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Modeling Rice Farmers' Behavioral Intention to Adopt Blockchain Traceability Systems in The Municipality of Banaybanay: An Empirical Application of the Unified Theory of Acceptance and Use of Technology (UTAUT)

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Abstract

This study examined the behavioral intention of rice farmers toward adopting blockchain-enabled traceability systems in the Municipality of Banaybanay, Davao Oriental using the Unified Theory of Acceptance and Use of Technology (UTAUT). Specifically, it investigated the influence of performance expectancy, effort expectancy, social influence, and facilitating conditions on behavioral intention, as well as the moderating effects of age and farming experience. The study employed a quantitative, non-experimental, cross-sectional explanatory correlational design. Data were collected through a validated and reliable structured questionnaire administered to 234 qualified rice farmers selected through stratified random sampling. Descriptive statistics, Pearson Product-Moment Correlation Analysis, Multiple Linear Regression Analysis, and Hierarchical Moderation Regression Analysis were used to analyze the data. Findings revealed that respondents exhibited high to very high levels of technology acceptance and behavioral intention toward blockchain-enabled traceability systems. Performance expectancy, effort expectancy, social influence, and facilitating conditions demonstrated significant positive relationships with behavioral intention and significantly predicted adoption intention. The regression model explained 67.4% of the variance in behavioral intention, indicating substantial explanatory power. In contrast, age and farming experience did not significantly moderate the relationships between the UTAUT constructs and behavioral intention. The study concludes that rice farmers' intention to adopt blockchain-enabled traceability systems is primarily influenced by perceptions of usefulness, ease of use, social support, and facilitating conditions rather than demographic and experiential characteristics. The findings support the applicability of the UTAUT framework in explaining technology adoption behavior in agricultural settings and suggest the need for strengthened digital agriculture initiatives, farmer education programs, infrastructure support, and stakeholder collaboration to facilitate technology adoption. This study aligns with SDG 2 (Zero Hunger), SDG 8 (Decent Work and Economic Growth), SDG 9 (Industry, Innovation and Infrastructure), and SDG 12 (Responsible Consumption and Production) through its focus on agricultural innovation, productivity enhancement, and traceability systems. The study contributes to socio-economic, technological, community, and institutional sustainability by providing evidence that may support digital agriculture adoption, agricultural modernization, and informed policy development within rural farming communities.

Keywords: Behavioral Intention; Blockchain-Enabled Traceability Systems; Digital Agriculture; Facilitating Conditions; Performance Expectancy; Rice Farmers; Unified Theory of Acceptance and Use of Technology (UTAUT)

1. Introduction

The agricultural sector is experiencing rapid digital transformation through technologies such as the Internet of Things (IoT), artificial intelligence, big data analytics, and blockchain. These innovations are increasingly utilized to improve food security, supply chain transparency, operational efficiency, and sustainable agricultural development. Among these technologies, blockchain has emerged as a promising solution for agricultural traceability because of its ability to provide secure, transparent, and tamper-resistant recordkeeping systems that improve accountability and trust among supply chain participants (Klerkx et al., 2019; Trendov et al., 2019; Bosona & Gebresenbet, 2023; Casino et al., 2019). Despite its potential, blockchain adoption remains limited in many developing countries because of infrastructural, technological, institutional, and behavioral barriers. Understanding the factors influencing farmers' behavioral intention toward blockchain-enabled traceability systems is therefore essential for advancing digital agriculture and agricultural modernization.

1.1 Background of Blockchain-Enabled Traceability Adoption Among Rice Farmers

Digital agriculture has become an important strategy for improving agricultural productivity, transparency, and sustainability. Blockchain technology offers decentralized and immutable recordkeeping systems capable of enhancing traceability, monitoring, and information reliability throughout agricultural supply chains (Bosona & Gebresenbet, 2023;

Casino et al., 2019). Through blockchain-enabled traceability systems, production, harvesting, storage, transportation, and distribution records can be securely documented and verified, reducing opportunities for fraud and information asymmetry. However, adoption of digital agriculture technologies remains uneven in low- and middle-income countries because of inadequate infrastructure, weak internet connectivity, limited electricity access, and low digital literacy among rural populations (Manzoor et al., 2025). These challenges are particularly evident among smallholder farmers who often possess limited technological exposure and access to digital resources. In the Philippines, rice farming remains a vital component of food security and rural livelihoods, supporting approximately 45% of farming households (Kürschner et al., 2016). Nevertheless, rice farmers continue to encounter challenges related to production costs, market access, pricing instability, and inefficient agricultural systems. In the Municipality of Banaybanay, Davao Oriental, rice production serves as a major economic activity, with approximately 1,737 hectares of hybrid rice planted during the 2025 dry season (Oblianda, 2025). Despite their significant contribution to agricultural production, many rice farmers continue to rely on traditional farming methods and manual recordkeeping systems, limiting opportunities for improved transparency, efficiency, and competitiveness (FAO, 2019; Klerkx et al., 2019).

1.2 Themes and Insights from Literature on Blockchain Technology, Digital Agriculture, and Technology Acceptance

Blockchain technology has been recognized as a transformative innovation capable of improving agricultural traceability, transparency, accountability, and operational efficiency. Blockchain-enabled traceability systems provide secure, timestamped, and immutable records that improve product verification, food safety monitoring, quality assurance, and supply chain coordination (Saberi et al., 2019; Casino et al., 2019; Bosona & Gebresenbet, 2023). Existing literature indicates that blockchain systems offer several benefits, including improved transparency, enhanced information reliability, strengthened accountability, greater market access, and improved supply chain efficiency (Bosona & Gebresenbet, 2023; Casino et al., 2019; Tian, 2017). In rice farming, these systems may improve product authenticity, monitoring efficiency, and compliance with traceability standards required by domestic and international markets (Tian, 2017; Bosona & Gebresenbet, 2023). However, studies also identify significant barriers affecting adoption. These include technological complexity, limited digital literacy, inadequate infrastructure, financial constraints, institutional challenges, technology anxiety, and uncertainty regarding implementation outcomes (Klerkx et al., 2019; Trendov et al., 2019; Manzoor et al., 2025; Ninsiima et al., 2025; Rogers, 2003). Successful implementation therefore depends on technological accessibility, institutional support, stakeholder collaboration, and farmers' perceptions regarding usefulness and ease of use (Xue et al., 2024; Ninsiima et al., 2025). Digital literacy, institutional support, affordability, and social influence have likewise been identified as critical determinants of technology adoption among smallholder farmers (Mittal & Mehar, 2016; Manzoor et al., 2025; Rogers, 2003). Within the Philippine agricultural sector, ongoing digitalization efforts continue to face challenges related to infrastructure, connectivity, and digital capability, although farmers have shown increasing receptiveness toward technologies perceived as beneficial and practical (Department of Agriculture, 2023; FAO, 2019).

1.3 Local, National, and Global Context of Blockchain-Enabled Traceability Adoption

Globally, agricultural sectors are increasingly integrating blockchain and digital technologies to improve transparency, sustainability, and food system accountability (Klerkx et al., 2019; Trendov et al., 2019). International studies demonstrate the growing application of blockchain across agricultural supply chains to improve traceability, quality assurance, and consumer trust (Bosona & Gebresenbet, 2023; Casino et al., 2019). Nationally, the Philippines continues to pursue agricultural modernization through digital agriculture initiatives, ICT-based platforms, and technology-supported extension services. Nevertheless, rural farmers continue to face barriers related to infrastructure limitations, inconsistent connectivity, and varying levels of digital literacy (Department of Agriculture, 2023; FAO, 2019). Locally, rice farmers in Banaybanay, Davao Oriental represent an important agricultural population whose readiness toward blockchain-enabled traceability systems remains largely unexplored. Given the municipality's contribution to regional rice production and the predominance of smallholder farming operations, understanding farmers' adoption intentions is necessary for supporting localized digital agriculture initiatives (Oblianda, 2025).

1.4 Theoretical and Conceptual Basis of Behavioral Intention Toward Blockchain-Enabled Traceability Systems

The present study is anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. (2003). UTAUT proposes that behavioral intention toward technology adoption is influenced by four major determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy refers to the belief that technology improves productivity, efficiency, and performance (Venkatesh et al., 2003). Effort expectancy reflects the perceived ease associated with technology use. Social influence represents the effect of significant individuals and institutions on technology adoption decisions, while facilitating conditions refer to the availability of resources, infrastructure, and support mechanisms necessary for technology utilization (Venkatesh et al., 2003). Supporting literature demonstrates that these constructs significantly influence behavioral intention toward blockchain-enabled and digital agriculture technologies (Xue et al., 2024; Ninsiima et al., 2025; Manzoor et al., 2025; Klerkx et al., 2019; Trendov et al., 2019). Furthermore, age and farming experience have been identified as potential moderating variables affecting technology acceptance behavior (Venkatesh et al., 2003; Al-Gahtani et al., 2007; Morris &

Venkatesh, 2000; Czaja et al., 2006). The study also draws conceptual support from earlier technology adoption theories, including the Theory of Reasoned Action (Fishbein & Ajzen, 1975), Theory of Planned Behavior (Ajzen, 1991), Technology Acceptance Model (Davis, 1989), and Diffusion of Innovations Theory (Rogers, 2003), which collectively explain how attitudes, social influence, perceived control, usefulness, ease of use, and innovation characteristics influence technology adoption behavior.

1.5 Research Gaps and Rationale

A review of existing literature reveals several important gaps. Current blockchain research primarily focuses on technical architectures, system implementation, logistics optimization, and organizational adoption, with limited attention given to farmers' behavioral adoption decisions (Bosona & Gebresenbet, 2023). Existing studies are concentrated on large organizations, agribusiness firms, and developed-country contexts, while empirical evidence involving smallholder farmers remains limited (Ninsiima et al., 2025). A knowledge gap exists regarding farmers' awareness, understanding, and readiness to adopt blockchain-enabled traceability systems. A population gap is evident because smallholder rice farmers remain underrepresented in blockchain adoption studies. An empirical gap exists because no known study has specifically examined the behavioral intention of rice farmers in the Municipality of Banaybanay toward blockchain-enabled traceability systems. A theoretical gap remains because limited studies have applied the UTAUT framework within blockchain-enabled agricultural traceability contexts. Geographic and policy gaps are likewise apparent because localized evidence from rural Philippine communities remains scarce. To address these gaps, the study investigates the influence of performance expectancy, effort expectancy, social influence, and facilitating conditions on the behavioral intention of rice farmers to adopt blockchain-enabled traceability systems while examining the moderating effects of age and farming experience. The findings are expected to contribute localized empirical evidence supporting digital agriculture implementation and policy development within rural agricultural communities.

1.6 Alignment with Relevant Sustainable Development Goals (SDGs)

This study aligns with SDG 2 – Zero Hunger by supporting agricultural innovation that may improve food system transparency, traceability, and efficiency. It also aligns with SDG 8 – Decent Work and Economic Growth through its focus on enhancing agricultural productivity, competitiveness, and market opportunities for smallholder farmers. The study further supports SDG 9 – Industry, Innovation and Infrastructure by examining the adoption of blockchain technology as an emerging digital innovation capable of strengthening agricultural systems and promoting rural technological development. Additionally, it contributes to SDG 12 – Responsible Consumption and Production through improved traceability, accountability, and verification within agricultural supply chains.

1.7 Importance of the Study to Multidisciplinary Sustainability

The study contributes to socio-economic sustainability by exploring technologies that may improve agricultural productivity, transparency, and market participation among rice farmers. It supports community sustainability by providing evidence that may guide local governments, agricultural institutions, cooperatives, and development organizations in designing inclusive digital agriculture initiatives. The study also contributes to technological sustainability by advancing knowledge on digital agriculture adoption and blockchain implementation within rural communities. From a policy and institutional sustainability perspective, the findings may support evidence-based decision-making, agricultural modernization strategies, and technology adoption programs that strengthen the long-term resilience and competitiveness of the Philippine agricultural sector.

2. Material and methods

2.1 Research Design

The study utilized a non-experimental, cross-sectional explanatory correlational design. It examined the relationships among the Unified Theory of Acceptance and Use of Technology (UTAUT) constructs—performance expectancy, effort expectancy, social influence, and facilitating conditions—and behavioral intention. The study also investigated the moderating effects of age and farming experience. Descriptive and inferential statistical techniques were used to analyze the data.

2.2 Locale of the Study

The study was conducted in the Municipality of Banaybanay, Davao Oriental, Philippines. Data were collected from six major rice-producing barangays: Caganganan, Rang-Ay, Poblacion, Mogbongcogon, Causwagan, and Calubihan. The locality was selected because of its active rice farming sector and suitability for examining technology adoption in a rural agricultural setting.

2.3 Respondents of the Study

The respondents were registered and actively engaged rice farmers from the selected barangays. Eligible participants were at least 18 years old, actively involved in rice production and farm-level decision-making, and willing to participate in the study. Only qualified and complete responses were included in the final analysis.

2.4 Sample and Sampling Procedure

Stratified random sampling was employed to ensure proportional representation of rice farmers from each selected barangay. The sample size was initially determined using Cochran's Formula (1977). A total of 320 rice farmers participated in the survey; however, after data screening and validation, 234 qualified responses were retained for analysis. The final sample size was considered adequate for regression and moderation analyses (Hair et al., 2019).

2.5 Research Instrument

Data were gathered using a structured questionnaire adapted from the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. (2003). The instrument consisted of demographic items and measures of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Behavioral Intention. Responses were measured using a five-point Likert scale ranging from Strongly Disagree (1) to Strongly Agree (5). The instrument underwent expert validation and pilot testing among 62 rice farmers with characteristics similar to the target respondents. Content validity results indicated strong construct representation (S-CVI = 0.89). Reliability testing showed excellent overall internal consistency ($\alpha = 0.9235$), confirming the suitability of the instrument for the study.

2.6 Data Gathering Procedure

After securing the necessary approvals from relevant authorities and stakeholders, the researchers conducted face-to-face survey administration during farmers' meetings and community activities. The questionnaire was explained in the local dialect to ensure comprehension. Participation was voluntary, and informed consent was obtained from all respondents. Completed questionnaires were retrieved, encoded, screened, and cleaned prior to statistical analysis.

2.7 Data Analysis Techniques

Frequency and percentage distributions were used to describe the demographic profile of the respondents. Weighted mean and standard deviation were employed to determine the levels of the UTAUT constructs and behavioral intention. Pearson Product-Moment Correlation Analysis was used to examine relationships among variables, while Multiple Linear Regression Analysis identified significant predictors of behavioral intention. Hierarchical Moderation Regression Analysis using the PROCESS Macro framework of Hayes (2022) was conducted to determine whether age and farming experience moderated the relationships between the UTAUT constructs and behavioral intention. Prior to inferential analysis, assumption testing confirmed normality, absence of multicollinearity, homoscedasticity, independence of errors, and the absence of extreme outliers, indicating the suitability of the dataset for parametric statistical procedures.

3. Results and Discussion

3.1 Demographic Characteristics of Rice Farmers

3.1.1 Age Distribution

Most respondents were aged 50 years and above, followed by those aged 40–49 years, 30–39 years, and 20–29 years. This indicates that rice farming in Banaybanay is largely managed by mature and experienced individuals. The findings suggest that farmers from different age groups were represented in the study, providing demographic diversity for examining technology adoption behavior. The results imply that blockchain-enabled technologies may be accepted across various age groups when perceived as useful and beneficial.

3.1.2 Farming Experience Distribution

Most respondents had 16 years or more of farming experience, while fewer respondents reported shorter farming involvement. This indicates that the majority of participants possessed extensive agricultural experience. The findings suggest that respondents had sufficient farming knowledge and practical exposure to evaluate blockchain-enabled traceability systems. The varied levels of farming experience also allowed assessment of technology adoption across different experience groups.

3.2 Technology Acceptance and Behavioral Intention Toward Blockchain-Enabled Traceability Systems

3.2.1 Performance Expectancy

Respondents demonstrated a very high level of performance expectancy, indicating strong agreement that blockchain-enabled traceability systems can improve transparency, monitoring, record accuracy, operational efficiency, and farm management. This finding supports the UTAUT framework of Venkatesh et al. (2003), which identifies performance expectancy as a key determinant of technology adoption. The result is consistent with Bosona and Gebresenbet (2023), Tian (2017), Ninsiima et al. (2025), and Xue et al. (2024).

3.2.2 Effort Expectancy

Respondents reported a high level of effort expectancy, indicating favorable perceptions regarding the ease of learning and using blockchain-enabled traceability systems. The findings suggest that rice farmers generally perceive the technology as understandable and manageable. This supports Venkatesh et al. (2003) and aligns with Xue et al. (2024), Manzoor et al. (2025), and Klerkx et al. (2019).

3.2.3 Social Influence

Respondents exhibited a high level of social influence, indicating that support from family members, fellow farmers, agricultural organizations, and government agencies contributes to their willingness to adopt blockchain-enabled traceability systems. The findings support Venkatesh et al. (2003), which emphasizes the role of social influence in technology adoption. The result is consistent with Xue et al. (2024), Ninsiima et al. (2025), and Rogers (2003).

3.2.4 Facilitating Conditions

Respondents reported a high level of facilitating conditions, reflecting favorable perceptions regarding the availability of resources, technical assistance, infrastructure, and institutional support. The findings indicate that rice farmers believe adequate support systems can facilitate blockchain adoption. This supports Venkatesh et al. (2003) and is consistent with Klerkx et al. (2019), Trendov et al. (2019), and Manzoor et al. (2025).

3.2.5 Behavioral Intention Toward Blockchain Adoption

Respondents demonstrated a very high level of behavioral intention, indicating strong willingness to use, learn, implement, and recommend blockchain-enabled traceability systems. The findings suggest a favorable disposition toward blockchain adoption among rice farmers. This supports Venkatesh et al. (2003) and aligns with Xue et al. (2024), Ninsiima et al. (2025), and Bosona and Gebresenbet (2023).

3.2.6 Overall Technology Acceptance and Behavioral Intention

Overall, respondents exhibited a very high level of acceptance toward blockchain-enabled traceability systems. Behavioral intention and performance expectancy obtained the highest ratings, while effort expectancy, social influence, and facilitating conditions also received favorable evaluations. The findings indicate that rice farmers generally perceive blockchain-enabled traceability systems as useful, manageable, socially supported, and implementable. The results support the UTAUT framework developed by Venkatesh et al. (2003) and are consistent with Bosona and Gebresenbet (2023), Xue et al. (2024), and Ninsiima et al. (2025).

3.3 Relationship Between UTAUT Constructs and Behavioral Intention

3.3.1 Relationship Between Technology Acceptance Factors and Behavioral Intention

The correlation analysis revealed that performance expectancy, effort expectancy, social influence, and facilitating conditions all had significant and very strong positive relationships with behavioral intention toward adopting blockchain-enabled traceability systems. Among the variables, performance expectancy demonstrated the strongest relationship. These findings indicate that rice farmers who perceive blockchain-enabled traceability systems as useful, easy to use, socially supported, and adequately facilitated are more likely to adopt the technology. The results support the Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. (2003) and are consistent with Xue et al. (2024), Ninsiima et al. (2025), and Rogers (2003).

3.4 Predictive Influence of UTAUT Constructs on Behavioral Intention

3.4.1 Explanatory Power of the UTAUT Model

The regression analysis showed that the UTAUT constructs explained 67.4% of the variance in behavioral intention, indicating substantial explanatory power and a strong relationship between the predictors and behavioral intention. This finding suggests that performance expectancy, effort expectancy, social influence, and facilitating conditions play important roles in shaping rice farmers' intention to adopt blockchain-enabled traceability systems. The result supports the applicability of the UTAUT framework in agricultural technology adoption (Venkatesh et al., 2003; Xue et al., 2024; Ninsiima et al., 2025).

3.4.2 Significance of the Regression Model

The regression model was found to be statistically significant, indicating that the combined UTAUT constructs significantly predict behavioral intention toward adopting blockchain-enabled traceability systems. This result confirms that favorable perceptions regarding usefulness, ease of use, social support, and facilitating resources collectively influence farmers' willingness to adopt blockchain technology. The finding supports Venkatesh et al. (2003), Xue et al. (2024), Ninsiima et al. (2025), Klerkx et al. (2019), and Manzoor et al. (2025).

3.4.3 Predictive Effect of the UTAUT Constructs

The regression coefficient analysis revealed a strong and significant positive effect of the combined UTAUT constructs on behavioral intention. Increases in favorable perceptions regarding performance expectancy, effort expectancy, social influence, and facilitating conditions corresponded to increases in behavioral intention. The findings indicate that rice farmers are more likely to adopt blockchain-enabled traceability systems when they perceive the technology as beneficial, manageable, socially encouraged, and supported by adequate resources. This result supports the theoretical assumptions of Venkatesh et al. (2003) and is consistent with Xue et al. (2024), Ninsiima et al. (2025), Klerkx et al. (2019), and Manzoor et al. (2025).

3.5 Moderating Effects of Age and Farming Experience

3.5.1 Moderating Effect of Age

The analysis revealed that age did not significantly moderate the relationships between performance expectancy, effort expectancy, social influence, facilitating conditions, and behavioral intention. The influence of the UTAUT constructs on behavioral intention remained consistent across different age groups. This finding suggests that both younger and older rice farmers demonstrated similar willingness to adopt blockchain-enabled traceability systems when they perceived the technology as useful, easy to use, socially supported, and adequately facilitated. The result is consistent with Zhang et al. (2024), Manzoor et al. (2025), Klerkx et al. (2019), Trendov et al. (2019), Rogers (2003), and Ninsiima et al. (2025).

3.5.2 Moderating Effect of Farming Experience

The analysis further revealed that farming experience did not significantly moderate the relationships between the UTAUT constructs and behavioral intention. The effects of performance expectancy, effort expectancy, social influence, and facilitating conditions remained stable regardless of years of farming experience. The findings indicate that both less experienced and highly experienced farmers shared similar perceptions toward blockchain-enabled traceability systems. This result supports the findings of Manzoor et al. (2025), Zhang et al. (2024), Klerkx et al. (2019), Trendov et al. (2019), Venkatesh et al. (2003), Rogers (2003), and Ninsiima et al. (2025).

3.6 Summary of Hypothesis Testing Results

The findings revealed significant positive relationships between the UTAUT constructs and behavioral intention, leading to the rejection of the first null hypothesis. The second null hypothesis was also rejected, confirming that performance expectancy, effort expectancy, social influence, and facilitating conditions significantly predict behavioral intention toward adopting blockchain-enabled traceability systems. However, the third null hypothesis was not rejected because age and farming experience did not significantly moderate the relationships between the UTAUT constructs and behavioral intention. These findings support the UTAUT framework of Venkatesh et al. (2003) and suggest that blockchain-enabled traceability systems have broad adoption potential among rice farmers when perceived as useful, manageable, and supported by adequate resources and institutional assistance.

4. Conclusion and Recommendations

The study found that rice farmers in the Municipality of Banaybanay, Davao Oriental exhibited high to very high levels of technology acceptance and behavioral intention toward adopting blockchain-enabled traceability systems. Performance expectancy, effort expectancy, social influence, and facilitating conditions were significantly associated with and predictive of behavioral intention, confirming the applicability of the UTAUT framework in explaining technology adoption behavior. Conversely, age and farming experience did not significantly moderate these relationships, indicating that favorable perceptions regarding usefulness, ease of use, social support, and facilitating conditions are the primary drivers of adoption intention regardless of demographic and experiential differences.

Rice farmers, local government units, the Department of Agriculture, agricultural cooperatives, extension services, and blockchain developers are encouraged to strengthen digital agriculture initiatives, farmer education, technical support, and collaborative efforts related to blockchain-enabled traceability systems. Efforts should focus on enhancing digital literacy, technological readiness, infrastructure accessibility, awareness programs, and pilot implementation activities to support the adoption and practical application of blockchain-enabled agricultural technologies. Future researchers are encouraged to expand the scope of investigation, include additional adoption-related variables, and examine actual technology usage behavior in broader agricultural contexts.

The study was limited to registered rice farmers in selected barangays of the Municipality of Banaybanay, Davao Oriental and focused on behavioral intention rather than actual usage of blockchain-enabled traceability systems. The investigation examined only the UTAUT constructs, age, and farming experience, while other factors that may influence technology adoption were not included. Furthermore, the use of a cross-sectional design restricted the assessment of changes in perceptions and adoption behavior over time.

Compliance with ethical standards

The author declare no conflict of interest. This study received no external funding and was conducted with the cooperation of the participating rice farmers and relevant local agricultural stakeholders in the Municipality of Banaybanay, Davao Oriental. Participation was voluntary, informed consent was obtained from all respondents prior to data collection, and information was gathered through a non-invasive survey questionnaire. All responses were treated with strict confidentiality, and no identifying personal information was disclosed in the reporting of the findings.

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