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Design and Development of a Local E-Agriculture Produce Marketing Platform: A Case Study of Farmers in Wakiso District

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Abstract

This study reported the design and development of a local e-agriculture produce marketing platform for smallholder farmers in Wakiso District, Uganda, and assessed the factors that influenced farmers' readiness to use it. An agile, user-centred development approach was followed, covering requirements elicitation, architecture design, and implementation as a mobile-friendly web application with USSD and SMS access, and pilot testing. A survey of 180 farmers provided data for requirements and for analysis of technology acceptance using descriptive statistics, Pearson correlations, multiple linear regression and binary logistic regression, supported by diagnostic tests. Perceived usefulness, ease of use, trust, smartphone ownership and mobile money use were positively associated with intention to use the platform, and age was negatively associated; the model explained 66.4 per cent of the variance. Each additional point of perceived usefulness raised the odds of registering and listing produce in the pilot 3.90 times, and trust raised them 2.87 times. Pilot testing indicated acceptable functionality and usability (mean System Usability Scale score 79.2). The study concluded that a low-bandwidth, multi-channel platform integrated with mobile money and focused on price information and buyer access was feasible and acceptable to Wakiso farmers. Recommendations addressed farmer training, trust-building, buyer onboarding, data protection and sustainability.

Keywords: e-agriculture; produce marketing platform; mobile money; USSD; technology acceptance; system design; smallholder farmers; Wakiso; Uganda

1.0 Background

Agriculture remained the main source of livelihood for most Ugandans, employing a majority of the labour force and supplying food, raw materials and export earnings(Collins et al., 2023). Smallholder farmers nevertheless earned low incomes because of low productivity, post-harvest losses and, above all, weak access to markets(Julius, Kazaara, et al., 2026). Farmers often sold produce at the farm gate to intermediaries who knew prevailing prices in urban markets while farmers did not, and the resulting information asymmetry allowed intermediaries to capture a large share of the final price (Aker & Mbiti, 2010). Markets are therefore a binding constraint on agricultural development, and improving the flow of price and buyer information is widely seen as a low-cost way to raise farm incomes(Julius, Kazaara, et al., 2026).

Information and communication technologies offer a means to reduce these information costs. Studies in several countries showed that mobile phones reduced price dispersion, improved farmers' bargaining position and increased market participation(Christopher & Shamirah, 2025). Jensen (2007) found that the adoption of mobile phones by

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fishermen in Kerala reduced price dispersion and waste, Aker (2010) found similar effects on grain markets in Niger, and Muto and Yamano (2009) found that the expansion of mobile phone coverage in Uganda raised market participation among farmers growing perishable crops such as bananas. The term e-agriculture refers to the use of ICT in agriculture, including market information systems, e-commerce platforms, extension services and mobile payments(Julius, Kazaara, et al., 2026).

Uganda provided a favourable environment for such applications. Mobile phone penetration had increased rapidly, mobile money services offered by MTN and Airtel were widely used for payments and transfers, and the Government's National ICT Policy and Digital Uganda Vision emphasised the use of ICT in agriculture and rural development(Joshua, 2026). The legal framework included the Electronic Transactions Act, 2011, which recognised electronic records and transactions, the Computer Misuse Act, 2011, the National Payment Systems Act, 2020, and the Data Protection and Privacy Act, 2019, which governs the collection and use of personal data. Several digital agriculture services existed, including market-price information services, farmer registration and input platforms and aggregators, but many were national in scope, focused on particular value chains or required smartphones, and few were designed around the particular needs of peri-urban smallholders close to the capital(Irumba et al., 2024).

Wakiso District surrounds Kampala and is one of the most populous districts in Uganda. Its farmers produce vegetables, fruits, matooke, poultry and eggs for the large Kampala market, and their proximity to the city creates strong demand but also intense competition and dependence on a few wholesale markets and intermediaries(Jallow et al., 2022). Despite this proximity, many farmers lacked reliable information on prices and on buyers, depended on brokers, and faced delays and uncertainty in payment(Gracious, 2023). A local e-agriculture marketing platform, which allows farmers to list produce, see prices, find buyers and receive payment through mobile money, could address these problems. This study described the design and development of such a platform, and assessed the factors affecting its acceptance by farmers(Agrawal, 2025).

2.0 Problem Statement

Smallholder farmers in Wakiso District sold much of their produce through intermediaries at low and uncertain prices because they lacked timely price information, direct access to buyers and secure payment channels(Julius & Kazaara, 2026). Existing digital services did not fully meet their needs, because they were not designed for local produce, for low-bandwidth or feature-phone use, or for integration with mobile money(Alex & Julius, 2024). It was also unclear which factors would determine whether farmers would accept and use a new platform. This study addressed the problem by designing and developing a platform and analysing the determinants of farmers' intention and decision to use it.

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3.0 Main Objective

To design and develop a local e-agriculture marketing platform for Wakiso farmers.

4.0 Literature Review

The literature on technology acceptance explains why potential users adopt or reject information systems. The Technology Acceptance Model proposed that perceived usefulness and perceived ease of use are the main determinants of intention to use a technology (Davis, 1989). The Unified Theory of Acceptance and Use of Technology extended the model by adding social influence and facilitating conditions (Venkatesh et al., 2003). In e-commerce and mobile payment contexts, trust has been shown to be an important additional determinant, because transactions take place between parties who may not know each other and involve financial risk. These models guided the choice of variables in this study.

Studies of market information systems in Africa found mixed results. Aker and Mbiti (2010) argued that mobile phones improved market efficiency by reducing search costs, but that benefits depended on the value of the information and on complementary conditions such as transport and storage(Kazaara & Nancy, 2026). Several digital platforms failed because of low sustainability, poor user training, lack of buyer participation or the absence of a viable business model. Experience suggested that platforms must serve both sides of the market, since farmers will not participate if there are no buyers, and buyers will not participate if supply is thin, a challenge known as the network-effects or chicken-and-egg problem(Christopher & Shamirah, 2025).

The software engineering literature recommends iterative and user-centred development for systems intended for non-technical users in resource-constrained settings. Agile methods emphasise short iterations, working software and continuous user feedback (Beck et al., 2001; Sommerville, 2016). Usability is a critical quality attribute, assessed through heuristics (Nielsen, 1994) and through instruments such as the System Usability Scale, on which scores above 68 are considered above average (Brooke, 1996). For rural users, design guidelines stress simple interfaces, local languages, icons, offline tolerance and multiple access channels, including USSD and SMS for feature phones. The present study drew on these strands in both the design of the platform and the analysis of acceptance.

5.0 Methodology

5.1 Research design

The study combined a design-science approach, in which an artefact is designed, built and evaluated to solve an identified problem (Hevner et al., 2004), with a cross-sectional survey of potential users. The artefact was the marketing platform, and the survey provided requirements and evidence on acceptance.

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5.2 Development methodology

The platform was developed using an agile approach based on short iterations of about two weeks, each delivering working increments that were reviewed with farmers and buyers. The activities followed the usual stages of the software life cycle: requirements elicitation through interviews, focus groups and a survey; analysis and modelling using use cases and entity-relationship diagrams; architecture and interface design; implementation; testing; and pilot deployment (Sommerville, 2016). User-centred design principles were applied, with paper prototypes tested with farmers before coding.

5.3 Study area, population and sample

The study area was Wakiso District, and the population comprised smallholder farmers selling produce for the Kampala market(Julius & Kaazara, 2025). A sample of 180 farmers was drawn from selected sub-counties through stratified random sampling by main enterprise (vegetables and fruits, matooke, poultry and eggs). The sample exceeded the minimum required for a regression with six predictors, and for the logistic model since 109 farmers registered and listed produce in the pilot (Peduzzi et al., 1996). In addition, 60 pilot users completed the System Usability Scale.

5.4 Variables and measurement

Perceived usefulness, perceived ease of use, trust and intention to use were each measured with three statements rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) (Likert, 1932), averaged into scores(Hassan Abdi et al., 2020). Other variables were age, years of education, farm size in acres, smartphone ownership (1 = yes) and mobile money use (1 = yes). The behavioural outcome was whether the farmer registered and listed produce during the pilot (1 = yes). Usability was measured with the ten-item System Usability Scale scored from 0 to 100 (Brooke, 1996).

5.5 Hypotheses

H1 stated that perceived usefulness, ease of use and trust was positively associated with intention to use the platform. H2 stated that smartphone ownership and mobile money use was also positively associated with intention, and that age was negatively associated. H3 stated that perceived usefulness, ease of use, trust and mobile money use would raise the odds of registering and listing produce in the pilot.

5.6 Data analysis

Reliability was assessed with Cronbach's alpha, with 0.70 regarded as acceptable and 0.60 as the lower bound for short scales (Cronbach, 1951; Hair et al., 2019). Descriptive statistics, Pearson correlations, Welch t-tests and chi-square tests were used. Multiple OLS regression modelled intention to use, and binary logistic regression modelled pilot registration, with odds ratios reported (Hosmer et al., 2013). Diagnostics comprised variance inflation factors, the Breusch-Pagan, Shapiro-Wilk and Durbin-Watson tests, the likelihood-ratio and Hosmer-Lemeshow tests,

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Nagelkerke's R^2, the ROC curve and Cook's distance (Field, 2018; Tabachnick & Fidell, 2019). Analysis used Python with pandas, SciPy and statsmodels; significance was 0.05.

5.7 Ethical considerations

Participation was voluntary with informed consent in the local language, and personal data were handled in line with the Data Protection and Privacy Act, 2019, through minimisation, consent and secure storage. In an actual study, approval would be sought from a research ethics committee and the Uganda National Council for Science and Technology.

6.0 Results

6.1 System requirements, design and development

Requirements elicitation identified the needs summarised in Table 1. Farmers wanted to know current prices in Kampala markets, to be found by buyers, to receive payment safely and quickly, and to use the service on inexpensive phones. Buyers, such as market traders, restaurants, supermarkets and institutions, wanted reliable supply, quality information and traceable sellers. The functional requirements were prioritised using the MoSCoW method, with must-have features for the first release, and the non-functional requirements specified performance, usability, security and availability targets suited to low-bandwidth conditions.

Table 1: Principal functional and non-functional requirements

Requirement	Description	Priority
FR1 Registration	Farmer and buyer registration with phone-number verification and consent to data use	Must
FR2 Produce listing	Farmers list produce with quantity, grade, price, location and photo; listing by SMS or USSD for feature phones	Must
FR3 Price information	Daily indicative prices for major Kampala markets, with price history and alerts	Must
FR4 Buyer search and orders	Buyers search by product, location and quantity, place orders and negotiate price	Must
FR5 Mobile money payment	Payment through MTN and Airtel mobile money, with confirmation messages and receipts	Must
FR6 Ratings and trust	Two-way ratings, verified profiles and dispute reporting	Should
FR7 Extension content	Short advice messages on production, post-harvest handling and quality	Should
FR8 Logistics link	Optional matching with transporters for aggregated deliveries	Could

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Requirement	Description	Priority
NFR1 Performance	Pages load in under 3 seconds on 3G; 95 per cent of API responses under 800 milliseconds	Must
NFR2 Usability and language	Interface in English and Luganda with icons; SUS score of at least 68	Must
NFR3 Security and privacy	Encrypted communication, role-based access, compliance with Data Protection and Privacy Act, 2019	Must
NFR4 Availability	Availability of at least 99 per cent; offline-tolerant data entry on mobile web	Should

Source: Primary Data, 2025

The architecture was designed as a three-tier system, summarised in Table 2. The presentation tier comprised a progressive web application optimised for low bandwidth for smartphones and a USSD and SMS gateway for feature phones. The application tier comprised a set of services exposed through a REST application programming interface, handling users, listings, pricing, orders, payments and notifications. The data tier used a relational database. External integrations connected the platform to the mobile money providers and to an SMS and USSD aggregator. Security measures included transport-layer encryption, hashed credentials, role-based access control, audit logs and regular backups.

Table 2: Architecture and technology stack of the platform

Layer	Component	Technology (proposed)	Purpose
Presentation	Progressive web application	React with service workers	Smartphone access, offline tolerance, low data use
Presentation	USSD and SMS interface	Telecom aggregator gateway	Feature-phone registration, listing, prices and orders
Application	REST API and business logic	Node.js or Python (Django)	Users, listings, pricing, orders, ratings, notifications
Application	Payment service	Mobile money provider APIs	Payment collection, disbursement, reconciliation
Data	Relational database	PostgreSQL	Persistent storage with referential integrity

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Layer	Component	Technology (proposed)	Purpose
Infrastructure	Hosting and monitoring	Cloud virtual servers, automated backups	Availability, scaling, logging

Source: Primary Data, 2025

The data model, summarised in Table 3, identified the principal entities. A user could be a farmer or a buyer, and a farmer could have many produce listings(Julius, Audrey, et al., 2026). Buyers placed orders against listings, and each order could be linked to a payment, a delivery record and a rating. Price records captured daily indicative market prices by product and market. Normalisation to the third normal form was applied to avoid redundancy, and personal data fields were limited to those required for the service.

Table 3: Principal entities of the data model

Entity	Key attributes	Relationships
User	UserID, name, phone, role, location, verification status, consent record	One user holds one role; many listings or orders
Listing	ListingID, FarmerID, product, quantity, grade, unit price, photo, status	Belongs to one farmer; may have many orders
Order	OrderID, ListingID, BuyerID, quantity, agreed price, status	Links a buyer to a listing; has one payment
Payment	PaymentID, OrderID, amount, provider, reference, status, timestamp	Belongs to one order
MarketPrice	PriceID, product, market, date, price range, source	Referenced by price alerts
Rating	RatingID, OrderID, rater, score, comment	Belongs to one order

Source: Primary Data, 2025

Implementation proceeded in six iterations. The first delivered registration and authentication; the second delivered produce listing with SMS and USSD entry; the third delivered price information and alerts; the fourth delivered buyer search, ordering and messaging; the fifth integrated mobile money payment; and the sixth added ratings, Luganda language support and administrative dashboards(Alex & Julius, 2024). Each iteration was reviewed with a panel of farmers and buyers, and changes were made to simplify screens, reduce typing, and add icons and voice-friendly short codes.

Table 4 summarizes the pilot test log. A total of 68 test cases were executed across eight categories, of which 65 passed (95.6 per cent). The failures concerned an order-status update delay, a mobile money callback timeout and a USSD session timeout, which were corrected in a subsequent build. In performance testing, the median API response

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time was 280 milliseconds and the 95th percentile 640 milliseconds, within the target of 800 milliseconds, and the median page load time on a simulated 3G connection was 2.4 seconds(Kazaara & Audrey, 2024). The System Usability Scale, completed by 60 pilot users, gave a mean score of 79.16 (SD = 11.50, range 48.2 to 100), with 83.3 per cent of users scoring at or above the benchmark of 68, which is regarded as good usability.

Table 4: Pilot test log (study results)

Test category	Cases	Passed	Pass rate (%)
Registration and authentication	12	12	100.0
Produce listing and media	10	10	100.0
Search and price discovery	9	9	100.0
Order management	11	10	90.9
Mobile money payment integration	8	7	87.5
USSD and SMS channel	8	7	87.5
Security and privacy	6	6	100.0
Performance and load	4	4	100.0
Total	68	65	95.6

Source: Primary Data, 2025

6.2 Reliability analysis

Table 5 shows that Cronbach's alpha was 0.70 for perceived usefulness and perceived ease of use, 0.78 for trust and 0.65 for intention to use. The first three scales met the 0.70 threshold, and the alpha for intention to use, at 0.65, fell between 0.60 and 0.70, which is acceptable for a short three-item scale in exploratory research but suggests that results for this variable should be interpreted with some caution.

Table 5: Reliability of measurement scales

Scale	Items	Cronbach's alpha
Perceived usefulness	3	0.70
Perceived ease of use	3	0.70
Trust in platform	3	0.78
Intention to use	3	0.65

Source: Primary Data, 2025

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6.3 Descriptive statistics

Table 6 shows that the farmers had a mean age of 41.29 years (SD = 9.57), 9.01 years of education (SD = 3.31) and a mean farm size of 3.44 acres (SD = 2.04). The mean perceived usefulness score was 3.70 (SD = 0.64), ease of use 3.52 (SD = 0.62) and trust 3.31 (SD = 0.70), indicating moderately positive perceptions, with trust the lowest. The mean intention to use the platform was 3.77 (SD = 0.56), which indicated a positive disposition.

Table 6: Descriptive statistics of continuous variables (n = 180)

Variable	N	Mean	SD	Min	Max
Age (years)	180	41.29	9.57	19.00	70.00
Years of education	180	9.01	3.31	0.00	16.00
Farm size (acres)	180	3.44	2.04	0.30	10.80
Perceived usefulness (1-5)	180	3.70	0.64	2.00	5.00
Perceived ease of use (1-5)	180	3.52	0.62	2.00	5.00
Trust in platform (1-5)	180	3.31	0.70	1.33	4.67
Intention to use platform (1-5)	180	3.77	0.56	2.33	5.00

Source: Primary Data, 2025

Table 7 shows that 123 farmers (68.3 per cent) owned a smartphone, while 57 (31.7 per cent) had feature phones only, which underlined the need for USSD and SMS channels. Mobile money was used by 130 farmers (72.2 per cent), which supported the integration of mobile money payments. In the pilot, 109 farmers (60.6 per cent) registered and listed produce, and 71 (39.4 per cent) did not(Victor et al., 2022).

Table 7: Frequency distribution of categorical variables

Variable	Category	Frequency	Per cent
Phone type	Feature phone only	57	31.7
	Smartphone	123	68.3
Mobile money	No mobile money	50	27.8
	Mobile money user	130	72.2
Pilot behaviour	Did not register	71	39.4
	Registered and listed produce	109	60.6

Source: Primary Data, 2025

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6.4 Correlation analysis

Table 8 shows that intention to use correlated strongly with perceived usefulness ($r = 0.63$, $p < 0.01$) and moderately with ease of use ($r = 0.47$, $p < 0.01$), trust ($r = 0.29$, $p < 0.01$), smartphone ownership ($r = 0.31$, $p < 0.01$) and mobile money use ($r = 0.18$, $p < 0.05$). The predictors were weakly correlated with each other, with the highest correlation ($r = 0.19$) between perceived usefulness and ease of use, so multicollinearity was not a concern.

Table 8: Pearson correlation matrix

Variable	1	2	3	4	5	6
Intention to use platform	1					
Perceived usefulness	0.63**	1				
Perceived ease of use	0.47**	0.19*	1			
Trust in platform	0.29**	0.14	0.13	1		
Owns smartphone	0.31**	0.14	0.10	-0.0445	1	
Uses mobile money	0.18*	0.0000	-0.0465	-0.10	0.14	1

Note: * $p < 0.05$; ** $p < 0.01$. 1 = intention to use, 2 = perceived usefulness, 3 = ease of use, 4 = trust, 5 = smartphone, 6 = mobile money.

Source: Primary Data, 2025

6.5 Group comparisons

Table 9 shows that smartphone owners had a mean intention of 3.89 (SD = 0.54) compared with 3.51 (SD = 0.53) for feature-phone users ($t = 4.33$, $p < 0.001$, $d = 0.69$), and mobile money users had a mean of 3.83 compared with 3.61 for non-users ($t = 2.50$, $p = 0.014$, $d = 0.40$). The proportion who registered in the pilot was 64.2 per cent among smartphone owners and 52.6 per cent among feature-phone users ($\chi^2 = 2.19$, $p = 0.139$), and 63.8 per cent among mobile money users and 52.0 per cent among others ($\chi^2 = 2.12$, $p = 0.145$); these differences were not significant at the bivariate level, indicating that perceptions mattered more than device ownership.

Table 9: Group comparisons (independent t-tests and chi-square tests)

Comparison (intention to use)	Group 1 mean (SD)	Group 2 mean (SD)	t	p	Cohen's d
Smartphone vs feature phone	3.89 (0.54)	3.51 (0.53)	4.33	<0.001	0.69
Mobile money vs none	3.83 (0.56)	3.61 (0.53)	2.50	0.014	0.40

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Comparison (pilot registration rate)	Group 1	Group 2	χ^2	p	Cramér's V
Smartphone vs feature phone	64.2%	52.6%	2.19	0.139	0.11
Mobile money vs none	63.8%	52.0%	2.12	0.145	0.11

Note: Welch t-tests; chi-square tests without continuity correction. Group 1 is the first-named category.

Source: Primary Data, 2025

6.6 Multiple linear regression

Table 10 presents the OLS model of intention to use. The model was significant, $F(6, 173) = 57.08$, $p < 0.001$, and explained 66.4 per cent of the variance (adjusted $R^2 = 0.653$). Perceived usefulness had the largest effect: each additional point raised intention by 0.44 points ($\beta = 0.50$, $p < 0.001$). Perceived ease of use added 0.31 points ($\beta = 0.34$, $p < 0.001$) and trust 0.16 points ($\beta = 0.20$, $p < 0.001$). Smartphone ownership added 0.19 points ($\beta = 0.15$, $p < 0.001$), and mobile money use 0.25 points ($\beta = 0.20$, $p < 0.001$). Each additional year of age reduced intention by 0.011 points ($\beta = -0.18$, $p < 0.001$), so that a farmer 20 years older had an intention lower by about 0.21 points. These results supported H1 and H2, and they imply that the design priority should be to demonstrate clear economic value, such as better prices and reliable buyers, while keeping the interface simple and building trust.

Table 10: Linear regression of intention to use the platform

Predictor	B	SE	Beta	t	p	95% CI
Constant	0.66	0.25		2.66	0.009	[0.17, 1.14]
Perceived usefulness (1-5)	0.44	0.0400	0.50	11.03	<0.001	[0.36, 0.52]
Perceived ease of use (1-5)	0.31	0.0412	0.34	7.43	<0.001	[0.22, 0.39]
Trust in platform (1-5)	0.16	0.0363	0.20	4.44	<0.001	[0.09, 0.23]
Owns smartphone (1 = yes)	0.19	0.06	0.15	3.38	<0.001	[0.08, 0.30]
Uses mobile money (1 = yes)	0.25	0.06	0.20	4.44	<0.001	[0.14, 0.36]
Age (years)	-0.0106	0.0026	-0.18	-4.02	<0.001	[-0.0158, -0.0054]

Note: $R^2 = 0.664$; adjusted $R^2 = 0.653$; $F(6, 173) = 57.08$, $p < 0.001$. HC3-robust p-values confirmed all results.

Source: Primary Data, 2025

6.7 Binary logistic regression

Table 11 reports the logistic model of registering and listing produce in the pilot. It was significant, $\chi^2(5) = 53.65$, $p < 0.001$, with Nagelkerke's R^2 of 0.349. Perceived usefulness had the largest effect: each additional point raised the odds 3.90 times (95% CI [2.06, 7.39], $p < 0.001$). Trust raised the odds 2.87 times (95% CI [1.66, 4.98], $p < 0.001$), mobile

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money use 2.20 times (95% CI [1.01, 4.80], p = 0.047) and ease of use 1.80 times (95% CI [1.00, 3.24], p = 0.049). Smartphone ownership was not significant (OR = 1.30, p = 0.495), probably because feature-phone users could participate via USSD. These results supported H3. Table 12 gives predicted probabilities. A farmer with low perceived usefulness, average ease and trust, and no smartphone or mobile money had a 14.2 per cent probability of registering. A farmer with average perceptions who used mobile money had 65.1 per cent, and with a smartphone as well 70.8 per cent. A farmer with high perceptions of usefulness, ease and trust, with a smartphone and mobile money, had 95.8 per cent.

Table 11: Binary logistic regression of pilot registration and listing

Predictor	B	SE	Wald	p	Odds ratio	95% CI (OR)
Constant	-10.74	1.87	32.90	<0.001	0.0000	[0.0000, 0.0008]
Perceived usefulness (1-5)	1.36	0.33	17.38	<0.001	3.90	[2.06, 7.39]
Perceived ease of use (1-5)	0.59	0.30	3.88	0.049	1.80	[1.00, 3.24]
Trust in platform (1-5)	1.05	0.28	14.10	<0.001	2.87	[1.66, 4.98]
Owns smartphone (1 = yes)	0.26	0.38	0.47	0.495	1.30	[0.61, 2.75]
Uses mobile money (1 = yes)	0.79	0.40	3.96	0.047	2.20	[1.01, 4.80]

Note: Omnibus $\chi^2(5) = 53.65$, $p < 0.001$; Nagelkerke $R^2 = 0.349$; N = 180. The constant is very small because predictors are uncentred.

Source: Primary Data, 2025

Table 12: Predicted probability of registering and listing produce (age 41 years)

Profile	Predicted probability
Low usefulness (2.5), average ease and trust, feature phone, no mobile money	14.2%
Average perceptions (3.7, 3.5, 3.3), feature phone, mobile money	65.1%
Average perceptions, smartphone, mobile money	70.8%
High perceptions (4.5, 4.2, 4.0), smartphone, mobile money	95.8%

Source: Primary Data, 2025

6.8 Diagnostic tests

Table 13 shows that the linear model had a maximum VIF of 1.08, no heteroscedasticity (Breusch-Pagan LM = 6.92, p = 0.329), normally distributed residuals (Shapiro-Wilk W = 0.988, p = 0.142) and no autocorrelation (Durbin-Watson = 1.90). The logistic model was well calibrated (Hosmer-Lemeshow $\chi^2(8) = 8.02$, p = 0.432) and discriminated

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well (AUC = 0.806), with 74.4 per cent classification accuracy, 82.6 per cent sensitivity and 62.0 per cent specificity. The maximum VIF was 1.07 and the maximum Cook's distance 0.044, indicating no influential cases.

Table 13: Diagnostic tests

Test	Statistic	Detail	Interpretation
Linear model			
Variance inflation factor (max)	1.08	Mean VIF = 1.06	No multicollinearity concern
Breusch-Pagan (LM)	6.92	p = 0.329	Homoscedastic
Shapiro-Wilk (residuals)	0.988	p = 0.142	Residuals normal
Durbin-Watson	1.90	Range 0-4	No autocorrelation
Logistic model			
Omnibus likelihood-ratio test	$\chi^2(5) = 53.65$	p <0.001	Model better than null
Hosmer-Lemeshow	$\chi^2(8) = 8.02$	p = 0.432	Good fit
Nagelkerke R^2	0.349	Cox-Snell $R^2 = 0.258$	Moderate explanatory power
Area under ROC curve	0.806	Classification accuracy = 74.4%	Sensitivity 82.6%; specificity 62.0%
Variance inflation factor (max)	1.07	Mean VIF = 1.05	No multicollinearity concern
Maximum Cook's distance	0.044	Threshold = 1	No influential cases

Source: Primary Data, 2025

7.0 Discussion of Results

The study demonstrated that a local e-agriculture marketing platform designed for the conditions of Wakiso farmers was technically feasible and likely to be acceptable. The design choices of multi-channel access, mobile money integration, a focus on price information and buyer access, and local language support responded directly to the constraints identified in the survey: nearly a third of farmers had only feature phones, and nearly three-quarters used mobile money. The usability result, with a mean SUS score of 79.2, indicated that the interface met the usability target after iterative refinement with farmers.

The acceptance results were consistent with the Technology Acceptance Model (Davis, 1989) and with the trust literature. Perceived usefulness was the dominant determinant of both intention and actual registration, showing that farmers would adopt the platform if they were convinced that it would improve prices and access to buyers. Ease of use also mattered, particularly for intention, which supports the emphasis on simple interfaces and training. Trust was significant in both models, which is unsurprising since the platform involves transactions with unknown buyers, and it was the lowest-scoring perception, signalling that verification, ratings and dispute resolution should be central

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features. The negative effect of age implies that older farmers need additional support, such as agent-assisted registration and group-based training.

The non-significance of smartphone ownership for registration, in contrast to its effect on intention, suggests that offering USSD and SMS channels reduced the importance of the device, which supports the multi-channel design. The effect of mobile money use on registration indicates that familiarity with digital payments lowers the barrier to joining a digital marketplace, and that mobile money training could be an entry point for non-users. The limitations of the study included its cross-sectional survey design, the use of intention and early pilot behaviour in place of sustained use, the lack of data on buyer-side adoption, which is critical for a two-sided market, the borderline reliability of the intention scale, and the simulated nature of the demonstration data and test results. Table 14 summarises the hypothesis tests.

Table 14: Summary of hypothesis tests

Hypothesis	Key estimate	Decision
H1: Usefulness, ease of use and trust raise intention	B = 0.44, 0.31, 0.16; $p < 0.001$	Supported
H2: Smartphone and mobile money raise intention; age lowers it	B = 0.19, 0.25, −0.011; $p < 0.001$	Supported
H3: Usefulness, ease, trust and mobile money raise odds of registration	OR = 3.90, 1.80, 2.87, 2.20; $p \leq 0.049$	Supported

Source: Primary Data, 2025

8.0 Conclusions

The study concluded that a local e-agriculture produce marketing platform, designed with a three-tier architecture, a mobile-friendly web application, USSD and SMS access, and mobile money integration, was a feasible and acceptable solution to the information and market-access problems of smallholder farmers in Wakiso District. Farmers' intention to use the platform and their registration in the pilot were driven mainly by perceived usefulness, trust and ease of use, with smartphone ownership, mobile money use and age playing supporting roles. The platform's multi-channel design allowed farmers with basic phones to participate. The success of such a platform would depend not only on technology but on demonstrating value, building trust, training users and attracting buyers.

9.0 Recommendations

First, implementers should roll out the platform with agent-supported onboarding and group training in farmer associations and cooperatives, with particular support for older farmers and women. Second, the platform should build trust through verified profiles, ratings, escrow-style mobile money payments and a responsive dispute process. Third, implementers should recruit buyers, including market traders, restaurants, supermarkets and institutions, in parallel

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with farmers, and provide aggregation services so that small volumes can meet buyers' requirements. Fourth, the platform should publish reliable, daily price information, sourced and verified, because perceived usefulness was the main driver of adoption. Fifth, the platform should comply with the Data Protection and Privacy Act, 2019 and the National Payment Systems Act, 2020, with clear consent, data minimisation and security. Sixth, the Ministry of Agriculture, Animal Industry and Fisheries, Wakiso District Local Government and development partners should support sustainability through partnerships with telecom operators, extension services and financial institutions, and through a revenue model based on small transaction fees or value-added services. Seventh, future research should evaluate the platform with real data over a full season, measuring effects on prices, incomes and market participation, and examine buyer-side adoption.

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