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Original Research Article

Role of Stakeholder Involvement in Development and Implementation of Agri E-Commerce Platforms among Potato Farmers in Elgeyo Marakwet County, Kenya

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Abstract: The Kenya Agricultural Marketing Strategy (AMS) 2023-2032 highlights on leveraging digital technologies to enhance market access for smallholder farmers by integrating mobile applications and e-commerce platforms into the agricultural landscape. Yet, implementation of these technologies among smallholder farmers in Sub-Saharan Africa (SSA) remains a challenge. This paper analyzes the role of stakeholder involvement in the development process and implementation of agri e-commerce platforms in Kenya. A participatory action research (PAR) design was adopted, integrating Design Thinking, Lean Startup, and Agile methodologies within the Agricultural Innovation Systems (AIS) framework. Data were collected through baseline and endline surveys bearing in mind the platform analytics through user interaction with the agri e-commerce platform. Results of the study indicate that participatory co-design significantly improved platform outcomes with users increasing by 88.9% at exit / endline survey. Average transaction time for farmers decreased by more than half while user satisfaction scores improved by 37.5%. Additionally, stakeholder participation levels increased by 46%, confirming that inclusive engagement and iterative feedback loops enhanced usability, adoption, and implementation success. Statistical t-tests further revealed that users with higher digital literacy achieved significantly greater implementation success ($p < 0.05$). This study was however limited to one county context and a single digital platform namely *warumarket* presenting difficulty in generalization of results to other regions. The findings underscore the value of participatory innovation frameworks for sustainable agri e-commerce adoption in developing regions.

Keywords: Agri e-commerce, Stakeholder Involvement, Participatory Development, Digital Innovation, Smallholder Farmers, Kenya.

INTRODUCTION

Small holder farmers in sub-Saharan Africa are considered the backbone of Agricultural produce managing about 62 % of the land across the region's farms (FAO, 2021). In Kenya, Agriculture remains a central pillar of Kenya's economy, providing employment for more than 70% of the rural population (World Bank, 2023). Amidst this development, digitalization of agricultural markets through e-commerce platforms has gained prominence as a means to address market inefficiencies, enhance information flow, and connect smallholder farmers to broader markets. Nevertheless, the sustainability and success of such initiatives are closely linked to the degree of stakeholder involvement during the development and implementation phases. While smallholder farmers in Elgeyo Marakwet County for instance are increasingly being encouraged to implement agri e-commerce platforms to market their produce, challenges such as low digital literacy, limited stakeholder participation, and weak institutional frameworks remain a restraint to this achievement (Ondieki *et al.,* 2022). Thoughtfully, the success of such initiatives depends on the level of stakeholder engagement throughout the development process. This paper therefore explores the role of stakeholder involvement in development and implementation of agri e-commerce platforms with *Warumarket.co.ke* platform being conceptualized as a participatory, user-centered digital marketplace designed

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to improve market access and efficiency among smallholder farmers in Elgeyo Marakwet County.

Theoretical Framework

Two major theoretical perspectives underpin this study thus; Stakeholder Theory and Participatory Development Theory.

Stakeholder Theory

Proposed by Freeman (1984), Stakeholder Theory posits that organizational success is dependent on satisfying the interests of all parties who have a stake in the outcomes. This theory emphasizes inclusivity and collaborative decision-making, which are essential in projects involving diverse actors such as agri e-commerce initiatives. In the agri e-commerce context, ICT developers, government, policymakers, NGOs and farmers have interdependent roles. For instance, according to (Lamboll *et al*., 2021), developers depend on farmers' feedback to refine applications, while farmers rely on supportive policies from the government to access digital infrastructure. Mutual engagement ensures that the system reflects real needs and capabilities.

Participatory Development Theory

Participatory Development Theory (Chambers, 1994) emphasizes the inclusion of local communities in development processes. It rejects top-down models of intervention and advocates for empowerment through involvement, voice, and ownership. Participation enhances the sense of accountability and allows communities to define their own development priorities. It is for this reason that the current study in view of agri e-commerce implies that smallholder farmers who are the primary beneficiaries should not be passive recipients of e-commerce platforms but instead take part in its design and development. Their participation will ensure that platforms reflect local conditions such as internet accessibility, literacy levels, and cultural practices (Mutua *et al*., 2021). This will ultimately enhance implementation process.

LITERATURE REVIEW

The Concept of Stakeholder Involvement

Stakeholder involvement has emerged as a central determinant of success in technology-driven agricultural innovations. According to Freeman (1984), stakeholders include individuals and organizations that influence or are affected by a project. In agri e-commerce, these include farmers, agricultural cooperatives, policymakers, ICT developers, consumers and non-governmental organizations (NGOs) as conceptualized in Figure 1. Studies in Kenya and Ethiopia show that active stakeholder participation enhances adoption rates, trust, and long-term sustainability (Abebe *et al*., 2022; Wanjiru, 2021). Conversely, top-down or donor-driven models often fail due to limited local ownership and context alignment.

Active engagement ensures that system designers incorporate the practical realities of end-users. For example, when farmers contribute to defining the structure and functionality of an e-commerce platform, the resulting system becomes more user-friendly and contextually relevant (Kariuki & Ndiritu, 2020). In contrast, when development is dominated by technical experts or donors, the final product often fails to meet user needs, resulting in low adoption rates.

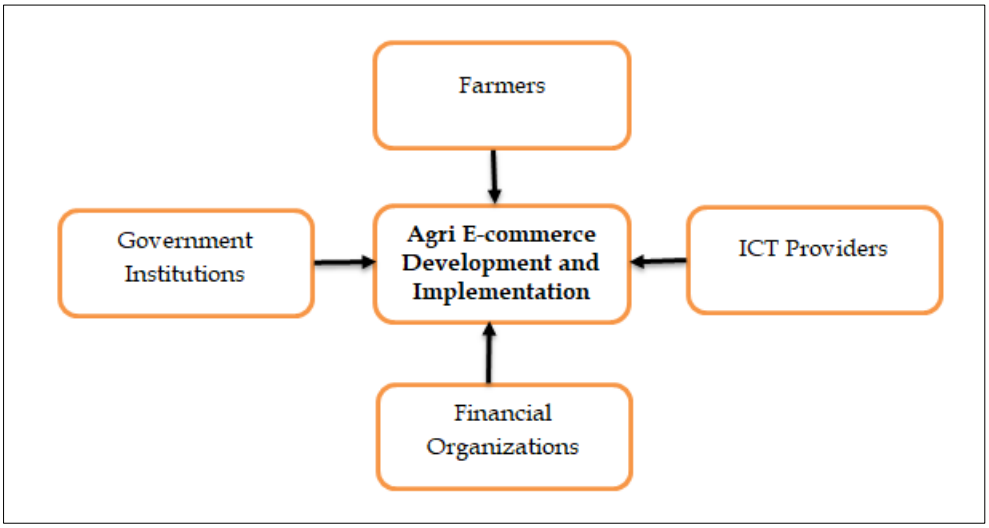

Figure 1: Conceptual Model of Stakeholder Involvement in Agri E-Commerce Implementation

Importance of Stakeholder Involvement in Agri E-Commerce Development

Enhancing System Relevance and Usability. Involving users in the design and testing stages leads to platforms that are aligned with their everyday needs and technological capacities. According to Mwangi and Omondi (2023), co-created platforms demonstrate higher adoption rates because users feel ownership of the product. When farmers are consulted during the design phase, they can provide insights on preferred features,

such as language options, crop listing categories, and payment methods.

Building Trust and Ownership. Trust plays a crucial role in digital platform adoption. Farmers are more likely to use systems they perceive as transparent and beneficial. By involving them in the design and decision-making process, developers build a sense of ownership and trust (Nyaga, 2022). This trust extends to financial transactions and data security, which are often major concerns in digital platforms.

Strengthening Institutional Collaboration. Effective stakeholder involvement promotes coordination among public, private, and community actors. Government agencies can offer regulatory and infrastructural support, while private developers provide technical expertise. NGOs and cooperatives on the other hand act as intermediaries facilitating communication and capacity building. Such multi-sector collaboration ensures policy alignment and resource optimization (Kihoro & Njenga, 2021).

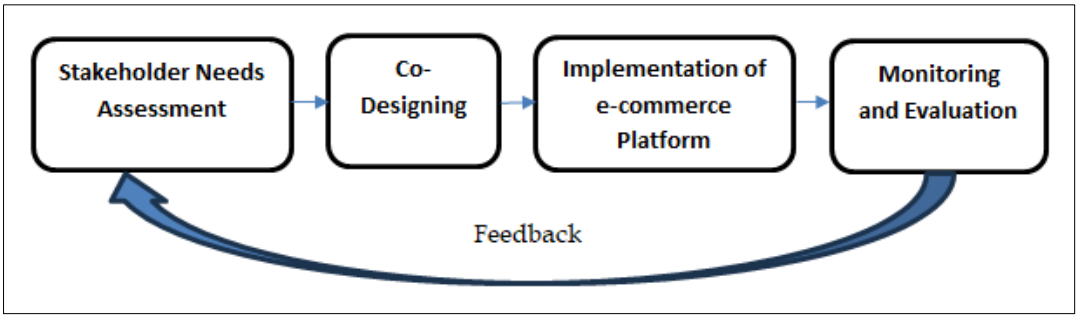

Figure 2: Stages of Stakeholder Involvement in Agri E-Commerce Development

Research has shown that stakeholder involvement in the development and implementation of the agri e-commerce platforms can follow four sequential stages, supported by continuous feedback loops (Sun & Ma, 2025). These stages as posited by Abdi (2019) are as follows:

1. Stakeholder Needs Assessment: This initial stage involves identifying and understanding the needs, challenges, and expectations of key stakeholders, including farmers, vendors, extension officers, and ICT developers.
2. Co-Designing: At this stage, stakeholders actively participate in joint design sessions to define platform features, user interfaces, and functionalities. The collaborative process ensures that the platform reflect local realities and address user needs effectively.
3. Implementation of the E-Commerce Platform: The co-designed platform is then developed and rolled out to the target users, in this case farmers. Stakeholders played a critical role during pilot testing, user training, and initial deployment, which help ensure smooth adoption and implementation.
4. Monitoring and Evaluation: This phase involves tracking platform performance, user engagement, and outcomes. Feedback provided from the evaluation stage to the needs assessment is meant to ensure continuous learning and adaptation allowing stakeholder input to inform ongoing platform refinement and sustainability.

Wanjiru (2021) found that participatory design increased platform usability by 35% in a Kenyan agri e-commerce pilot project. Farmers involved in testing and feedback sessions demonstrated higher confidence and consistency in using the digital system. Similarly, Abebe *et al*., (2022) reported that participatory innovation approaches in Ethiopia's agricultural digital markets improved system sustainability after donor exit.

In Uganda, Okello *et al*., (2021) discovered that stakeholder engagement enhanced extension services' reach and efficiency. Their study emphasized that collaboration between ICT developers and agricultural extension officers bridged the gap between technology design and field implementation. In contrast, projects lacking stakeholder input often faced early abandonment or low user adoption rates.

Moreover, Nyaga (2022) highlighted that stakeholder involvement fosters adaptability allowing systems to evolve with user feedback. Continuous engagement ensures that emerging challenges such as new market trends, climate-related shocks, and digital security issues are addressed promptly. Overall, empirical evidence demonstrates a positive correlation between participatory development and the success of digital agricultural systems.

METHODOLOGY

Product Development Framework for the Agri E-Commerce Platform

The design and development of the *Warumarket.co.ke* platform were guided by a hybrid product development framework that combined Design Thinking (Aswathy & Suresh, 2024), the Lean Startup methodology (Aswathy & Suresh, 2024), and Agile Development principles (Silva *et al*., 2024), adapted to the Agricultural Innovation Systems (AIS) perspective

(FAO, 2014). This integration created a participatory, iterative, and user-centered process that emphasized continuous improvement and collaboration among stakeholders. The framework recognized that technological interventions in agriculture must not only be innovative but also inclusive, reflecting the knowledge, experiences, and needs of smallholder farmers and other actors in the agricultural ecosystem.

The product development framework followed a phased approach consisting of problem identification, prototype development, iterative testing, and scaling through ecosystem partnerships. Several conceptual models were evaluated to determine the most appropriate approach for developing the platform. These included the Linear Flow Model, Circular Iterative Model, Layered Model, and the AIS Actor-Centric Product Model (Serna-Herrera *et al*., 2025).

The Linear Flow Model provided a stepwise structure from problem identification to scaling and sustainability, which suited the research's need for clarity and systematic progression. The Circular Iterative Model reflected the adaptive, feedback-driven nature of Agile Development, while the Layered Model captured the relationship between inputs, processes, and outputs, highlighting how actors and resources interact in development. The AIS Actor-Centric Model, on the other hand, placed the e-commerce platform at the center of a network of interacting stakeholders such as government agencies, private sector actors, ICT providers, non-governmental organizations, and farmers (Aswathy & Suresh, 2024). After critical evaluation, this study adopted the Linear Flow Model and the AIS Actor-Centric Model because they best encapsulated the participatory and structured nature of agricultural digital innovation and aligned with the AIS framework principles.

A Participatory Action Research (PAR) design (McIntyre, 2008) was employed to assess the role of stakeholder involvement. The PAR design is cyclical, involving stages of planning, action, observation, and reflection, making it suitable for research that combines action with learning. It allowed stakeholders to actively contribute to the project's design, development, and assessment rather than merely serving as data sources. This approach enhanced collective ownership of the innovation process, leading to more context-sensitive and sustainable outcomes. Through participatory engagement, stakeholders contributed directly to identifying problems, proposing solutions, and evaluating outcomes, aligning the research process with the principles of empowerment and collaboration.

From a total of 280 targeted respondents, this paper considered a sample of 120 farmers and respondents that were purposively sampled. They included; smallholder farmers, ICT developers, County ICT and Agriculture representatives all of who ensured representativeness and minimized bias. Data were collected using both quantitative and qualitative approaches to provide a comprehensive understanding of stakeholder participation and its impact on implementation outcomes. Quantitative data were gathered through the Agri E-Commerce Platform Development and Implementation Survey, which evaluated stakeholder involvement across key domains such as co-creation, prototyping, training, ICT readiness, and implementation success. The survey employed a five-point Likert scale ranging from *1 (Strongly Disagree)* to *5 (Strongly Agree)* to measure levels of agreement with specific statements related to these domains. Qualitative data were collected through open-ended survey questions and focus group discussions involving cooperative leaders, farmers, extension officers, and ICT developers. These discussions explored participants' experiences, challenges, and perceptions regarding the participatory process. The qualitative data enriched the quantitative findings by providing deeper insights into the context and meanings behind numerical trends.

Both descriptive and inferential statistical techniques were applied in data analysis. Descriptive statistics, including means and standard deviations, were used to summarize stakeholder perceptions across the survey domains. Inferential analysis was conducted using correlation methods to examine relationships between stakeholder involvement and implementation success. The following hypotheses guided this analysis:
H_0: Stakeholder involvement has no significant influence on the implementation of agri e-commerce platforms

In addition, qualitative data were analyzed thematically. Emerging themes included the importance of user feedback, the role of cooperative leadership in mobilizing participation, and the impact of training on user confidence. Integrating both datasets allowed for triangulation and strengthened the credibility and validity of the findings.

RESULTS AND DISCUSSION

This chapter presents the results and discussion related to influence of stakeholder involvement in the design process of agri e-commerce platforms on the implementation process. To develop and test a product development framework for an Agri E-Commerce platform (Warumarket.co.ke) aimed at improving market accessibility among smallholder farmers in Elgeyo Marakwet County.

The findings are organized into five sections: (1) problem identification and user needs assessment, (2) platform design and prototype development, (3) pilot testing and iterative refinement, (4) comparative evaluation of implementation outcomes, and (5) stakeholder collaboration and ecosystem integration.

Each section integrates empirical findings, tables, and relevant theoretical interpretation.

Problem Identification and User Needs Assessment

The first stage of development involved conducting a needs assessment of the stakeholders, 100 questionnaires were considered fit for analysis showing a response rate of 83%. From the results, the study revealed several practical challenges that have important implications for the design and implementation of agri e-commerce platforms among smallholder farmers. Majority reported poor connectivity in rural areas (29%), followed by those who reported limited digital literacy among farmers at (25%) and Occasional delays in system updates (24%). Nevertheless, 22% of the respondents ere of the opinion that need for more user training was a challenge that hindered them from accessing markets. The findings are summarized in Table 1.

Table 1: Key Challenges Affecting Farmers' Market Access

	Frequency	Percent
Limited digital literacy among farmers	25	25.0
Need for more user training	22	22.0
Occasional delays in system updates	24	24.0
Poor connectivity in rural areas	29	29.0
Total	100	100.0

These challenges point to the importance of designing agri e-commerce platforms that are inclusive, adaptive, and resilient to local infrastructural limitations. Simplified interfaces, user training programs, responsive system maintenance, and offline functionalities can significantly improve user experience and long-term adoption as well as implementation success among smallholder farmers in rural contexts (Morepje *et al*., 2024). These findings are in line with Kamau *et al*., (2021) and Oduor *et al*., (2021), who emphasize that information asymmetry, and digital illiteracy remain key barriers to inclusive agricultural marketing in Kenya.

Table 2 illustrates some of the proposed improvements that could be made to enhance adoption and implementation of the agri e-commerce platforms.

Table 2: Suggested e-commerce platform improvements

	Frequency	Percent
Add more local language options	24	24.0
Enhance mobile app interface	32	32.0
Improve internet reliability	19	19.0
Provide continuous training	25	25.0
	100	100.0

The most suggested improvement was to enhance the mobile app interface (32%) while those who said that continuous training should be provided accounted for 25%. There was need to consider use of local language (24%) as the digitally illiterate respondents may have found it difficult to understand the English language.

Platform Design and Prototype Development

The second stage involved translating user insights into a functional digital solution. Guided by Design Thinking, the process followed the stages of *Empathize*, *Define*, *Ideate*, *Prototype*, and *Test*. The team developed a Minimum Viable Product (MVP) that integrated multi-channel access and low-cost technology suitable for rural farmers.

The design was also influenced by Lean Startup and Agile Development methodologies, emphasizing iterative testing and user feedback. The resulting MVP consisted of five major components, as summarized in Table 3.

Table 3: Core Platform Features and Theoretical Frameworks

Feature	Purpose	Underlying Framework
Farmer-to-Buyer Marketplace	Enables direct trade and negotiation.	Design Thinking (User-Centered Design)
Price Transparency Dashboard	Provides daily market updates.	Lean Startup (Validated Learning)
Digital Payment Integration (M-Pesa)	Enhances transaction trust and speed.	Agile Development (Modular Improvement)
Logistics Coordination Tool	Connects farmers to local transporters.	AIS (Network Integration)
Multi-Channel Access (USSD, WhatsApp, Web)	Accommodates users with different devices and connectivity.	HCD (Inclusivity and Accessibility)

Testing of the prototype was conducted among 36 cooperative-affiliated farmers in Elgeyo Marakwet County. Results showed that 61% preferred the Unstructured Supplementary Service Data (USSD)

platform due to its compatibility with basic phones, 25% used WhatsApp for convenience, and 14% accessed the platform via the web. Farmers appreciated the simplified design, low data requirements, and integration with mobile payments.

The platform's features were continually refined based on user feedback. For instance, the interface was translated into Swahili and Kalenjin to accommodate farmers with lower literacy levels, and a produce-tracking feature was added for cooperative managers. The findings highlight the importance of user participation in product design, consistent with Onyango and Wekesa (2021), who emphasize localized digital inclusion in agriculture.

Pilot Testing and Iterative Refinement

The third phase of platform development involved pilot testing over six weeks, during which iterative improvements were made based on weekly feedback. This process demonstrated the effectiveness of Agile Development and Lean Startup principles. Between weeks 1 and 6, active user numbers rose from 36 to 68, representing an 88.9% increase. The number of produce listings grew from 45 to 142 (+215.6%), while successful transactions increased from 21 to 89 (+323.8%). The average transaction completion time reduced from 3.4 days to 1.6 days, a 52.9% decrease, and the average user satisfaction score rose from 3.2 to 4.4, an improvement of 37.5%.

These metrics show substantial adoption and engagement growth, attributed to iterative platform updates and continuous user training. Farmers consistently highlighted four recurring feedback themes: accessibility, payment reliability, price transparency, and language usability. The preference for the USSD version reinforced the need for accessible, low-data solutions suitable for rural contexts.

Comparative Evaluation of Implementation Outcomes

To evaluate overall impact, baseline and endline data were collected to compare the level of improvement across five implementation factors: stakeholder involvement, prototyping and testing, user training, ICT readiness, and implementation success. The results summarized in Table 4, indicate significant improvement in all areas.

Table 4: Comparison of Baseline and Endline Findings on Platform Implementation Factors

Factor	Baseline Findings (Pre-Test)	Interventions / Actions Taken	Endline Findings (Post-Test)	Change (%)
Stakeholder Involvement	Limited consultation; researcher-driven decisions.	Co-creation workshops, regular feedback meetings.	81% of respondents agreed stakeholders were actively involved in planning and design.	+46%
Prototyping & Testing	No existing prototype; farmers unfamiliar with digital tools.	Developed MVP, iterative updates with 35 users.	84% reported prototypes improved usability and content.	+52%
User Training & Capacity Building	42% of farmers had limited digital literacy.	Conducted training sessions, demonstrations, and tutorials.	76% indicated confidence in using the platform independently.	+34%
ICT Infrastructure Readiness	Poor connectivity and low smartphone ownership.	Introduced offline integration (SMS) and cooperative-level management.	63% reported it will improve access and transaction reliability.	+25%
Implementation Success	Fragmented market access, heavy broker dependence.	Integrated into cooperative operations and direct buyer links.	85% agreed the system will improve market access and price reliability.	+50%

The table demonstrates substantial improvements across all factors, particularly in prototyping (+52%) and stakeholder involvement (+46%), confirming that participatory co-design leads to more effective product development. The +50% increase in perceived implementation success highlights the platform's capacity to reduce market fragmentation and increase price transparency. These findings are consistent with Karimi *et al*., (2021), who argue that active stakeholder participation enhances user acceptance and system performance.

Stakeholder Collaboration and Ecosystem Integration

The implementation of *Warumarket.co.ke* relied on a multi-actor collaboration model consistent with the Agricultural Innovation Systems (AIS) framework. The Elgeyo Marakwet Farmers Marketing Cooperative Society (EMFMCS) coordinated operations, while ICT developers managed platform functionality and updates. The county agricultural department provided regulatory guidance, and NGOs such as SNV and One Acre Fund facilitated training and outreach. Transport providers also played a vital role by offering logistical support to link farmers directly to buyers. The cooperation among these actors enhanced

platform governance, improved system stability, and accelerated adoption. The collaboration reduced transaction time by over 50% and increased reliability across the potato value chain. This partnership-based structure validated the AIS principle that innovation thrives within a networked ecosystem where information and resources are shared. It also strengthened the platform's sustainability, as the cooperative retained operational ownership after the pilot phase.

Table 5: Summary of Key Findings

Key Variable	Findings	Interpretation
User Needs	Farmers' key needs were buyer access (78.3%), pricing (70.8%), and payments (64.2%).	Informed platform features and design priorities.
Adoption Rate	Active users increased by 88.9%; transactions rose by 323.8%.	Demonstrated rapid user uptake willingness and satisfaction.
Performance	Transaction time reduced from 3.4 to 1.6 days (–52.9%).	Signified enhanced operational efficiency.
Satisfaction	User satisfaction rose from 3.2 to 4.4 (+37.5%).	Reflected the effectiveness of iterative refinement.
Implementation Success	85% agreed platform improved market access and reliability.	Confirmed the success of the co-creation and training approach.

Further, a descriptive analysis was conducted to compare means between the study variables as illustrated in Table 6.

Table 6: Composite Means and Variability

Construct	Items	Mean	SD	Analytical Interpretation
Stakeholder Involvement	St1–St4	**3.60**	0.51	Moderate–positive involvement, but inconsistent across users
Prototyping & Testing	Pr1–Pr4	**3.65**	0.59	Iterative design practices moderately applied
Usability	Us1–Us4	**3.65**	0.54	Generally user-friendly platform
Institutional Coordination	IC1–IC4	**3.62**	0.60	Moderate cross-institutional collaboration
Implementation Success	Im1–Im4	**3.65**	0.62	Average to good implementation outcome

The results presented indicate that means cluster around 3.6, suggesting fairly uniform perceptions across constructs. This stability reflects balanced system performance but limited excellence in any one domain in relation to successful implementations of the *warumarket* agri e-commerce platform.

Correlation Matrix

The researcher conducted a correlation analysis to determine if there was a linear relationship in the variables applied in the study in relation to the implementation success of the platform. The findings as shown in Table 7 are based on the average scores of the various items of the questionnaire for the specific variables.

Table 7: Correlation Analysis between dependent and independent variables

		IS	St	Prt.	Us	IC
Implementation Success (IS)	Pearson Correlation	1.000				
Stakeholder Involvement (St)	Pearson Correlation	-.186	1.000			
Prototype testing	Pearson Correlation	.135	-.046	1.000		
Usability	Pearson Correlation	-.053	.072	.075	1.000	
Institutional coordination	Pearson Correlation	-.029	-.156	-.084	-.128	1.000
**. Correlation is significant at the 0.01 level (2-tailed).						

Pearson product-moment correlation coefficient was used to measure the strength of relationships between the variables. According to Wong and Hiew (2005), a correlation coefficient (r) ranging between, 0.5 to1.0 is considered strong, 0.30 to 0.49 is medium while 0.10-0.29 is considered to be weak relationship. From the foregoing, stakeholder involvement showed a strong negative relationship (r=-.186, p=0.000). Although stakeholder involvement is generally associated with positive implementation outcomes, this study found a negative relationship between the two variables. This indicates that uncoordinated or poorly managed participation may undermine the effectiveness of agri e-commerce platform implementation. The finding emphasizes the need for structured stakeholder engagement frameworks that define roles, streamline decision-making, and balance inclusivity with efficiency. Prototyping on the other hand showed a strong positive relationship with implementation success (r=.135, p=0.000). The strong positive relationship between prototyping and implementation success demonstrates that iterative design processes contribute significantly to the development of effective agri e-commerce platforms. Prototyping enabled context-specific adaptations, enhanced user satisfaction, and improved technical

performance, ultimately supporting a smoother and more successful implementation phase. Both usability and institutional coordination presented a weak negative relation with implantation success as shown by (r=-.053, p=0.000) and (r=-.029, p=0.000) respectively. The weak but negative correlations between usability and institutional coordination with implementation success suggest that minor inefficiencies in user experience and inter-institutional collaboration slightly impeded platform performance. However, the small effect sizes imply that these challenges were not substantial enough to critically undermine the overall success of agri e-commerce platform implementation.

In testing the hypothesis from the foregoing, stakeholder involvement and implementation success ($r = –0.186$, $p = 0.000$) show a negative but statistically significant relationship since $p < 0.05$. The null hypothesis that stated: H_0: Stakeholder involvement has no significant influence on the implementation of agri e-commerce platforms was rejected thus the study concluded that as stakeholder involvement increases, implementation success tends to decrease. This result is in tandem with the report presented by the United Nations Development Programme which indicated that when multiple stakeholders (farmers, vendors, government agencies, developers, and NGOs) are involved without clear coordination, conflicting priorities may arise (UNDP, 2020). This implies that while farmers may prioritize affordability, vendors may focus on profit, as government agencies emphasize compliance. This can ultimately slow down decision-making, introduce bureaucratic delays, and weaken implementation efficiency. To this end, this study proposed a model of stakeholder involvement that creates a unified ownership and management of the *warumarket* agri e-commerce platform through a cooperative society. This is intended to limit individual ownership and management thus smooth decision making.

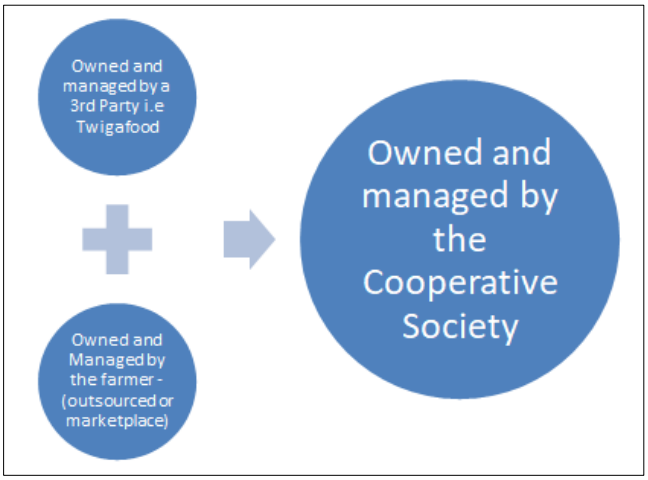

Figure 3: Recommended Ownership Model for Agri E-Commerce Platforms

The figure illustrates a progressive ownership structure where digital agricultural platforms transition from being managed by third parties or individual farmers to being collectively owned and managed by cooperative societies. This cooperative-led model promotes inclusivity, accountability, and sustainability by ensuring that farmers retain control over platform governance and benefit distribution.

CONCLUSION

In conclusion, the findings demonstrate that combining participatory design, iterative prototyping, and ecosystem collaboration results in a practical and sustainable Agri E-Commerce solution. The *Warumarket.co.ke* platform will effectively enhanced market access, reduced transaction time, and increased transparency for smallholder farmers in Elgeyo Marakwet County. The study concludes that successful digital agricultural transformation relies on user-centered innovation, continuous improvement, and strong institutional linkages. Future scale-up should focus on multilingual interface development, integration with financial and logistics services, and policy alignment with county-level digital agriculture frameworks. Further research could explore long-term socio-economic impacts of such platforms on rural income and productivity across Kenya.

Recommendations

i. County governments and agricultural institutions should institutionalize participatory frameworks that involve farmers, cooperatives, ICT developers, NGOs, and policymakers throughout all stages of agri e-commerce development to ensure relevance, inclusivity, and sustainability.
ii. Develop a county-level stakeholder engagement policy to guide coordination, communication, and decision-making among agricultural actors involved in digital transformation initiatives.

iii. There's need to strengthen digital literacy and capacity-building programs for smallholder farmers through cooperatives, agricultural extension officers, and local training hubs to enhance confidence and competence in using digital tools.
iv. Integrate continuous feedback mechanisms within agri e-commerce platforms to collect user input, monitor satisfaction, and guide iterative improvements following Agile and Lean development principles.
v. Adoption of the cooperative-led ownership and management of digital platforms to strengthen sustainability, ensure accountability, and reduce dependency on external support.
vi. Finally, the study recommends the need for strengthening rural transportation and logistics through coordinated transport services by farmer cooperatives to handle harvesting, grading, and delivery.

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