

Integrated Community-based Web Platform for Safe Food Marketplace and Agricultural Knowledge Exchange

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Abstract - The increasing demand for safe food and sustainable agricultural products has highlighted the need for digital platforms that facilitate direct interaction between producers and consumers while supporting agricultural knowledge sharing within local communities. This research aimed to design, develop, and evaluate a community-based web platform that integrates safe food marketing with agricultural knowledge management. The proposed platform provides comprehensive functionalities, including user management, product management, agricultural knowledge dissemination, online ordering, customer reviews, real-time communication through a chat system, sales reporting, and Telegram notification services.

The study adopted a system development methodology consisting of five phases: requirement analysis, system design, system development, system testing, and system evaluation. The completed platform was evaluated by representative users using a five-point Likert scale, and the collected data were analyzed using descriptive statistics, including mean and standard deviation.

The evaluation results indicated that the proposed platform achieved a high level of user satisfaction, with an overall mean score of 4.35 (S.D. = 0.57). The highest-rated aspect was the timeliness of post and content updates (Mean = 4.65, S.D. = 0.57), while the platform also received high ratings for usability, information quality, system functionality, and overall benefits. These findings demonstrate that the developed platform effectively supports community-based safe food management, enhances agricultural knowledge exchange, improves communication between producers and consumers, and contributes to local economic development. The proposed platform provides a practical digital solution for promoting sustainable community food systems and offers a foundation for future integration with emerging technologies, such as artificial intelligence, the Internet of Things, and blockchain.

Keywords - Safe Food; Community-Based Platform; Agricultural Knowledge Management; Digital Agriculture; Web Application;

I. INTRODUCTION

The growing demand for safe food and sustainable agricultural products has become a global concern due to increasing awareness of food safety, environmental sustainability, and public health. Consumers are increasingly seeking agricultural products that are free from chemical residues while expecting greater transparency regarding product origins and production processes. At the same time, small-scale farmers continue to encounter significant challenges in accessing markets, disseminating agricultural knowledge, and establishing direct connections with consumers. Recent studies have highlighted that digital technologies have become essential tools for facilitating knowledge exchange, improving communication among stakeholders, and strengthening agri-food value chains through integrated digital platforms [1], [2]. Furthermore, digital transformation has been recognized as a key driver for improving sustainability, transparency, and resilience across agri-food systems [4], [7]. Digital extension tools and online agricultural platforms have also demonstrated considerable potential for improving farmers' access to agricultural information, although challenges related to usability, digital literacy, and stakeholder engagement remain significant [5]. Recent studies further emphasize that responsible and socially inclusive digital innovation is essential for ensuring equitable participation and sustainable development within food systems [10].

Community-based digital platforms have emerged as an effective approach for promoting collaboration among farmers, consumers, and local organizations. These platforms not only facilitate agricultural knowledge sharing but also support local product marketing, enhance consumer confidence, and contribute to sustainable food systems. Previous studies have shown that successful knowledge sharing within agricultural communities depends on social participation, organizational support, and appropriate digital technologies [4], [6]. In addition, digital technologies have been reported to strengthen food safety and quality management throughout agricultural supply chains while supporting data-driven decision-making [8], [9]. Online agricultural communities have also been shown to improve farmers' access to practical knowledge, encourage peer-to-peer learning, and strengthen local agricultural networks, thereby enhancing sustainable agricultural development [1], [3].

Despite the rapid advancement of digital agriculture and community-based digital platforms, several important research gaps remain. Existing studies have primarily focused on individual aspects of digital agriculture, such as agricultural knowledge dissemination, food traceability, digital advisory services, or online marketplaces. Although these studies have demonstrated the potential of digital technologies to improve agricultural productivity and information accessibility, relatively few have developed an integrated platform that simultaneously supports safe food marketing, agricultural knowledge exchange, community interaction, product reviews, and real-time communication within a single digital ecosystem. Moreover, previous research has largely emphasized technological capabilities and supply chain efficiency, while comparatively limited attention has been given to strengthening collaboration among local producers, consumers, and community organizations through a user-centered platform that promotes sustainable local food systems and community participation [4], [6], [8].

To address these limitations, this study aims to design, develop, and evaluate a Smart Community Platform for Safe Food Marketplace and Agricultural Knowledge Exchange. The proposed web-based platform integrates safe food marketing, agricultural knowledge management, product reviews, online communication, sales analytics, and notification services into a unified environment. The platform is designed to connect local producers directly with consumers while providing comprehensive information on vegetable cultivation, food processing, nutritional values, and sustainable agricultural practices. Furthermore, the effectiveness of the proposed platform is evaluated through user satisfaction assessment to determine its usability, functionality, information quality, and overall benefits for community-based food systems.

The contributions of this study are threefold. First, it proposes an integrated community-based digital platform that combines safe food commerce with agricultural knowledge management, addressing the limitations of existing platforms that typically focus on a single application domain. Second, the proposed platform enhances collaboration among farmers, consumers, and community organizations through integrated communication, product review, and notification mechanisms that facilitate knowledge sharing and community participation. Finally, this study provides empirical evidence regarding the usability and effectiveness of the developed platform through a

systematic user evaluation, offering practical guidelines for researchers, policymakers, and local organizations seeking to promote sustainable agriculture, local food security, and digital transformation in community-based food systems.

II. METHODOLOGY

This research employed a system development approach to design and develop a community-based web platform for safe food marketing and agricultural knowledge sharing. The methodology consisted of five sequential phases: requirement analysis, system design, system development, system testing, and system evaluation.

A. Requirement Analysis

The first phase focused on identifying the requirements of the proposed platform. Information was collected from project documents, existing business processes, and discussions with potential users, including community members, product sellers, and system administrators. The objective was to understand the problems encountered in the existing community food distribution process and identify the essential functions required by the users.

The analysis indicated that the existing process lacked a centralized platform for product promotion, communication between producers and consumers, agricultural knowledge dissemination, and order management. Based on these findings, the functional requirements of the system were defined. The main functions included user management, product management, agricultural knowledge management, online ordering, customer reviews, communication through a chat system, sales reporting, and notification services.

B. System Design

After the requirements had been identified, the system architecture and database structure were designed. The architecture consisted of three main components: the presentation layer, application layer, and database layer.

The presentation layer provides web interfaces for customers, sellers, and administrators. The application layer processes business logic, user authentication, product management, and transaction management. The database layer stores information related to users, products, agricultural knowledge, purchase orders, customer reviews, and sales records.

Entity Relationship Diagrams (ERD), Data Flow Diagrams (DFD), and system flowcharts were prepared to describe the relationships among system components and the flow of information. These design models served as the foundation for software implementation. As shown in Fig. 1 and Fig. 2.

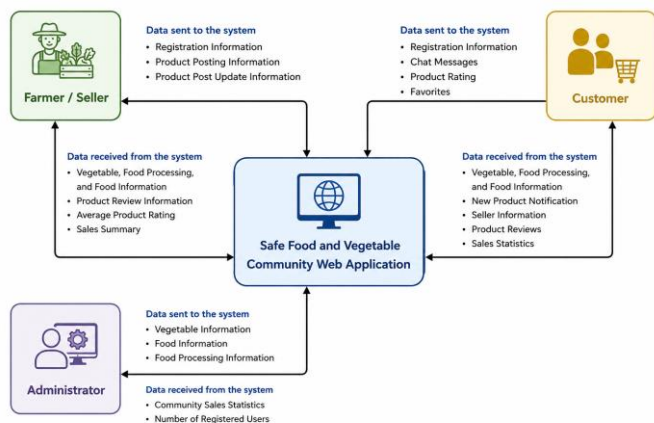


Fig. 1. Context Diagram.

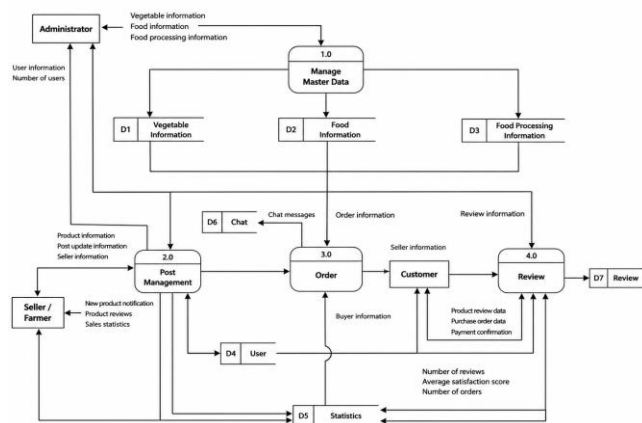


Fig. 2. Data Flow Diagram.

C. System Development

The web application was developed using standard web technologies. The front-end was designed to provide an intuitive interface that supports desktop and mobile web browsers. The back-end was responsible for processing application logic, database transactions, user authentication, and communication among different modules.

The developed platform consists of several integrated modules:

- User registration and authentication
- Product management
- Agricultural knowledge management
- Community news and announcements
- Shopping cart and order processing
- Customer review system
- Chat communication between buyers and sellers
- Sales statistics and reporting
- Telegram notification service for system events

All information generated by users is stored in a centralized database, allowing authorized users to manage products, monitor transactions, and retrieve reports through the administration interface.

D. System Testing

The developed system was tested to verify both functional correctness and system performance. Functional testing was performed by executing all major functions of the platform and comparing the observed outputs with the expected results. The testing covered user registration, login, product management, ordering process, payment confirmation, review submission, notification services, and report generation.

Any errors identified during testing were corrected before the final evaluation. The objective of this phase was to ensure that every module operated correctly and that data were accurately stored and retrieved from the database.

E. System Evaluation

The completed system was evaluated by representative users to determine its effectiveness and usability. The evaluation focused on five aspects: system functionality, ease of use, interface design, information quality, and overall user satisfaction.

Participants used the developed platform to perform common tasks, including product searching, ordering products, accessing agricultural knowledge, and communicating with sellers. After completing these activities, they provided feedback using a structured evaluation questionnaire based on a five-point Likert scale.

The collected responses were analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation. These statistics were used to summarize user opinions and determine the overall performance of the proposed community-based digital platform.

III. RESULTS

The research resulted in the successful development of a community-based digital platform for safe food marketing and agricultural knowledge sharing. The platform was designed as a web-based application that enables community members to manage agricultural products, disseminate farming knowledge, and communicate directly with consumers through an integrated online system. The developed platform supports three categories of users, namely administrators, product sellers, and customers, each with different access privileges according to their responsibilities. As shown in Fig. 3.



Fig. 3. Main Page.

The administrator module was developed to manage the overall operation of the platform. The system allows administrators to manage user accounts, product categories, agricultural knowledge, community news, customer orders, sales reports, and website content through a centralized management interface. These functions enable efficient monitoring of platform activities and ensure that the published information remains accurate and up to date. As shown in Fig. 4.

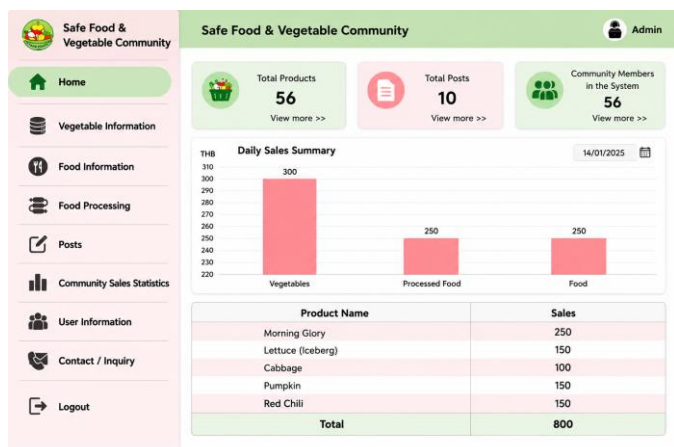


Fig. 4. Admin page.

The seller module provides tools for community members to manage their products and communicate with customers. Sellers can add, edit, and remove product information, including product images, prices, descriptions, and available quantities. In addition, the platform enables sellers to publish agricultural knowledge related to vegetable cultivation, food processing, and safe food production practices. Sellers are also able to receive customer orders, monitor sales transactions, and respond to customer inquiries through the integrated communication module.

For customers, the developed platform provides convenient access to safe food products through an intuitive web interface. Users can browse product categories, search for products, view detailed product information, place online orders, and monitor order status. The platform also includes a customer review function that allows users to provide feedback after receiving products, thereby increasing transparency and supporting purchasing decisions for future customers.

Another important outcome of this research is the integration of an agricultural knowledge management module. This module serves as an online repository where community members can publish articles related to vegetable cultivation, food preservation, nutritional information, and agricultural best practices. The knowledge repository enables continuous information exchange among producers and consumers and supports lifelong learning within the community.

To improve communication efficiency, the platform incorporates an online chat system and Telegram notification service. These features allow users to receive notifications regarding new orders, transaction updates, and important announcements in real time. As a result, communication between buyers and sellers becomes more efficient, reducing delays in order processing and improving customer service.

The developed platform also includes a sales reporting module that summarizes transaction data and presents statistical information for administrators and sellers. The reporting functions provide information on sales performance, customer purchasing behavior, and product popularity, allowing community members to analyze business performance and support future marketing decisions.

Overall, the developed system successfully integrates community commerce, agricultural knowledge management, customer communication, and sales management within a single web platform. The implementation demonstrates that digital technologies can effectively support local safe food communities by improving access to agricultural information, facilitating product distribution, and strengthening collaboration between producers and consumers. The completed platform satisfies the functional requirements identified during the system analysis phase and provides a practical digital solution for community-based safe food management.

Table I. Summary of User Satisfaction Evaluation of the Safe Food and Vegetable Community Web Application.

Evaluation Items	Mean	S.D.	Interpretation
System Design and Usability			
1. The user interface is visually attractive and appropriately designed.	4.15	0.48	High
2. The system menu is easy to understand and navigate.	4.1	0.54	High
3. Information can be accessed conveniently and quickly.	4.4	0.66	High
4. The color scheme, font size, and website layout are appropriate.	4.05	0.59	High
Content and Information Quality			
1. Information related to vegetables and food is accurate.	4.25	0.54	High
2. Information on vegetable cultivation, maintenance, and nutritional value is useful.	4.25	0.62	High
3. Posts and content are updated in a timely manner.	4.65	0.57	Very High
System Functionality			
1. The functions for adding, editing, and closing posts operate correctly.	4.45	0.59	High
2. The chat system is practical and convenient for communication.	4.5	0.81	Very High
3. The sales statistics are accurate and easy to understand.	4.2	0.75	High
Benefits and Overall Satisfaction			
1. The web application promotes product exchange within the community.	4.45	0.5	High
2. The platform helps increase income and promotes the local economy.	4.55	0.59	Very High
3. The platform improves consumers' access to safe food products.	4.5	0.5	Very High
4. Overall satisfaction with the web application.	4.35	0.48	High
Overall Mean	4.35	0.57	High

Table I. presents the results of the user satisfaction evaluation of the Safe Food and Vegetable Community Web Application. Overall, the developed system received a high level of user satisfaction, with an overall mean score of 4.35 (S.D. = 0.57). The findings indicate that the proposed platform effectively supports community-based safe food management and meets users' expectations in terms of usability, functionality, information quality, and overall benefits.

Regarding system design and usability, respondents expressed a high level of satisfaction across all evaluation items. The highest-rated aspect was the convenience and speed of accessing information (Mean = 4.40, S.D. = 0.66), indicating

that users were able to retrieve information efficiently. The visual appearance of the interface, menu organization, and website layout also received favorable evaluations, with mean scores ranging from 4.05 to 4.15, reflecting that the system interface was considered user-friendly and appropriate for community users.

For content and information quality, users evaluated the information provided by the platform positively. The highest score in this dimension was obtained for the timeliness of post and content updates (Mean = 4.65, S.D. = 0.57), which was rated at the very high level. In addition, information related to vegetables, cultivation practices, crop management, and nutritional value received consistently high ratings (Mean = 4.25), suggesting that the platform serves as a reliable source of agricultural information for community members.

The evaluation of system functionality also demonstrated positive outcomes. Respondents rated the chat function as the most satisfactory feature in this category (Mean = 4.50, S.D. = 0.81), indicating that the communication function effectively facilitates interaction between buyers and sellers. The functions for adding, editing, and closing product posts (Mean = 4.45, S.D. = 0.59) and the sales statistics module (Mean = 4.20, S.D. = 0.75) were likewise evaluated at a high level, confirming that the core functions of the web application operate correctly and efficiently.

With respect to the benefits and overall user satisfaction, respondents agreed that the platform contributes positively to the local community. The highest-rated item in this dimension was the platform's contribution to increasing community income and promoting the local economy (Mean = 4.55, S.D. = 0.59), followed by improving consumers' access to safe food products (Mean = 4.50, S.D. = 0.50) and supporting product exchange within the community (Mean = 4.45, S.D. = 0.50). Overall satisfaction with the web application was rated at a high level (Mean = 4.35, S.D. = 0.48), indicating that users perceived the developed platform as both useful and effective for supporting community-based safe food activities.

The results further reveal opportunities for future improvement. Although all evaluation items achieved high or very high ratings, the item concerning the appropriateness of the website's color scheme, font size, and layout received the lowest mean score (Mean = 4.05, S.D. = 0.59). This suggests that enhancing the visual design and user interface could further improve usability and provide a better experience for a wider range of users. Nevertheless, the overall findings confirm that the proposed web application successfully fulfills its intended objectives and provides an effective digital platform for promoting safe food marketing, agricultural knowledge sharing, and sustainable community development.

IV. DISCUSSION

The evaluation results show that the developed platform effectively supports community-based safe food management and agricultural knowledge sharing. The high level of user satisfaction indicates that the platform successfully integrates product marketing, agricultural information, and communication services into a single web-based environment. In particular, users highly appreciated the chat function, timely content updates, and product management features, suggesting

that integrating communication and information services improves interaction between producers and consumers. These findings are consistent with previous studies that reported digital platforms enhance knowledge sharing, stakeholder collaboration, and access to agricultural information [1], [5]. Likewise, the positive evaluation of the knowledge management module supports earlier studies indicating that community-based digital platforms facilitate continuous learning, strengthen local knowledge networks, and promote sustainable agricultural practices through effective knowledge exchange [4], [6].

The proposed platform extends previous community-based digital platforms by integrating safe food marketing, agricultural knowledge management, customer communication, product reviews, and notification services within a single system. Unlike conventional platforms that primarily focus on online transactions or information dissemination, the proposed platform emphasizes collaboration among producers, consumers, and community organizations, thereby supporting both economic and social aspects of community-based food systems. The positive evaluation of the platform also indicates that digital technologies can improve access to safe food products while creating new opportunities for local producers to reach consumers directly. Nevertheless, respondents assigned comparatively lower scores to the visual appearance of the user interface, suggesting that improvements in website design and user experience should be considered in future development. Additional enhancements, including mobile applications, artificial intelligence, Internet of Things (IoT) technologies, and blockchain-based product traceability, could further improve platform functionality, transparency, and long-term sustainability.

V. CONCLUSION

This research developed a community-based digital platform to support safe food marketing and agricultural knowledge sharing by integrating product management, online ordering, agricultural knowledge dissemination, customer reviews, communication services, sales reporting, and notification functions into a single web-based system. The developed platform enables producers to manage products and communicate directly with consumers, while providing consumers with convenient access to safe food products, agricultural information, and online purchasing services. The findings demonstrate that the proposed platform successfully fulfills the functional requirements identified during the system analysis and provides an effective digital solution for improving information management, facilitating community participation, and supporting collaboration among producers and consumers.

The integration of digital technologies within a single platform contributes not only to improving the efficiency of community-based food management but also to promoting knowledge exchange and strengthening local food systems. The proposed platform provides a practical foundation for supporting sustainable agriculture, expanding market opportunities for community producers, and increasing public access to safe food products. Future research may enhance the

platform by integrating mobile applications, artificial intelligence for product recommendation and demand forecasting, Internet of Things (IoT) technologies for agricultural monitoring, and blockchain technology for product traceability to further improve system intelligence, operational efficiency, and transparency throughout the food supply chain.

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