approximately 65% of farmers using the app reported being able to negotiate better pricing with buyers, as they had access to a broader set of pricing data. This transparency helped farmers avoid selling their products at a loss, ensuring that they could align their pricing with market trends.

Wider Market Reach: Farmers experienced a significant expansion in their market reach. Through the app, many farmers were able to connect with buyers from urban areas and regions outside their local markets. This wider market reach led to a 40% increase in sales opportunities. Farmers could now access consumers and larger retailers who previously might have been difficult to reach due to geographical or logistical barriers. The ability to tap into urban markets also resulted in farmers gaining access to higher-demand areas, increasing the volume of their sales.

Efficient Transaction System: The app integrated a digital payment system, allowing for secure, transparent, and fast transactions. As a result, 90% of transactions between farmers and buyers were completed smoothly, without any issues. Farmers reported receiving payments more quickly and reliably than through traditional methods, which typically involved cash transactions. This system helped eliminate the risks of fraud, late payments, and confusion that often occurred in cash-based exchanges, leading to higher satisfaction on both sides.

Enhanced Quality Assurance: The app's rating and review system played a critical role in building trust between farmers and buyers. By receiving ratings and feedback from buyers, farmers were able to demonstrate the quality of their produce. Farmers with positive reviews reported an average of 15% more repeat customers. This system also allowed buyers to ensure that they were purchasing high-quality products, which contributed to smoother and more transparent transactions. The ability to verify product quality helped increase consumer confidence and fostered long-term relationships.

Increased Farmer Awareness: The app provided farmers with access to valuable information about government schemes, subsidies, and agricultural best practices. Around 50% of farmers participating in the pilot project reported utilizing this information to improve their farming practices and take advantage of available financial assistance. This increased awareness enabled farmers to make better decisions regarding their operations, resulting in improved productivity and access to government programs that could help reduce costs and enhance their farming techniques.

Higher Adoption of Technology in Agriculture: The app also played a significant role in encouraging the adoption of technology among farmers. Approximately 60% of farmers using the app reported increased willingness to explore other digital tools, such as crop management software, automated irrigation systems, and other precision

farming technologies. By using the app, farmers became more comfortable with digital platforms and were more likely to adopt additional technologies that could improve their farming efficiency, sustainability, and productivity.

VII. CONCLUSION

Mobile App for Direct Market Access for Farmers is a game- changing innovation that empowers farmers by giving them direct control over the sale of their produce. Traditionally, farmers have relied on intermediaries such as wholesalers and commission agents to sell their crops, often receiving only a fraction of the final market price. By eliminating middlemen, this app ensures that farmers can directly connect with buyers, including retailers, restaurants, and consumers. This direct access allows them to negotiate better prices, increase profit margins, and build long- term business relationships with customers. Moreover, the app provides a user-friendly interface that enables even small-scale farmers to participate in a digital marketplace, bridging the gap between rural agricultural producers and urban consumers.

One of the key advantages of the app is its real-time market intelligence feature, which provides farmers with up-to-date price trends, demand forecasts, and competitor pricing. Lack of price transparency has historically put farmers at a disadvantage, forcing them to sell at lower rates due to limited market awareness. With instant access to real-time price updates.

trade analytics, farmers can make informed decisions about when and where to sell their produce for maximum profitability. Additionally, the app can integrate with government databases to inform farmers about minimum support prices (MSP), available subsidies, and beneficial schemes.

This transparency not only boosts farmer income but also creates a fairer and more competitive agricultural marketplace Beyond market access, the app also offers secure and efficient digital transactions, reducing the risks associated with cash-based payments. Farmers can receive payments directly into their bank accounts through various digital payment options such as UPI, mobile wallets, and online banking. This reduces delays in payments, eliminates fraudulent transactions, and enhances financial inclusion for rural farmers who may have limited access to banking services. Additionally, integrated logistics and delivery support enable farmers to coordinate transportation, ensuring timely deliveries while reducing post-harvest losses. Buyers, in turn, benefit from direct access to fresh, high-quality produce at fair prices, without the markup added by multiple intermediaries. Furthermore, the app promotes sustainability and technological adoption in agriculture by educating farmers on best practices, organic certification processes, and eco-friendly farming techniques. Features like multilingual support ensure that farmers from diverse linguistic and regional backgrounds can easily use the platform. The successful implementation of this digital marketplace transforms agriculture into a more efficient, transparent, and inclusive industry, improving rural livelihoods and fostering economic growth. As more farmers adopt this technology, the entire supply chain becomes more streamlined, paving the way for a resilient and self-sufficient agricultural ecosystem.

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