



## Development of a Non-Perishable Farm Product Web Based Transaction System

<sup>1</sup>Usman, Abdullahi Mohammed, <sup>2</sup>Ndubuisi, Akachukwu Samuel, <sup>3</sup>Idris, Mohammed Kolo, <sup>1</sup>Siyaka, Opotu Hassan

<sup>1</sup>Artificial Intelligent Department,

<sup>2</sup>Cyber Security Department, Federal Polytechnic, Bida, Niger State

<sup>3</sup>Computer Science Department, Federal University of Technology, Minna, Niger State

### ABSTRACT

*This study addresses the challenges farmers and buyers face in accessing a reliable, efficient, and direct marketplace for agricultural products. Traditional supply chains are burdened by high transportation costs, miscommunication, and multiple intermediaries, which reduce farmers' profit margins and increase costs for end consumers. To mitigate these issues, this research develops a web-based platform that connects farmers directly with buyers, enabling seamless interaction and transaction processing. Utilizing HTML, CSS, and JavaScript for front-end design, MySQL for database management, and PHP for backend logic, the platform offers a user-friendly interface, secure transactions, and real-time order tracking. Security measures, including data encryption and integration of Paystack for payment processing, ensure data protection and financial security. Testing with a pilot group demonstrated the system's effectiveness in streamlining agricultural commerce, enhancing market access for farmers, and improving sourcing efficiency for buyers. This scalable solution promotes transparency, fosters trust, and supports diverse user needs, advancing digital transformation in agriculture. Recommendations for system scalability, user training, mobile app development, and feedback integration are provided to enhance long-term user engagement and platform adaptability.*

### ARTICLE INFO

#### Article History

Received: May, 2024

Received in revised form: July, 2024

Accepted: September, 2024

Published online: December, 2024

### KEYWORDS

Non-Perishable Goods, Supply chain, Transaction System, Web-Based

### INTRODUCTION

Agriculture is a critical sector in many economies, providing the primary source of livelihood for a significant portion of the population. However, one of the persistent challenges faced by farmers is the lack of direct access to buyers. This disconnection often leads to farmers receiving lower prices for their products due to the involvement of intermediaries (Abid, Abid, & Anwar, 2022). Additionally, buyers face difficulties in sourcing fresh produce directly from farmers, leading to inefficiencies in the supply chain. With the advent of the internet and the proliferation of web-based technologies, there is an opportunity to bridge this gap by creating a platform that directly connects farmers to buyers,

ensuring a more efficient and transparent marketplace (Annamalai & Rao, 2023).

One of the primary challenges in agriculture is market inefficiency. Farmers often have limited access to markets, and when they do, they typically rely on intermediaries. These middlemen can significantly inflate prices, reducing the income that farmers receive for their produce. A web-based system can streamline this process by connecting farmers directly with buyers, ensuring better prices for farmers and fresher produce for buyers (Abid, Abid, & Anwar, 2022). Farmers often lack critical information regarding market prices, demand trends, and best farming practices. This information gap can lead to poor decision-making and reduced productivity.

Corresponding author: Usman, Abdullahi Mohammed

✉ [usmannck@gmail.com](mailto:usmannck@gmail.com)

Artificial Intelligent Department, The Federal Polytechnic, Bida, Niger State.

© 2024. Faculty of Technology Education. ATBU Bauchi. All rights reserved



A web-based platform can provide real-time information and data analytics, empowering farmers with the knowledge needed to make informed decisions (Annamalai & Rao, 2023). The proliferation of mobile phones and internet connectivity even in rural areas has created an unprecedented opportunity to leverage technology for agricultural development. By designing and implementing a web-based system, it is possible to harness these technological advancements to create a more efficient and equitable agricultural market (Deichmann *et al.*, 2016).

The integration of technology into agriculture has been the subject of extensive research and development. Numerous studies have highlighted the potential benefits of web-based systems in enhancing the efficiency and transparency of agricultural markets. In recent years, there has been an increased focus on integrating technology into marketing to streamline agricultural transactions. For instance, using digital tools like data analytics helps farmers make informed decisions regarding pricing, distribution, and market demand, enhancing their market competitiveness (Cheng *et al.*, 2023). This technological integration allows farmers to better understand buyer behavior and preferences, which is crucial in optimizing marketing strategies. Additionally, the adoption of mobile applications and web-based systems has facilitated real-time communication between farmers and buyers, further simplifying the marketing process (Wang *et al.*, 2021). Several web-based platforms have been developed globally to facilitate direct transactions between farmers and buyers. For instance, the e-Choupal initiative in India provides farmers with information and access to markets, resulting in improved price realization and reduced transaction costs (Annamalai & Rao, 2023).

## LITERATURE REVIEW

### Farm Produce

Farm produce forms the backbone of many economies, especially in developing countries where agriculture is a significant source of income. However, traditional methods of selling

farm produce are often marred by inefficiencies such as long supply chains, high transaction costs, and limited market access (Ali *et al.*, 2021). Digital platforms have emerged as a solution to these challenges, providing a direct link between farmers and buyers. These platforms enable farmers to sell their produce at competitive prices, reducing the exploitation by intermediaries and increasing their profit margins (Zhao *et al.*, 2022). The direct sale of farm produce through web-based systems also enhances the quality of products reaching consumers, as there is better control over the supply chain (Wang *et al.*, 2021). For example, farmers can now monitor the conditions of their produce in real-time and adjust their handling methods to ensure freshness. Studies have shown that such platforms not only improve the economic outcomes for farmers but also enhance consumer satisfaction by providing access to fresh and high-quality products (Nguyen *et al.*, 2022). Furthermore, these systems often incorporate traceability features, which allow consumers to know the origin of the produce, thus promoting transparency and trust.

Moreover, selling farm produce online has been particularly advantageous in promoting non-perishable goods such as grains, dried fruits, and nuts, which can be stored and sold over a longer period. This aspect of digital platforms helps stabilize farmers' income and reduces the pressure to sell perishable items quickly at lower prices (Cheng *et al.*, 2023). By facilitating direct sales, web-based systems empower farmers to control their supply chain and access a wider market, ultimately contributing to food security and economic growth.

### Non-Perishable Goods

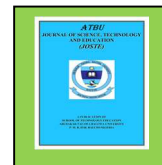
The market for non-perishable goods has grown significantly with the advent of online marketplaces and digital platforms. These goods, which include items such as grains, seeds, and dried products, have a longer shelf life, making them ideal for e-commerce. The ability to sell non-perishable goods directly to consumers through web-based systems offers farmers an opportunity to diversify their income streams and mitigate risks associated with price fluctuations in the market.

Corresponding author: Usman, Abdullahi Mohammed

✉ [usmannck@gmail.com](mailto:usmannck@gmail.com)

Artificial Intelligent Department, The Federal Polytechnic, Bida, Niger State.

© 2024. Faculty of Technology Education. ATBU Bauchi. All rights reserved



(Liu *et al.*, 2021). The shift towards direct sales of non-perishables also reduces the costs associated with traditional distribution methods, such as storage and transportation.

Furthermore, the sale of non-perishable goods through e-commerce platforms helps stabilize the agricultural market by providing a consistent supply of these products throughout the year (Wu *et al.*, 2022). This continuity is crucial in managing demand and maintaining price stability, benefiting both farmers and consumers. Non-perishable goods are also less susceptible to post-harvest losses, making them a more secure option for farmers looking to maximize their profits through online sales (Patel *et al.*, 2023).

The increased accessibility of non-perishable goods through online platforms also supports sustainable farming practices. By having a reliable market for their products, farmers are encouraged to adopt better storage techniques and invest in quality improvement measures, further enhancing the overall value of their produce (Jones *et al.*, 2021). The digital market for non-perishable goods, therefore, plays a significant role in promoting sustainable agricultural practices while providing farmers with a stable and profitable avenue for their produce.

### Farmers and Buyers System

Developing a web-based system that connects farmers directly with buyers has become increasingly important in the modern agricultural landscape. Such systems reduce the reliance on traditional markets and intermediaries, allowing for more transparent and efficient transactions. Studies indicate that these systems can significantly increase farmers' income by enabling direct communication and negotiation with buyers, which is often not possible in traditional supply chains (Nguyen *et al.*, 2022). The integration of real-time data and analytics within these systems also helps farmers make informed decisions about pricing, market trends, and inventory management.

The effectiveness of farmers and buyers systems lies in their ability to provide a seamless and user-friendly platform for conducting business. These systems often incorporate various features such

as secure payment gateways, logistics management, and quality assurance, all of which are critical in building trust between the two parties (Singh *et al.*, 2021). Additionally, these platforms provide farmers with access to valuable market information, which can help them better understand consumer demand and adjust their production strategies accordingly. This real-time access to market dynamics is particularly beneficial in reducing waste and optimizing resource use (Zhang *et al.*, 2023).

### Review of Related Works

Mambile (2019) conducted a study on a web-based platform designed to provide reliable market linkage between poultry farmers and potential buyers in Tanzania. The study employed the eye-tracking method to assess the user experience of the platform, focusing on how users visually interact with and distribute their attention across different interface elements. The platform supported various functionalities such as buying, selling, and order management, providing a comprehensive solution for poultry market transactions. However, the study identified a significant limitation regarding the cash-on-delivery payment method, which allows farmers to conduct auctions on the platform. The potential risks, including payment defaults and disputes, were not thoroughly addressed, highlighting a gap in the system's risk management considerations.

Anusha *et al.*, (2024) developed an Android-based e-commerce application called "Farm to Home" aimed at facilitating direct sales of agricultural produce from farmers to consumers. The application was developed using Android Studio and SDK to eliminate intermediaries and provide a platform for farmers to sell their products directly to consumers at better prices. The research found that the "Farm to Home" application successfully addressed the challenges inherent in traditional agricultural marketing systems, particularly by removing agents and allowing for direct transactions. However, the study noted that the specific challenges faced by Indian farmers and consumers may not be directly applicable to other regions with different agricultural practices and

market structures, thereby limiting the generalizability of the proposed solution.

Anurag *et al.*, (2024) discussed the development of an e-commerce platform designed to facilitate direct communication between farmers and consumers, enhancing the accessibility of agricultural products and providing guidance on best practices for maintaining product quality. The platform offers farmers access to information on new agricultural practices, price comparisons, trade data analysis, and profit calculations, thus creating a secure and exclusive environment for agricultural marketing. Despite its benefits, the paper noted a limitation in the lack of detailed discussion on the platform's user experience aspects, including the design of the user interface, ease of navigation, and feedback mechanisms.

Sulthana and Rajitha (2023) introduced AgroMart, a mobile and web application that allows farmers to upload details of their products while enabling buyers to view and purchase these products within a specified time frame. The results suggested that AgroMart could revolutionize the agricultural market in India by empowering farmers, eliminating middlemen, and fostering a direct and beneficial relationship between farmers and buyers. However, the study did not address measures or mechanisms to ensure the quality and authenticity of the products listed on the platform, indicating a gap that needs to be explored for maintaining consumer trust and satisfaction.

## METHODOLOGY

To develop a web-based system that facilitates direct interaction and transactions between farmers and buyers, the study employed an iterative development methodology to accommodate changing requirements and ensure stakeholder engagement throughout the process. This required the following steps:

1. To design a user-friendly interface for non-perishable farm produce using HTML, CSS and JavaScript. The back-end was developed using PHP for its non-blocking, event-driven architecture, which is ideal for handling multiple concurrent requests efficiently.

**bootstrap.css** was used as a lightweight web framework for building interaction, while for the front-end, HTML and CSS will be utilized due to its component-based architecture, which facilitates the development of dynamic and responsive user interfaces. **Paystack** will be integrated for secure payment processing.

2. To design a database for non-perishable farm produce using MySQL. **MySQL** serve as the database, providing a scalable solution for managing large datasets of user and transaction information.

These technologies were chosen based on their proven reliability, security features, and ability to handle real-time data processing, ensuring that the platform can grow and evolve with user demand.

## Description of the New System

The proposed web-based system aims to create a centralized platform that directly connects farmers with buyers. This platform will enable farmers to list their produce, including details such as type, quantity, and price. Buyers will be able to search for available produce, compare prices, and make purchases directly through the platform. The system also include features such as secure payment processing, logistics coordination, and quality assurance mechanisms to ensure that both parties have a seamless and trustworthy trading experience. By leveraging technology, the new system will facilitate better market access, fairer pricing, and reduced post-harvest losses.

## System Specification and Design

The requirement for the installation and smooth running of the system are subdivided into hardware and software requirements and are stated below:

1. **Hardware Requirement:** The computer to install and run the application should have a minimum of Intel Pentium CPU @1.70GHz –

2.10GHz, RAM Memory storage 2.00GB, 64-bit operating system and 250 GB Hard Drive.

2. **Software Requirement:** Web application development framework, Database management system (MySQL), Payment gateway integration SDKs. (Paystack) and Xampp

The system design will encompass both the front-end user interface and the back-end infrastructure. The front-end was user-friendly, with intuitive navigation and clear options for

listing produce, searching for products, and completing transactions. The back-end was robust, incorporating secure databases, efficient search algorithms, and reliable payment gateways. Key components of the system design will include user authentication, data encryption, real-time notifications, and an integrated logistics module to facilitate the delivery of produce. The design will also ensure scalability to accommodate a growing number of users and transactions over time as shown in figure 1.

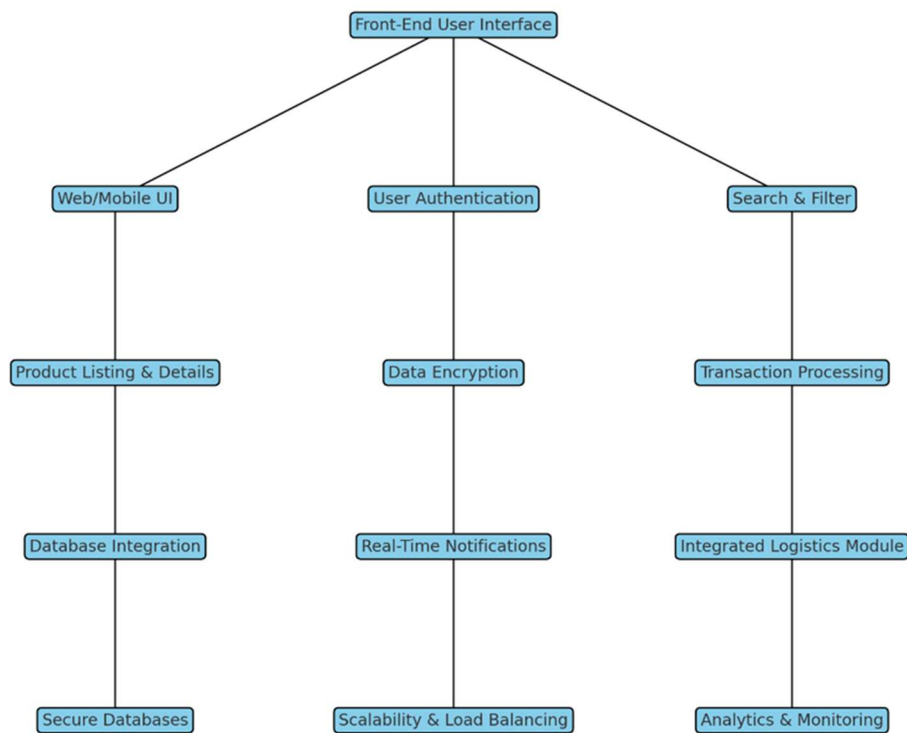


Figure 1: System Design Block Diagram

### System Workflow

The system workflow begins with user registration, where both farmers and buyers create profiles and provide necessary information. Farmers then list their produce, including details such as type, quantity, and price. Buyers can search for available produce using various filters and place orders directly through the platform.

Once an order is placed, the system coordinates logistics, ensuring timely pickup and delivery of the produce. Payments are processed securely through the platform, with funds transferred to the farmer upon successful delivery and confirmation from the buyer. The system also includes feedback mechanisms to continuously monitor and improve the quality of service as shown in figure 2.

Corresponding author: Usman, Abdullahi Mohammed

✉ [usmannck@gmail.com](mailto:usmannck@gmail.com)

Artificial Intelligent Department, The Federal Polytechnic, Bida, Niger State.

© 2024. Faculty of Technology Education. ATBU Bauchi. All rights reserved

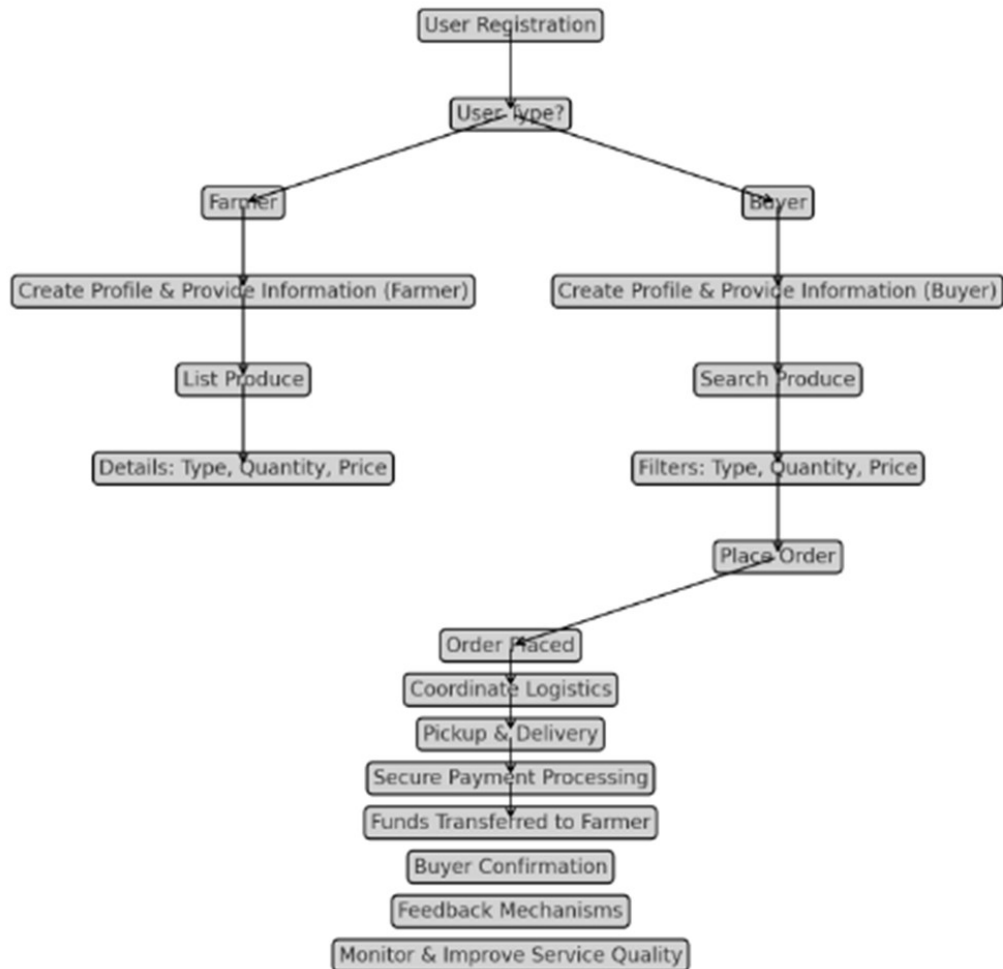


Figure 2: System Workflow

### Data Collection

Data collection for the new system will involve gathering information from both farmers and buyers. For farmers, this includes details on the types of crops grown, harvest schedules, average yields, and pricing preferences. For buyers, data collection will focus on demand patterns, preferred types of produce, and purchasing behavior. Additionally, the system will collect transaction data, user feedback, and logistical details to continuously improve the

platform's efficiency and effectiveness. This data was collected through user registration, regular updates from farmers on their produce, and real-time tracking of transactions.

### SYSTEM OVERVIEW

#### Home Page

The homepage, as illustrated in Figure 3, serves as the primary interface for users accessing the platform. Upon landing on the page, buyers are presented with a dynamic display of produce listed by various farmers, offering a comprehensive view of available products.



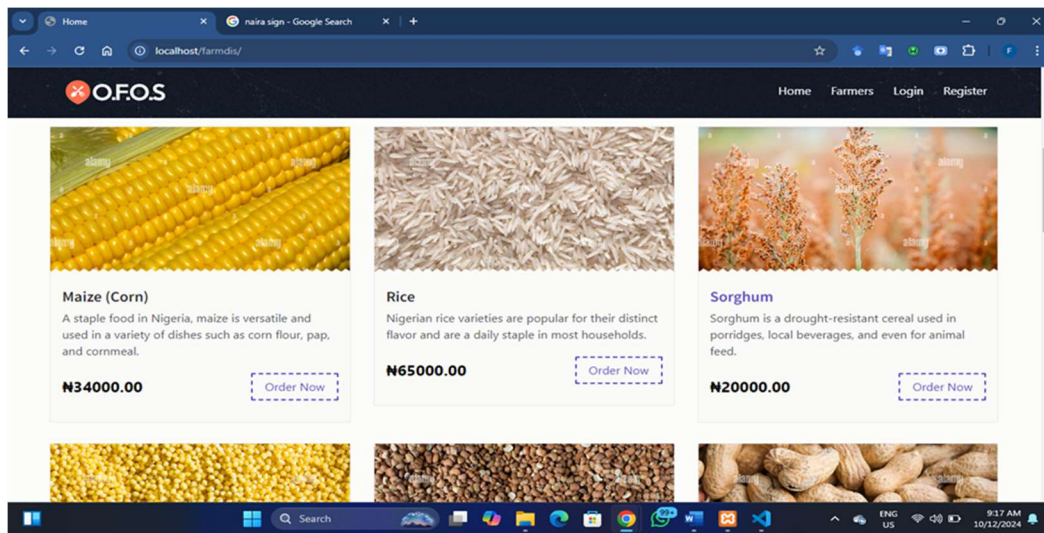


Figure 3: Home Product List Page

Each listing prominently features details such as the type of produce, price per unit, and quantity available, allowing buyers to easily compare options. The design of the homepage ensures that buyers can quickly navigate through a wide range of produce categories, including fruits, vegetables, grains, and more.

### Buyer Registration

As depicted in Figure 4, the registration process for buyers is straightforward and user-friendly, allowing them to create an account with essential details that ensure a personalized and secure experience on the platform.

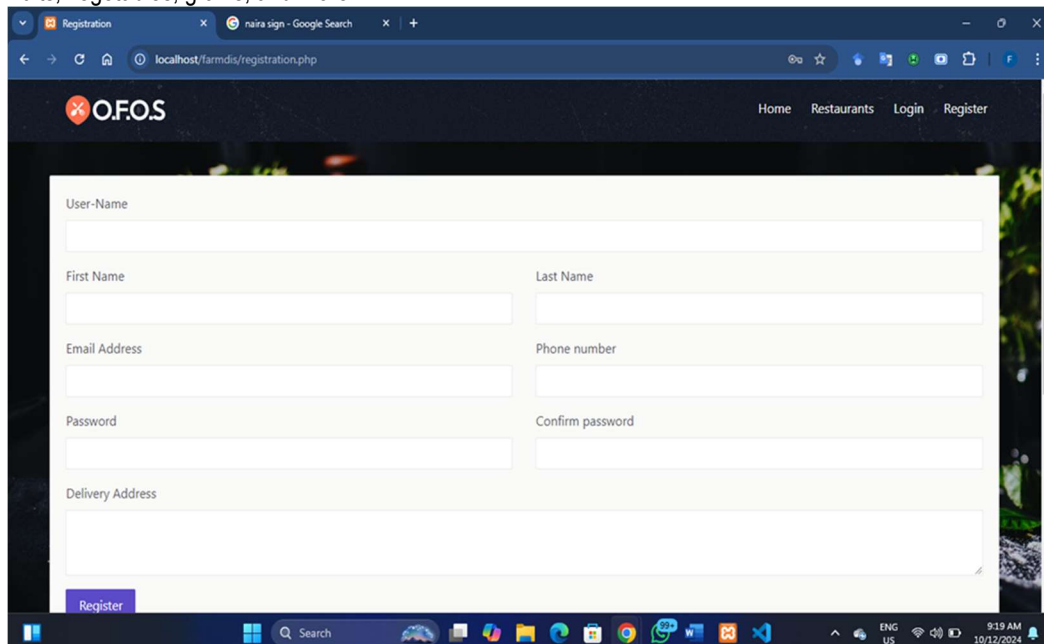


Figure 4: Buyers Registration Page

Corresponding author: Usman, Abdullahi Mohammed

[usmannck@gmail.com](mailto:usmannck@gmail.com)

Artificial Intelligent Department, The Federal Polytechnic, Bida, Niger State.

© 2024. Faculty of Technology Education. ATBU Bauchi. All rights reserved

Buyers are required to provide their full name, which will be associated with their account and used in future transactions, particularly for delivery and billing purposes.

As illustrated in Figure 5, the platform provides a comprehensive list of farmers, giving buyers the opportunity to explore individual farmers' profiles and view their produce.

### List of Farmers

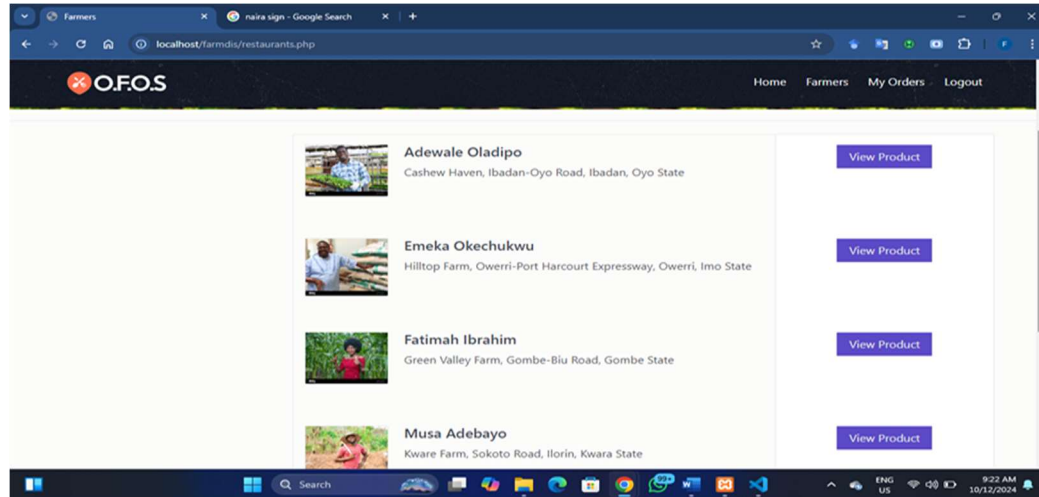


Figure 5: Farmers List Page

This feature enhances the transparency of the marketplace, allowing buyers to learn more about the farmers they are purchasing from. Each farmer's profile includes key details such as their name, location, and farm type (organic or conventional), providing buyers with useful context about the source of their produce.

### Add to Cart

As shown in Figure 6, the "Add to Cart" page is a critical component of the platform, designed to streamline the purchasing process for buyers. This page allows users to manage their selected produce before proceeding to checkout, offering a clear overview of all items they intend to purchase. The page displays each product that the buyer has added to their cart.

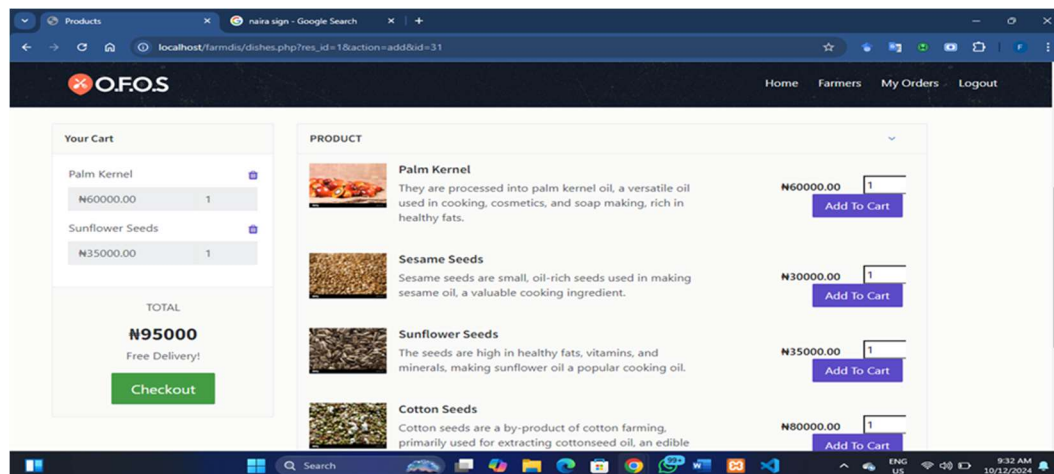


Figure 6: Add to Cart Page

Corresponding author: Usman, Abdullahi Mohammed

[usmannck@gmail.com](mailto:usmannck@gmail.com)

Artificial Intelligent Department, The Federal Polytechnic, Bida, Niger State.

© 2024. Faculty of Technology Education. ATBU Bauchi. All rights reserved



The "Add to Cart" page is designed for ease of use, providing buyers with full control over their selections. For instance, buyers can adjust the quantity of each item directly on the page, and the total cost will automatically update to reflect

these changes in real-time. If a buyer wishes to remove an item from the cart, they can do so with a single click, and the cart will update instantly.

### Order and Payment

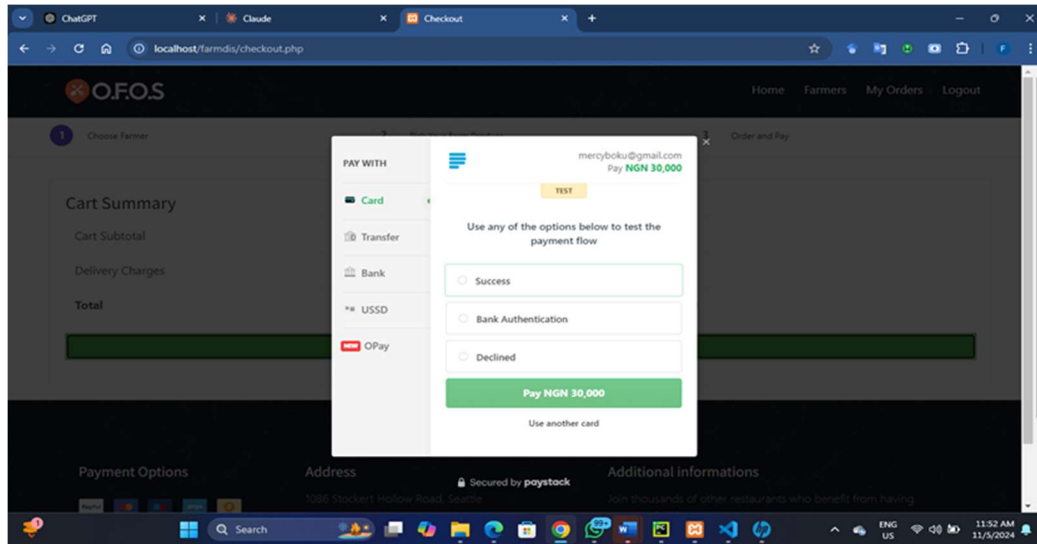
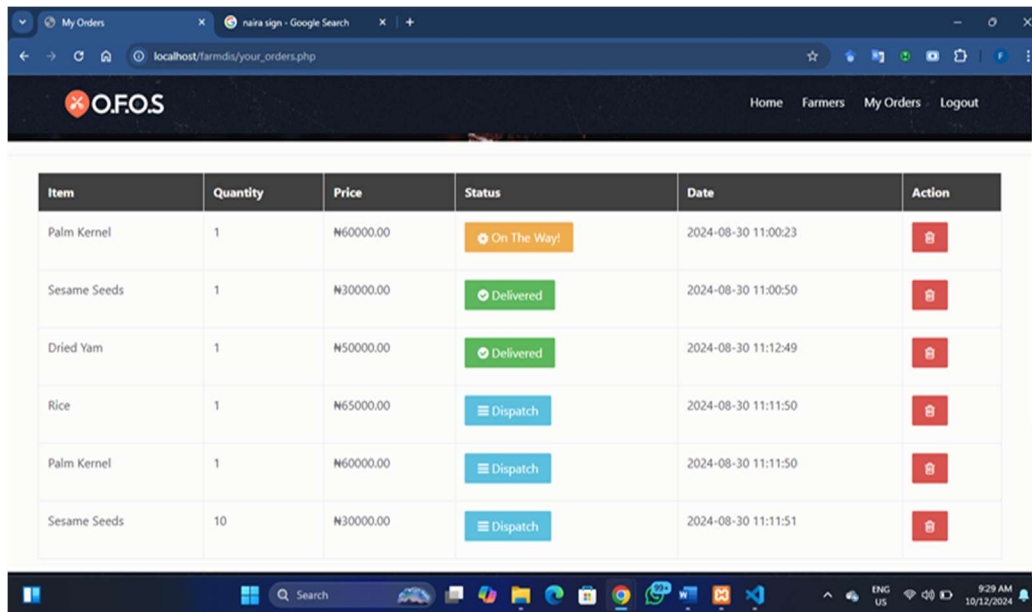


Figure 7: Paystack Payment

As depicted in Figure 7, the platform provides a detailed order page with paystack

integration, allowing buyers to pay for their produce in real time.

### Delivery



Item	Quantity	Price	Status	Date	Action
Palm Kernel	1	N60000.00	On The Way!	2024-08-30 11:00:23	
Sesame Seeds	1	N30000.00	Delivered	2024-08-30 11:00:50	
Dried Yam	1	N50000.00	Delivered	2024-08-30 11:12:49	
Rice	1	N65000.00	Dispatch	2024-08-30 11:11:50	
Palm Kernel	1	N60000.00	Dispatch	2024-08-30 11:11:50	
Sesame Seeds	10	N30000.00	Dispatch	2024-08-30 11:11:51	

Figure 8 Delivery Status

Once buyer purchases produce from a farmer, the order details are logged, and the order status is immediately visible. The order status page includes important information such as the produce purchased, quantity, price, and the total cost, including delivery charges if applicable. The system breaks down the order journey into clear stages, such as "Order Placed," "Payment Confirmed," "Produce Ready for Dispatch," "Out for Delivery," and "Delivered" as in figure 8.

#### Conclusion

The developed system represents a transformative approach to managing agricultural orders and deliveries. By automating and centralizing the order and delivery processes, the platform reduces the time and effort traditionally required for managing these transactions. It provides a streamlined and efficient experience for both buyers and farmers, who can now monitor each stage of the order and delivery process in real time. This transparency and accessibility foster trust and reliability, which are critical for maintaining long-term user engagement.

Furthermore, the system's scalability allows it to serve both small-scale farmers and

large agricultural businesses, making it suitable for diverse user needs. With built-in security features and a user-friendly interface, the platform is positioned as a robust solution for the agricultural sector. The inclusion of secure payment processing and logistics integration further enhances the system's utility, making it a valuable tool for advancing agricultural commerce in a digital-first economy.

#### RECOMMENDATIONS

The system is been recommended base on the underlisted advantages.

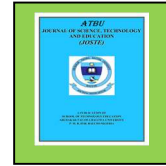
1. The integration of Paystack as the payment gateway simplifies the payment process and assures users of secure financial transactions, making the system more reliable. To maximize the effectiveness of the **system**, the following recommendations are suggested:
2. **User Training and Support:** Continuous training programs should be provided for both farmers and buyers to familiarize them with system updates and features, ensuring smooth operation and user satisfaction.

Corresponding author: Usman, Abdullahi Mohammed

[usmannck@gmail.com](mailto:usmannck@gmail.com)

Artificial Intelligent Department, The Federal Polytechnic, Bida, Niger State.

© 2024. Faculty of Technology Education. ATBU Bauchi. All rights reserved



3. **System Scalability:** As the user base grows, it is recommended to scale the system by optimizing the server resources and database architecture to handle increased traffic and transaction volumes efficiently

## REFERENCES

- Abid, F., Abid, M., & Anwar, A. (2022). Market access challenges in agricultural sectors. *Journal of Agricultural Economics*, 33(4), 324-338.
- Ali, M., Zhang, Q., & Han, X. (2021). Economic outcomes of online platforms for farm produce sales. *Journal of Digital Agriculture*, 6(2), 125-142.
- Annamalai, K., & Rao, S. (2023). Enhancing market access for smallholder farmers through technology: A case of e-Choupal. *International Journal of Rural Studies*, 29(5), 417-432.
- Anusha, P., & Singh, R. (2024). Farm to Home: An android-based direct market application for farmers. *Journal of Mobile Technology in Agriculture*, 7(1), 11-25.
- Anurag, R., & Das, L. (2024). Leveraging e-commerce for agricultural marketing: Connecting farmers and consumers. *International Journal of Agricultural Technology*, 8(4), 401-419.
- Cheng, Z., Li, H., & Wu, Q. (2023). Targeted digital marketing strategies for agricultural products. *Journal of Agricultural Marketing*, 18(1), 88-103.
- Deichmann, U., Goyal, A., & Mishra, D. (2016). Technology and agricultural market linkages in developing countries. *Agricultural Economics*, 47(1), 31-45.
- Jones, S., & Smith, L. (2021). Consumer confidence and agricultural e-commerce systems. *Journal of Agricultural Economics*, 59(2), 183-199.
- Liu, X., & Wang, P. (2021). The expansion of non-perishable goods in e-commerce. *Journal of E-commerce in Agriculture*, 4(4), 322-336.
- Mambile, S. (2019). Web-based poultry market platform usability assessment. *East African Journal of Agricultural Sciences*, 5(3), 280-295.
- Nguyen, T., & Zhao, Y. (2022). Digital agricultural marketing and supply chain efficiency. *Journal of Agrarian Studies*, 21(2), 134-146.
- Patel, R., & Kumar, N. (2023). Stability in agricultural markets through non-perishable goods. *Journal of Sustainable Agriculture*, 14(3), 402-415.
- Singh, V., & Gupta, R. (2021). Online marketplaces for agricultural produce: A review. *Agricultural Business Review*, 10(2), 155-172.
- Sulthana, N., & Rajitha, K. (2023). AgroMart: A platform for direct sales in Indian agriculture. *International Journal of Agrotechnology*, 5(2), 230-245.
- Wang, Q., & Zhao, H. (2021). Enhancing supply chain transparency in agricultural markets. *International Journal of Agricultural Marketing*, 13(4), 357-373.
- Wu, L., & Chen, F. (2022). E-commerce and agricultural logistics in rural regions. *Journal of Agricultural Logistics and Supply Chain Management*, 8(1), 120-140.
- Zhao, Y., & Liu, Z. (2022). Direct consumer engagement in agricultural marketing via social media. *Agricultural Marketing Review*, 16(3), 271-288.
- Zhang, Y., & Zhao, H. (2023). Supply chain optimization through data analytics in agriculture. *Journal of Agricultural Supply Chain*, 19(3), 195-209.