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Web-Based Market Goods Trading System of Agri-Pinoy Trading Center

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ABSTRACT: The agricultural trading practices in rural areas, such as those at the Agri-Pinoy Trading Center in Roxas, Isabela, Philippines continue to face inefficiencies stemming from labor-intensive manual transactions, disorganized marketplaces, and a lack of guaranteed market access. This study addresses these challenges through the development and evaluation of a Web-Based Market Goods Trading System tailored for local agricultural stakeholders. Guided by the Rapid Application Development (RAD) model, the system was designed to enable direct interactions between producers and buyers, streamlining the trading process through real-time product listings, negotiation tools, and notification features. The system architecture emphasizes accessibility, transparency, and secure data handling, managed via a centralized web server. Evaluation using the ISO/IEC 25010 Software Product Quality Model, incorporating feedback from IT experts, farmers, and buyers, demonstrated strong agreement across eight software quality characteristics, including functional suitability, usability, and maintainability, with an overall weighted mean of 4.46. The results affirm the system's effectiveness in modernizing agricultural commerce, reducing transaction delays, and enhancing economic opportunities for rural producers. This research highlights the transformative potential of digital platforms in fostering inclusive and resilient agricultural trading ecosystems.

KEYWORDS: Agricultural Trading, Web-Based System, Agri-Pinoy, ISO/IEC 25010, Rapid Application Development, Rural Commerce

I. INTRODUCTION

Trading refers to the transfer of ownership of goods or services from one party to another in exchange for monetary value, other products, or services. Traditionally, this practice encompasses commerce, financial transactions, or bartering, with markets serving as platforms for such exchanges. While manual trading requires discipline and precision, technological advancements have introduced automated systems that facilitate faster and more efficient transactions through real-time market data and trading algorithms. Despite the benefits of these innovations, many rural regions—especially those engaged in agricultural trade—continue to rely on traditional trading practices that are labor-intensive, inefficient, and economically limiting.

The Agri-Pinoy Trading Center in Roxas, Isabela exemplifies this traditional trading model. Local farmers and producers transport their agricultural goods to the center, often in bulk and without prior arrangements or confirmed buyers. In this highly competitive setting, producers may wait hours or even days to secure a sale, risking product spoilage and financial losses. Meanwhile, buyers visit the trading center to source products based on their quality and price, often navigating a disorganized and inconsistent marketplace. This situation reflects broader inefficiencies in rural trading systems, including poor information flow, unregulated pricing, and a lack of guaranteed market access.

Several studies (Gonzaga et al., 2020; Mayo & Villarta, 2023; Santos, 2023) have highlighted the structural weaknesses of such traditional agricultural trading systems. These include the absence of transparency across the supply chain, overreliance on costly intermediaries, limited access to capital and financial services, and inadequate integration between producers and end-users (Sivalakshmi et al., 2021). These constraints often lead to inflated market prices, deterioration in product quality, and elevated risks of food insecurity (Fronda, 2022). Furthermore, the economic opportunities of smallholder farmers are curtailed by these limitations, reinforcing cycles of poverty and underdevelopment in rural communities.

Emerging digital technologies and web-based platforms offer significant potential to transform agricultural trading by eliminating middlemen, enabling direct communication between stakeholders, and providing a more structured marketplace. Research shows that the digitization of agricultural markets can improve product traceability, enhance supply chain efficiency, and broaden market access for small-scale producers (Ma et al., 2024). Digital platforms not only support faster and safer transactions but also provide valuable data for decision-making. Importantly, the establishment of reliable communication

channels and real-time trading systems contributes to improved coordination, reduced waste, and more sustainable agricultural outcomes (Nedumaran et al., 2020; Levi et al., 2020).

To address the persistent inefficiencies in the current trading practices, this study proposes the development of a Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center in Roxas, Isabela. The platform is designed to modernize local agricultural commerce by facilitating direct interaction between farmers, producers, and buyers through a centralized digital marketplace. By allowing users to post and browse product listings, negotiate transactions, and receive timely updates, the system aims to enhance the transparency, accessibility, and efficiency of agricultural trade. Ultimately, the system seeks to empower local stakeholders, reduce transaction bottlenecks, and foster a more resilient and inclusive agricultural economy.

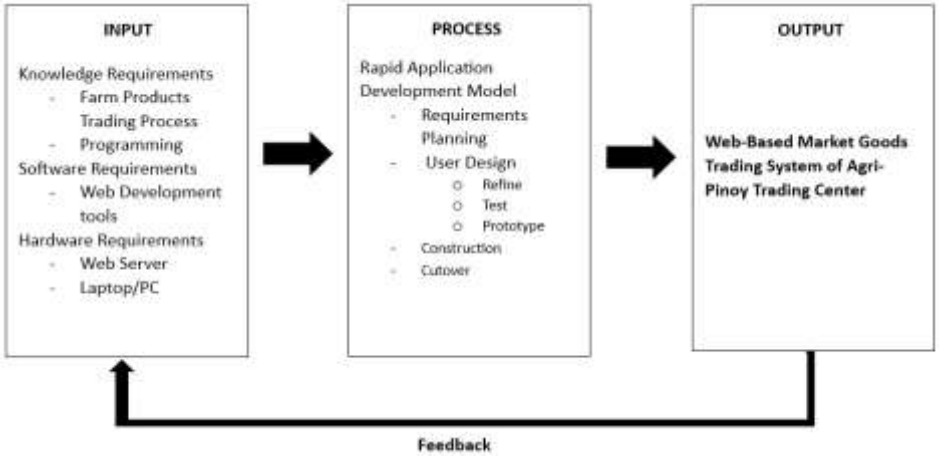

Figure 1: Input-Process-Output (IPO) model of the Web-Based Market Goods Trading System of Agri-Pinoy Trading Center

The Input–Process–Output (IPO) model presented in figure 1 illustrates the systematic development of the Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center. In the Input phase, the development process begins with gathering various requirements. These include knowledge requirements such as understanding farm products, trading processes, and programming concepts; software requirements like web development tools; and hardware requirements including access to a web server and personal computers or laptops. These inputs are essential in equipping the developers with the foundational resources and tools necessary for building the system. Moving into the Process phase, the development follows the Rapid Application Development (RAD) model, comprising several stages—Requirements Planning to gather and define user needs; User Design, where iterative cycles of refining, testing, and prototyping occur; Construction, the actual system development phase; and finally, Cutover, where the system is deployed and made ready for end-users. The culmination of this process leads to the Output, which is the functional and publicly accessible Web-Based Market Goods Trading System of the Agri-Pinoy Trading Center. Notably, a feedback mechanism is shown looping from the output back to the input, emphasizing continuous improvement. This feedback loop ensures that real-world use of the system can inform future updates and refinements, aligning the system with evolving user needs and technical standards.

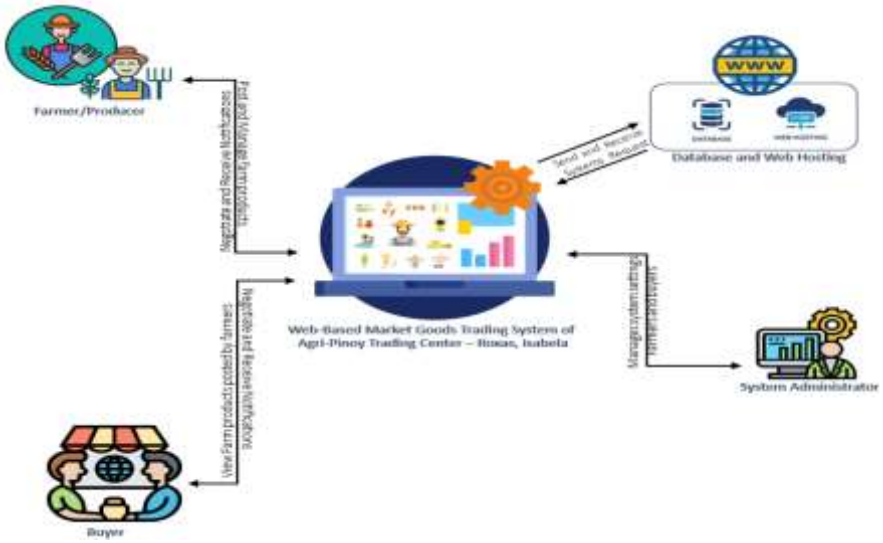

Figure 2: System Architecture of the Web-Based Market Goods Trading System of Agri-Pinoy Trading Center

Figure 2 illustrates the system architecture of the Web-Based Market Goods Trading System developed for the Agri-Pinoy Trading Center in Roxas, Isabela. The system acts as a digital intermediary that connects farmers or producers with potential buyers through an online platform. Farmers or producers can create accounts and post their farm products, which will then be publicly displayed on the system for buyers to view. Buyers, upon accessing the system, can browse the listed agricultural goods, initiate negotiations, and communicate directly with the farmers. Both parties receive notifications throughout the process, supporting transparent and real-time transactions.

The system is managed by a system administrator who oversees user accounts, maintains system configurations, and moderates the content posted on the platform. All data generated by users and the system—including product listings, user profiles, and transaction details—are stored in a centralized database and hosted on a web server. This setup ensures that the system is accessible online, with secure and efficient handling of system requests. Overall, the architecture supports a streamlined trading process, promoting ease of access to agricultural goods and enhancing market opportunities for local producers.

II. METHODOLOGY

This study adopts the Rapid Application Development (RAD) model to guide the systematic and iterative development of the Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center in Roxas, Isabela. The RAD model was selected for its emphasis on rapid prototyping, active user involvement, and swift iteration features well-suited for building functional systems within constrained timeframes. Through clearly defined phases: requirements planning, user design, construction, and implementation, the development process ensured responsiveness to user feedback and contextual needs.

Following the system's completion, its quality and performance were evaluated using the ISO/IEC 25010 Software Product Quality Model, which provides a comprehensive framework for assessing software based on characteristics such as functionality, reliability, usability, performance efficiency, maintainability, and portability. This evaluation aimed to determine the extent to which the system complies with international software quality standards, ensuring that it meets both technical and user-centered requirements.

A. Rapid Application Development Model

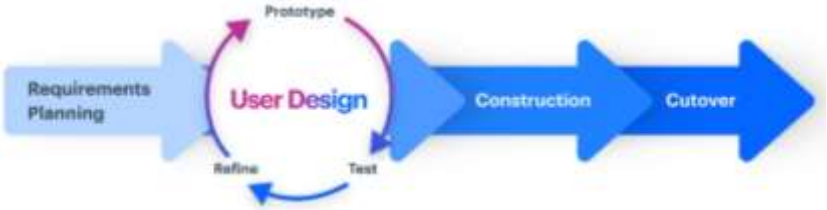

Figure 3: Rapid Application Development Model

The Rapid Application Development (RAD) model as shown in figure 3 was adopted in this research to ensure the efficient and user-centered development of the Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center in Roxas, Isabela. RAD emphasizes quick development cycles, active user participation, and iterative feedback, making it ideal for building systems that require close alignment with end-user needs.

The process began with the Requirements Planning phase, where the development team collaborated with stakeholders, including farmers/producers, buyers, and system administrators, to gather and analyze the system requirements. Through interviews, consultations, and surveys, the functional needs of the platform were defined such as product posting, user registration, buyer access, and negotiation features. This phase provided the foundational blueprint for the system's design and development.

The next phase, User Design, involved iterative prototyping to visualize and refine the system's interface and functionalities. This phase was broken down into three key sub-activities: refine, test, and prototype. In the refinement step, initial interface layouts and feature workflows were created based on the documented requirements. These early designs were then tested by actual users—farmers and buyers—who provided feedback on usability and functionality. Based on this feedback, the prototypes were continuously updated to address issues and improve user experience. This cycle of testing and refinement ensured that the system was both intuitive and practical for its intended users.

Following successful prototype validation, the project proceeded to the Construction phase. Here, the complete system was developed using appropriate web technologies. The development team implemented the front-end interface, back-end database, and system logic based on the approved design. Features such as product posting, user login, content management, and negotiation tools were fully built and tested. The database and hosting environment were also set up to ensure proper data

storage and system performance. During this phase, comprehensive debugging and functional testing were conducted to ensure system reliability.

Finally, the Cutover phase marked the deployment of the system into a live environment. This included final testing in the web-hosted environment, user training sessions for farmers, buyers, and administrators, and the official launch of the platform. Any issues identified during this stage were addressed promptly to ensure a smooth transition. The system was now ready for use by the Agri-Pinoy Trading Center and its stakeholders.

B. Sampling Technique, Respondents of the Study and Statistical Treatment

A purposive sampling approach was employed to select respondents for this study and it presented in table 1.

Table 1: Frequency Distribution of Respondents in the Evaluation of the System Using CISO/IEC 25010 Software Product Quality Model

Respondents	Frequency	Percentage
IT Experts	10	20%
Buyers	20	40%
Farmer Producers	20	40%
Total	**50**	**100**

Table 1 shows the frequency distribution of the 50 respondents who evaluated the system based on the ISO/IEC 25010 Software Product Quality Model, focusing on eight quality characteristics: Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability. The respondents were categorized into three groups: IT Experts (20%), Buyers (40%), and Farmer Producers (40%).

This diverse group ensured a well-rounded assessment of the system. IT Experts primarily contributed insights into the technical quality characteristics such as Performance Efficiency, Reliability, Security, Maintainability, and Portability, drawing on their professional knowledge and experience in software systems. Buyers, representing a significant portion of the respondents, emphasized aspects related to Usability, Functional Suitability, and Compatibility, as these directly impact their interaction with and satisfaction in using the system for purchasing products. Meanwhile, Farmer Producers also played a vital role in assessing Functional Suitability, Usability, and Compatibility, particularly in terms of how well the system supports their trading activities and integrates with their existing workflows. By involving both technical experts and actual end-users, the evaluation results offer a comprehensive perspective on the system's quality across all eight ISO/IEC 25010 criteria.

The researchers used the following formula to get the result of the system evaluation using ISO/IEC 25010 Software Product Quality Model .

$$WM = \frac{(1)F + (2)F + (3)F + (4)F + (5)F}{N}$$

Where,

WM = weighted mean

F = Frequency

N = Number of Respondents

Table 2: Likert Scale

NUMERICAL SCALE	Range	INTERPRETATION
5	4.21- 5.00	Strongly Agree
4	3.41 – 4.20	Agree
3	2.61 – 3.40	Fairly Agree
2	1.81 – 2.60	Disagree
1	1.00 – 1.80	Strongly Disagree

C. ISO/IEC 25010 Software Product Quality Model

The ISO/IEC 25010 Software Product Quality Model provides a comprehensive framework for evaluating the quality of software systems (ISO/IEC 25010, 2024). It outlines eight key quality characteristics, Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability, each with further sub-characteristics that guide

systematic assessment. In the context of this research, the model serves as a benchmark for evaluating the Web-Based Market Goods Trading System developed for the Agri-Pinoy Trading Center. For instance, functional suitability ensures that the system meets stakeholder requirements such as product posting, user registration, and negotiation features. Usability is assessed through the simplicity of the interface and user experience, particularly for farmers and buyers with limited technical literacy. Reliability and performance efficiency are measured through system uptime and response time under load, while security evaluates how well user data and transactions are protected. The model also aids in examining maintainability for future system updates and portability in case of deployment across various platforms or hosting environments.

III. RESULTS AND DISCUSSIONS

A. Wireframe of the Developed Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center

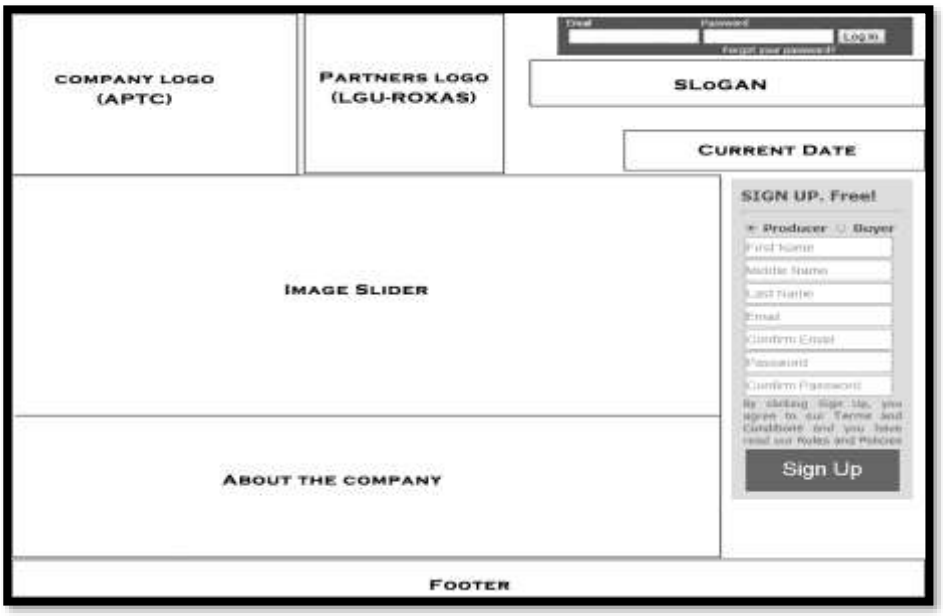

Figure 4: Home Page Wireframe

Figure 4 illustrates the home page wireframe of the developed Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center. The layout presents a clear and organized structure, showcasing the placement of key interface elements essential to the platform's functionality and design. Prominently positioned is the company logo along with partner agency logos, which help establish branding and credibility. The login form is centrally located to allow registered users, both farmers/producers and buyers, to securely access their accounts and utilize the system's full features. For first-time users, sign-up options are provided to facilitate easy registration for both buyers and producers. An image slider is also integrated into the homepage to visually highlight important information about the trading center, announcements, or featured farm products. Lastly, the footer section contains supplemental elements such as contact details, links, or policies, which contribute to both the usability and aesthetic appeal of the page. Overall, the wireframe represents a user-friendly and intuitive homepage layout that supports seamless navigation and engagement for its intended users.

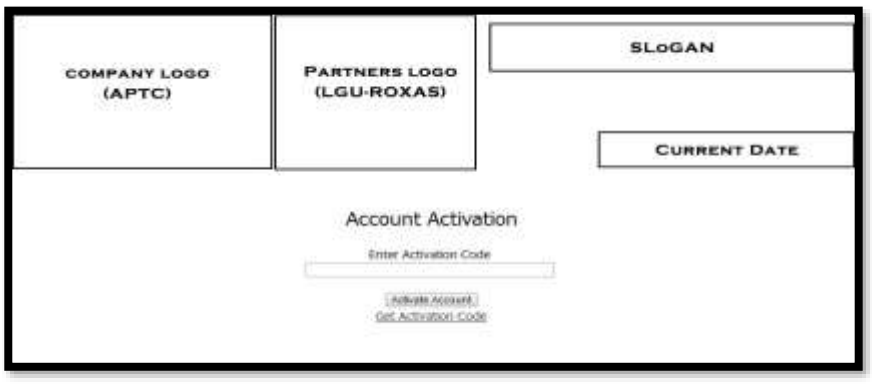

Figure 5: Account Activation Wireframe

Web-Based Market Goods Trading System of Agri-Pinoy Trading Center

Figure 5 presents the Activation Page Wireframe of the developed Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center. This interface appears immediately after a user, whether a buyer or a producer, completes the registration process. The activation page plays a crucial role in validating user accounts, serving as an added layer of security within the system. It ensures that only legitimate and verified users are granted full access to the platform's features. Account activation requires administrative approval, allowing the system administrator to monitor and control user entry, thus preventing unauthorized access. By implementing this activation mechanism, the system upholds data integrity and user authenticity, creating a secure and trustworthy environment for digital trading between farmers and buyers.

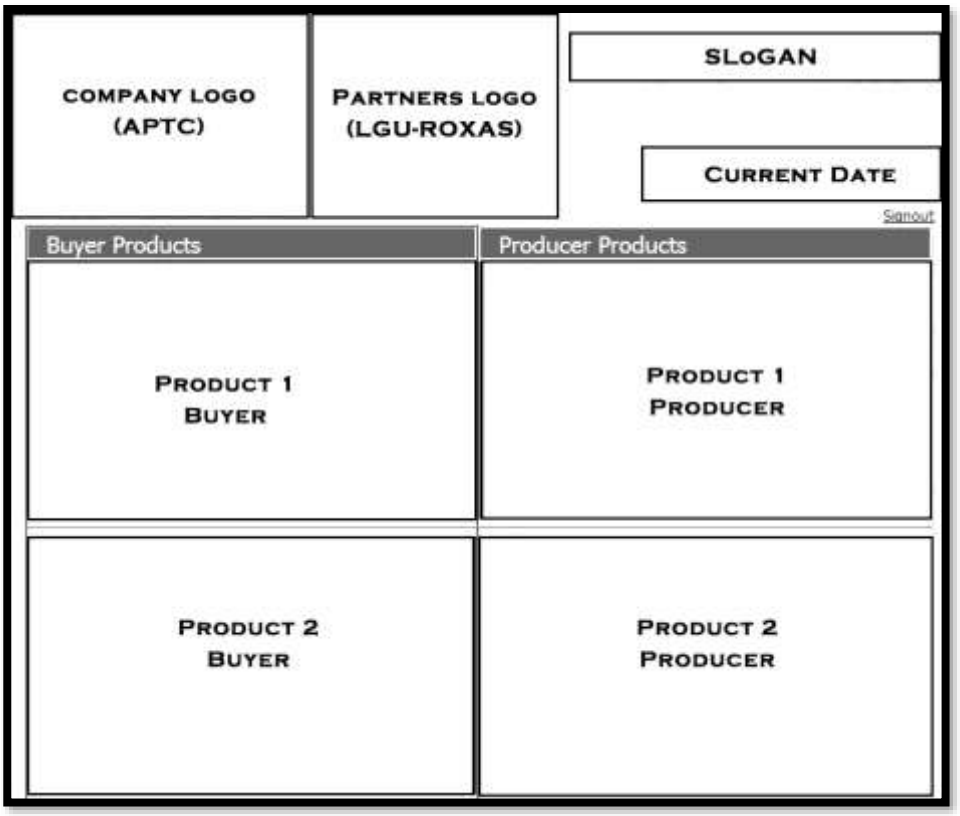

Figure 6: Admin Page Wireframe

Figure 6 presents the admin page wireframe of the developed Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center. This interface becomes accessible upon the successful login of the system administrator. It serves as the central management hub where the admin can oversee and moderate key activities within the platform. Specifically, the admin can monitor and manage the farm products posted by farmers and producers, as well as the product requests or needs submitted by buyers. The system provides functionality to align or match buyer demands with available products, thereby facilitating more efficient transactions between the two parties. Through this interface, the admin ensures that the marketplace remains organized, functional, and up-to-date by regulating content and managing user interactions within the platform.

B. Results Software Quality Evaluation of the Developed System based on ISO 25010

Table 3: Summary of mean on the software evaluation using ISO 25010

Criteria	Mean	Interpretation
Functional Suitability	4.59	Strongly Agree
Performance Efficiency	4.45	Strongly Agree
Compatibility	4.43	Strongly Agree
Usability	4.39	Strongly Agree
Reliability	4.42	Strongly Agree
Security	4.37	Strongly Agree
Maintainability	4.51	Strongly Agree
Portability	4.52	Strongly Agree
Weighted Mean	**4.46**	**Strongly Agree**

Table 3 presents the summary of the software evaluation results based on the ISO 25010 quality model criteria. Each quality attribute was rated by evaluators using a 5-point Likert scale, and the resulting mean scores indicate a high level of agreement on the system's quality.

Among the evaluated criteria, Functional Suitability received the highest mean score of 4.59, indicating that users strongly agree that the system meets its intended functional requirements and adequately supports users' needs. This suggests the system effectively performs its core trading features as designed. Following this, Maintainability and Portability scored 4.51 and 4.52, respectively, which implies that users found the system to be easily modifiable and transferable across different environments—crucial qualities for long-term system sustainability and scalability.

Other attributes such as Performance Efficiency (4.45), Compatibility (4.43), Usability (4.39), Reliability (4.42), and Security (4.37) also received strong ratings, all falling within the "Strongly Agree" range. These results indicate that the system operates efficiently, is user-friendly, functions reliably, and maintains a reasonable level of security.

The overall weighted mean of 4.46 reflects a general consensus among users that the system excels in quality across all evaluated dimensions. This high level of user satisfaction confirms that the developed Web-Based Market Goods Trading System meets critical software quality standards and is a viable tool for improving agricultural trade operations at the Agri-Pinoy Trading Center in Roxas, Isabela.

V. CONCLUSIONS

The development and evaluation of the Web-Based Market Goods Trading System for the Agri-Pinoy Trading Center in Roxas, Isabela demonstrate a significant step toward modernizing traditional agricultural trading practices. By leveraging digital technology, the system effectively addresses key inefficiencies that plague manual market transactions—such as delayed communication, lack of transparency, limited buyer access, and product spoilage due to unsold inventory.

Built using the Rapid Application Development (RAD) model, the system benefited from iterative design, prototyping, and active stakeholder involvement, ensuring that the final product was tailored to the real-world needs of farmers, producers, buyers, and administrators. Features such as product posting, account registration, negotiation tools, and administrative moderation were strategically developed to enhance functionality, usability, and user satisfaction.

The system's quality was thoroughly assessed using the ISO/IEC 25010 Software Product Quality Model, which confirmed that it met international standards across all major attributes including functional suitability, performance, usability, maintainability, and portability. With a weighted mean score of 4.46—interpreted as "Strongly Agree"—the results underscore the platform's readiness for operational deployment and long-term use.

In conclusion, the Web-Based Market Goods Trading System not only empowers local agricultural stakeholders by giving them direct access to a centralized and secure digital marketplace but also sets a foundation for scalable and sustainable digital transformation in rural trading ecosystems. It has the potential to improve income opportunities, minimize post-harvest losses, and foster a more inclusive, efficient, and resilient agricultural economy in the region.

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The researcher sincerely expresses heartfelt gratitude to all individuals and institutions who contributed to the successful completion of this study. Special thanks are extended to the Local Government Unit of Roxas and the Agri-Pinoy Trading Center for their invaluable support, cooperation, and for providing the necessary data and insights that shaped the development of this project. Their involvement was instrumental in understanding the real-world challenges of local agricultural trade and in aligning the system with the needs of farmers and buyers.

The researcher also extends profound appreciation to the Masters in Information Technology Faculty of the College of Computing Studies, Information and Communication Technology, whose expert guidance, technical advice, and academic mentorship greatly contributed to the conceptualization, development, and evaluation of the Web-Based Market Goods Trading System. Their collective support and collaboration have been vital to the successful completion of this research endeavor.

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