

SAJAAS



Southeast Asian Journal of Agriculture and Allied Sciences

Volume 5 Issue 2

Perception and Level of Adoption of Virtual Farmers' Field School in the Province of Bulacan

Santiago, Raymart C.¹

Navarro, Imelda S.A.²

Corresponding Author: santiagoraymart03@gmail.com

¹*Provincial Agriculture Office, Provincial Capitol Compound, Malolos City,
Bulacan, Philippines*

²*College of Agriculture and Graduate Studies of Agriculture, Bulacan
Agricultural State College, Pinaod, San Ildefonso, Bulacan, Philippines*

pp. 38–50

Perception and Level of Adoption of Virtual Farmers' Field School in the Province of Bulacan

<https://doi.org/10.63943/sajaas.vol5iss2art107pp38-50>

Santiago, Raymart C.¹

Navarro, Imelda S.A.²

Corresponding Author: santiagoraymart03@gmail.com

¹Provincial Agriculture Office, Provincial Capitol Compound, Malolos City, Bulacan, Philippines

²College of Agriculture and Graduate Studies of Agriculture, Bulacan Agricultural State College, Pinaod, San Ildefonso, Bulacan, Philippines

Article History:

Received: Jun. 13, 2025

Accepted: Aug. 11, 2025

Published: Sep. 30, 2025

Abstract

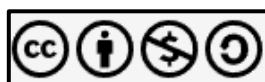
The COVID-19 pandemic greatly disrupted conventional agricultural training programs, prompting the Provincial Agriculture Office (PAO) of Bulacan to implement the Virtual Farmers' Field School (VFFS) on vegetable production in 2021. This study evaluated the extent to which smallholder farmers integrated vegetable production practices taught through the VFFS and analyzed how socio-demographic profiles, farming characteristics, and perceived challenges influenced their application of these practices. A total of 90 VFFS graduates from eight cities and municipalities in Bulacan were surveyed using a structured questionnaire. The research assessed practice application across four key production stages: land preparation, planting, crop management, and harvesting. Results revealed a generally high level of practice integration, particularly in planting, crop management, and harvesting. A statistically significant negative relationship was found between age and the degree of practice use, indicating that younger farmers were more receptive to the virtual training format and more likely to apply the recommended technologies and techniques in their farming activities. These findings highlight the effectiveness of virtual agricultural extension programs in improving farming practices among smallholder farmers, especially when supported by enabling systems. To further promote inclusivity and long-term sustainability, the study recommends strengthening digital infrastructure, enhancing farmers' digital literacy, and institutionalizing a hybrid approach that combines online and in-person learning.

Keywords: digital literacy, integration, smallholder farmers, vegetable production practices, Virtual Farmers' Field School

Introduction

The Farmers' Field School (FFS) is a proven participatory training method that enhances smallholder farmers' skills through hands-on, in-field learning. Traditionally conducted face-to-face, FFS encourages peer learning and adoption of improved practices. However, the COVID-19 pandemic disrupted these sessions, prompting the need for digital alternatives. In response, the Provincial Agriculture Office of Bulacan launched the Virtual Farmers' Field School (VFFS) on vegetable production in 2021, using online lectures, discussions, and demonstrations over 12 weeks across eight municipalities. While innovative, the effectiveness and sustainability of the VFFS in rural areas remain underexplored.

Literature points to key challenges in digital agricultural training, including limited internet access,



CC BY-NC-SA 4.0

ATTRIBUTION-NONCOMMERCIAL-SHAREALIKE 4.0 INTERNATIONAL

<https://creativecommons.org/licenses/by-nc-sa/4.0/>

low digital literacy, and poor infrastructure in rural communities. Although online platforms offer flexibility, there is limited evidence on their real-world impact on behavior change and productivity, especially in the Philippine context. The pandemic further exposed weaknesses in agricultural extension services, reinforcing the need for resilient, adaptive learning systems. Without proper evaluation, the ability of virtual platforms like the VFFS to maintain farmer engagement and support lasting change remains uncertain.

Understanding how farmers perceive and adopt virtual training is essential. The Diffusion of Innovations Theory explains that adoption depends on perceived advantages, compatibility, complexity, trialability, and observability. Similarly, perception theory suggests that farmers' attitudes and behavior are shaped by how they interpret their experiences—positive or negative. Studies by Salar (2020) and Maghinay and Guro (2024) show that farmers' perceptions of training clarity, accessibility, and usefulness strongly influence adoption. This highlights the importance of evaluating both perceptual experiences and actual outcomes in digital training programs like the VFFS.

Given this context, there is a critical need to evaluate the implementation and adoption of virtual training models within the agricultural sector, especially among smallholder farmers in developing regions. This study seeks to fill this gap by assessing the level of adoption and key factors influencing the uptake of VFFS technologies and practices in vegetable production in Bulacan, Philippines. Specifically, it explores the relationship between farmers' socio-demographic profiles, farming characteristics, and perceived challenges, and how these factors shape their engagement with VFFS.

By providing empirical evidence on the effectiveness and limitations of virtual agricultural training, this study contributes to the growing body of knowledge on digital extension models. The findings aim to inform policymakers, extension workers, and development practitioners in designing more inclusive, context-sensitive, and resilient training strategies that are responsive to the evolving needs of farming communities in the post-pandemic era.

Materials and Methods

Research Design

This study employed a correlational research design to determine the relationship between farmers' socio-demographic profiles, farming characteristics, and perceived challenges, and their level of adoption of practices introduced in the Virtual Farmers' Field School (VFFS) on vegetable production. The independent variables included age, sex, civil status, education, income source, household size, farming experience, tenurial status, crop types, land area, yield, irrigation source, and organizational affiliation. The dependent variable was the level of adoption of VFFS practices, measured across key stages of vegetable farming.

Study Setting and Time Frame

The study was conducted in the province of Bulacan, Philippines, focusing on eight cities and municipalities where the Virtual Farmers' Field School (VFFS) on vegetable production was implemented. These areas were selected based on the presence of VFFS graduates and active vegetable production activities. Bulacan is located in Central Luzon, a key agricultural region in the country, and serves as a major supplier of vegetables to nearby urban markets, including Metro Manila.

Data collection took place from January to March 2025, following the completion of the VFFS cycle conducted in 2021. (See Figure 1: Map of Study Sites in Bulacan, Philippines).

Figure 1

Map of Bulacan, Showing the Eight Municipalities and Cities Where the Study was Conducted



Sampling Procedure and Participants

A total of 90 out of 120 individual vegetable farmers who completed the Virtual Farmers' Field School (VFFS) program were selected as respondents using purposive sampling. These respondents represented the full population of graduates from the eight selected municipalities and cities in Bulacan where the program was actively implemented. The selection was based on accessibility and relevance to the study objectives. The distribution of respondents per municipality is presented in Table 1.

Table 1

Number of VFFS Graduates by City/Municipality Included in the Social Research

No	City/ Municipality	Population	Sample
1	Hagonoy	15	11
2	Pulilan	13	10
3	Baliwag City	14	11
4	Bustos	14	11
5	Plaridel	19	14
6	DRT	15	11
7	Bocaue	15	11
8	Pandi	15	11
Total		120	90

Research Instrument and Validation

The primary data collection tool was a researcher-developed questionnaire, validated by a panel of subject matter experts in vegetable production and extension education. The questionnaire was pre-tested with 25 VFFS graduates from eight cities and municipalities who were not part of the main study sample. Reliability analysis using Cronbach's alpha produced a coefficient of 0.964, which demonstrates excellent internal consistency.

The questionnaire was structured into three sections. The first section gathered socio-demographic and farming profiles of the respondents, including information such as age, sex, educational attainment, farming experience, crop types, yield, and other relevant background details. The second part addressed the perceived hindrances encountered during the implementation of the VFFS. This section utilized a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) and covered aspects such as internet connectivity, material sufficiency, training quality, provision of agricultural inputs, and the performance of Agricultural Extension Workers (AEWs). The third part measured the level of adoption of farming practices introduced through the VFFS, also using a 5-point scale (1 = Not Adopted to 5 = Fully Adopted). It covered four key stages of vegetable production: (a) pre-planting and planting, (b) crop management and maintenance, (c) harvest and postharvest handling, and (d) farm management and record-keeping.

Data Collection Procedure

Prior to data collection, permission was formally secured from the Provincial Agriculture Office (PAO) of Bulacan. Coordination was established with PAO field staff and Agricultural Extension Workers (AEWs) to assist in identifying and reaching VFFS graduates. Data collection was carried out through focus group discussions, semi-structured interviews, and the use of validated questionnaires. Supplemental tools such as an interview guide, notepad, and digital camera were used to support documentation and field notes.

Statistical Analysis

In accordance with the objectives of the study, this research used the following statistical tools to analyze the data gathered:

The percentage and frequencies were used to determine the socio-demographic and farming characteristics of farmers including age, sex, civil status, educational attainment, source of income, household size, organizational affiliation, tenurial status, years in farming, crops planted, area planted, and average yield of crops per cropping cycle, as well as source of irrigation. To identify the level of perception of respondents on hindrances in the implementation of VFFS, and level of adoption, mean and standard deviation were used. To examine the relationship between respondents' profiles, such as sex, civil status, educational attainment, source of income, household size, tenurial status, years in farming, organizational affiliation, farm size, average yield per cropping, source of irrigation and their level of adoption, ANOVA was used. To measure the relationship between age, perception on hindrances, and level of adoption of the respondents on VFFS, Pearson Product-Moment Correlation was used.

Ethical Consideration

This research adhered to ethical standards for human subject research. The respondents were informed of the study's purpose, and their informed consent was obtained prior to data collection. Respondents were assured of the **confidentiality** and **voluntary** nature of their participation, and all data were anonymized prior to analysis. Ethical approval was obtained from the local research ethics review board affiliated with the academic institution overseeing the study.

Results and Discussion

Socio-Demographic Profile of Participants

The study explored the socio-demographic characteristics of the farmer-respondents, focusing on variables such as age, sex, civil status, educational attainment, sources of income, household size, and organizational affiliation. As shown in Table 2, the profile of the 90 participants in the VFFS on vegetable

production in Bulacan offers a comprehensive overview of the individuals involved in the program. Understanding these demographic traits is essential for evaluating their engagement with and potential responsiveness to digital agricultural training.

Table 2

Socio-Demographic Profile of VFFS Graduates

Variable	Indicators	Frequency (f)	Percentage (%)
Age	18–35	9	10.00
	36–55	39	43.33
	56 and above	42	46.67
Sex	Male	48	53.30
	Female	42	46.70
Civil Status	Single	1	1.10
	Married	86	95.60
	Separated	3	3.30
Educational Attainment	Elementary Graduate	11	12.20
	High School Graduate	47	52.20
	College Graduate	32	35.60
Source of Income	Farming	83	92.20
	Non-farming	7	7.80
Household Size	1–3 members	55	61.11
	4–6 members	35	38.89
Affiliation	Farmers’ Association	90	100

Table 2 presents that majority of the 90 farmer-respondents were older adults, with 46.67% aged 56 and above, highlighting the aging trend in Philippine agriculture. This aligns with Guay et al. (2025), who noted that an aging farming population may face challenges in adopting digital technologies like the VFFS. Both sexes were well-represented (53.3% male, 46.7% female), reflecting balanced gender participation, which is consistent with the study of Wagayen (2024), who examined the involvement of both male and female respondents in agricultural and natural resource activities.

Most respondents were married (95.6%), indicating that farming remains a family-oriented livelihood. Velza et al. (2023) reported that most of their respondents were married, affirming the common link between family life and farming in rural communities. In terms of education, 52.2% were high school graduates and 35.6% had completed college, showing strong potential for technology adoption. This is supported by Red et al. (2021), who found that more educated farmers tend to be receptive to modern farming methods.

Farming was the main income source for 92.2% of respondents, underscoring their dependence on agriculture. Maghinay and Guro (2024) highlighted that full-time farmers are generally more responsive to training programs like the Farmers’ Field School. Most households (61.11%) had 1–3 members, which may limit farm labor but also encourage adoption of labor-saving technologies. This supports the findings of Velza et al. (2023) regarding the influence of household size on farming decisions. Moreover, all respondents were members of farmers’ associations, which, according to Velza et al. (2023), play a crucial role in enhancing access to extension services and promoting the adoption of innovations such as the VFFS.

Farming Characteristics of Farmers’ Respondents

This research examined the farming characteristics of the farmer-respondents in terms of tenurial status, years in farming, crops planted, area cultivated, average yield, and source of irrigation. Table 3

presents the farming profile of the 90 respondents who participated in the VFFS on vegetable production in Bulacan. These data provide a valuable overview of the agricultural background and production conditions of the program’s beneficiaries, offering insights into their potential needs and capacities in adopting digital farming technologies.

Table 3
Farming Characteristics of VFFS Graduates

Variable	Indicators	Frequency (f)	Percentage (%)
Tenurial Status	Owned	28	31.10
	Tenant	55	61.10
	Rented/Leased	7	7.80
Years in Farming	1–5 years	1	1.11
	6–10 years	32	35.56
	11–20 years	26	28.89
	More than 20 years	31	34.44
Crops Planted (in same area)	Palay and Vegetables	27	30.00
	Assorted Vegetables	63	70.00
Area Planted	0.01–0.50 ha	57	63.33
	0.51–1.00 ha	19	21.11
	1.01–1.50 ha	4	4.44
	1.51–2.00 ha	8	8.90
	2.51 ha and above	2	2.22
Average Yield	10.00–11.00 mt/ha	14	15.56
	11.01–12.00 mt/ha	7	7.78
	12.01–13.00 mt/ha	3	3.33
	14.01–15.00 mt/ha	8	8.89
	15.01–16.00 mt/ha	6	6.67
	16.01 mt/ha and above	52	57.77
Source of Irrigation	Irrigation System	75	83.30
	Rainfed	15	16.70

The majority of the 90 farmer-respondents were tenants (61.1%), indicating reliance on land they did not own. This aligns with Maghinay and Guro (2024), who found that land tenure affects farmers’ decision-making and investment in innovations like those introduced in the VFFS.

Most participants had substantial experience in farming: 35.56% had 6–10 years, 28.89% had 11–20 years, and 34.44% had more than 20 years of experience. While experienced farmers are generally consistent and resilient. According to Maghinay and Guro (2024) found, experienced farmers in a FFS program played a key role as mentors, helping facilitate the adoption of sustainable practices through intergenerational knowledge sharing.

Regarding crops, 70% of respondents planted assorted vegetables, while 30% grew both palay and vegetables, reflecting crop diversification. Red et al. (2021) emphasized that vegetable farmers are more engaged in capacity-building due to the intensive management needs of their crops.

Most respondents practiced small-scale farming, with 63.33% cultivating 0.01–0.50 hectares. Small landholdings. These figures suggest that vegetable farming in the area is mostly small-scale. Palanca-Tan and Gio (2021) found that small farm sizes limited farmers’ productivity and access to resources, making them more vulnerable to income and food insecurity.

In terms of yield, 57.77% produced more than 16.01 metric tons per hectare, indicating relatively

high productivity levels. As reported by Salvador and Casco (2025), FFS training improved rice farmers' practices, resulting in increased yields and better crop management.

Finally, 83.3% of respondents had access to irrigation, while the remaining 16.7% depended on rainfed farming. Launio and Abyado (2023) emphasized that reliable irrigation encourages investment in new farming technologies, including those taught in virtual platforms.

Level of Perception of Farmer Participants regarding Hindrances in the implementation of VFFS

The assessment focused on issues related to connectivity, training quality, facilities, materials and food provision, inputs for crop production, and monitoring and evaluation by AEWs. Table 4 presents the results of farmers' evaluations of the training program, which revealed consistently high satisfaction across all assessed categories ($M = 4.84$, $SD = 0.2014$) indicating strong agreement. The assessment of training delivery during the VFFS in Bulacan revealed that participants strongly agreed with all evaluated aspects. Internet connection was perceived as reliable ($M = 4.87$, $SD = 0.3294$), audio-visual aids were clear and effective ($M = 4.82$, $SD = 0.439$), topics were clearly explained ($M = 4.86$, $SD = 0.3418$), and time allocation per topic was followed ($M = 4.78$, $SD = 0.4104$). All results showed low standard deviations, indicating high consistency in responses.

Table 4

Level of Perception of Farmer-Participants During the Implementation of VFFS

Statement	Mean	Standard Deviation	Verbal Description
Connectivity Factors			
The internet connection was reliable	4.87	0.3294	Strongly Agree
The quality of the audio-visual aids was clear and effective	4.82	0.439	Strongly Agree
The topics were clearly explained	4.86	0.3418	Strongly Agree
The time allocated for each topic was followed	4.78	0.4104	Strongly Agree
Assessment and Quality of Training			
The objectives of the training were clearly explained	4.87	0.3294	Strongly Agree
The topics discussed was timely based on the needs	4.87	0.3418	Strongly Agree
The knowledge on the topics discussed was clearly conveyed	4.79	0.4104	Strongly Agree
The sequence of topics was organized	4.82	0.3845	Strongly Agree
Adequacy of Facilities, Materials, and Food			
The training venue observed measures	4.80	0.4547	Strongly Agree
The training venue was comfortable	4.82	0.3845	Strongly Agree
The materials used for the training was sufficient	4.80	0.4547	Strongly Agree
The food provided was adequate	4.82	0.3845	Strongly Agree
Provision and Availability of Inputs for Crop Production			
The assorted vegetable seedlings provided was sufficient	4.84	0.3645	Strongly Agree
The preferred varieties of vegetable seedlings were provided	4.83	0.4036	Strongly Agree
The amount of organic fertilizers provided was adequate	4.84	0.3645	Strongly Agree
The quantity of garden tools supplied was sufficient	4.81	0.3936	Strongly Agree
Factors Influencing Training Delivery			
The assigned AEW conducts monitoring regularly	4.84	0.3661	Strongly Agree
The assigned AEW provides timely feedback on monitoring results.	4.83	0.4074	Strongly Agree

The assigned AEW gives technical assistance where problems arise	4.86	0.3535	Strongly Agree
The assigned AEW offers guidance and solutions to improve farming practices	4.87	0.3435	Strongly Agree

Legend:1–1.80 = Strongly Disagree, 1.81–2.60 = Disagree, 2.61–3.40 = Neutral, 3.41–4.20 = Agree, 4.21–5.00 = Strongly Agree

The findings indicate that the VFFS in Bulacan was effectively delivered and received very high levels of satisfaction from farmer-participants. Key factors contributing to this success included reliable internet access, quality multimedia materials, clear instruction, and efficient time management. Participants gave the highest ratings to the clarity of training objectives and the timeliness of the topics served. They also strongly agreed that the training was well-structured, logically organized, and clearly communicated.

Logistical arrangements such as safe and comfortable venues, sufficient materials, and satisfactory food were also rated highly. Farmers positively evaluated the adequacy of inputs like vegetable seedlings, fertilizers, and tools, emphasizing the importance of timely support in motivating adoption of practices. Furthermore, AEWs were praised for regular monitoring, timely feedback, and technical assistance, reinforcing their critical role in program success.

Overall, the study shows that well-organized digital training, adequate resource provision, and active AEW involvement significantly enhance learning outcomes, satisfaction, and technology adoption in agricultural programs.

Level of Adoption of the VFFS on vegetable production among Farmer-Respondent

This research examined the level of adoption of the Virtual Farmers’ Field School on vegetable production among farmer respondents. This assessment aimed to determine participants’ level of adoption in the pre-planting and planting stage, crop management and maintenance, harvesting and postharvest handling and farm management and record-keeping. Table 5 indicates that farmer participants consistently applied proper agricultural practices across all stages of vegetable production with average mean ($M = 4.70$, $SD = 0.3017$).

The assessment of agricultural practices under the VFFS showed strong adoption of key techniques across different stages of farming, though some areas still need improvement.

In terms of pre-planting and planting practices, farmers gave the highest ratings to proper land preparation and appropriate plant spacing, indicating strong adherence to fundamental agronomic practices. However, soil testing received the lowest score, suggesting it was less commonly implemented—likely due to limited awareness, accessibility, or emphasis during training. This highlights the need to strengthen soil health education and practical demonstrations within the VFFS.

For crop care and irrigation, the highest-rated practice was ensuring that irrigation water was clean and sufficient, reflecting effective water management and an understanding of its importance in vegetable farming. In contrast, the relatively lower score for the cautious use of chemical pesticides may indicate a growing interest in natural alternatives, though it also suggests a limited access to organic methods or adequate training in integrated pest management (IPM).

In assessing postharvest practices, participants strongly agreed on the importance of harvesting crops at the right time, which supports optimal yield and product quality. However, the use of proper harvesting tools received a lower score, pointing to potential gaps in access or knowledge. This suggests the need for better provision of tools and targeted postharvest training to reduce losses and improve shelf life.

Lastly, the evaluation of farm recordkeeping revealed that farmers are actively monitoring their operational records, demonstrating a commitment to informed decision-making. Despite this, maintaining well-organized and updated records remains a challenge. Factors such as limited time, lack of training, and the absence of standardized recordkeeping tools may be contributing to this gap.

Overall, the findings indicate that while VFFS participants are successfully applying many recommended practices, improvements in soil testing, pest management, harvesting tools, and recordkeeping systems are essential to further enhance the program's impact.

Table 5

Level of Adoption of the VFFS on Vegetable Production Among Farmer-Respondents

Statement	Mean	Standard Deviation	Verbal Description
Pre-Planting Stage			
Conduct of soil tests before preparing the field to ensure the healthy and suitability of the soil for planting.	4.31	0.7591	Always
Choose or use of high-quality seeds/seedlings for productive crops	4.81	0.4471	Always
Proper preparation of the planting area according to correct methods	4.89	0.3806	Always
Ensure proper spacing between plants to allow them to grow well and avoid overcrowding	4.89	0.3806	Always
Use of appropriate type and amount of fertilizer and applying it at the right time	4.80	0.5446	Always
Crop Management and Maintenance			
Ensure that the source of irrigation water is clean and sufficient for the crops	4.78	0.5145	Always
Use of the right tools and equipment to water the field properly.	4.56	0.7512	Always
Keeping crops healthy by avoiding plant diseases and pests	4.74	0.552	Always
Only use chemical pesticides if there is no other solution and needs to be done as soon as possible.	4.50	0.7968	Always
Use of prepared/made organic pesticides to protect crops naturally.	4.67	0.687	Always
Harvesting and Post-Harvest Handling			
Harvesting of crops at the right time to get the best quality and yield.	4.89	0.316	Always
Taking into account the customer's preference when harvesting crops.	4.84	0.4216	Always
Using proper harvesting tools to keep the quality of crops	4.52	0.7225	Always
Following proper post-harvesting methods to maintain the quality of the harvest	4.84	0.4216	Always
Storing harvested crops in the right conditions to avoid spoilage and waste	4.84	0.4216	Always
Farm Management and Record-Keeping			
Maintaining well-organized and up-to-date farm records for efficient management	4.52	0.7225	Always
Accurately recording daily expenses and income to track cash flow and profitability	4.63	0.6262	Always
Regular monitoring of operational records to assess the progress of farm activities	4.71	0.5853	Always

Reviewing financial records to support effective budgeting and informed decisions	4.59	0.6686	Always
Ensuring accuracy and consistency in all farm records to improve transparency and accountability	4.70	0.608	Always

Legend: 1.00–1.80 = Never, 1.81–2.60 = Rarely, 2.61–3.40 = Sometimes, 3.41–4.20 = Often, 4.21–5.00 = Always

Relationship between Socio-Demographic and Farming Determinants on the Level of Adoption in the Implementation of VFFS

Table 6 shows a statistically significant, though weak, negative relationship between the age of the farmers and their level of adoption of VFFS practices. With a Pearson correlation of -0.230 and a p-value of 0.029, the analysis suggests that as farmers get older, their likelihood of adopting VFFS tends to decrease. In other words, younger farmers are generally more open and willing to adopt these innovative farming methods compared to their older counterparts. This could be due to younger farmers being more familiar with technology, more adaptable to change, or having greater exposure to modern agricultural practices.

On the other hand, older farmers might be more resistant to new techniques, possibly due to long-established habits, lack of training, or discomfort with technology. These findings imply that age should be a key consideration when promoting VFFS. Support programs might need to be customized to address the concerns of older farmers such as providing hands-on training or simplifying the learning curve—while also empowering younger farmers who are already more inclined to adopt. Overall, understanding this age-related difference can help in designing more effective outreach and implementation strategies to ensure broader adoption of sustainable farming practices.

Table 6

Relationship Between Age of Farmers and the Level of Adoption on the Implementation of VFFS

		Level of Adoption	Hypothesis
Age	Pearson Correlation	0-.230	Reject
	Sig. (2-tailed)	0.029	
	N	90	

Other demographic and farming characteristics such as sex, civil status, educational attainment, sources of income, household size, organizational affiliation, tenorial status, years in farming, crops planted, farm size, average yield per cropping and source of irrigation do not have a significant relationship with the level of adoption of farmers in the implementation of VFFS.

Relationship Between Level of Perception on the Hindrances and Level of Adoption on the Implementation of VFFS

The data in Table 7 explore how farmers’ perceptions of different hindrances relate to their level of adoption of VFFS practices. All the variables analyzed, connectivity, training assessment, facilities, materials and food, provision of inputs for crop production, and monitoring and evaluation of agricultural extension workers, show statistically significant positive relationships with the level of adoption, as indicated by p-values all below 0.05 and the decision to reject the null hypothesis in each case.

Among the factors, connectivity shows the strongest correlation ($r = 0.790$), suggesting that when farmers perceive better internet or communication infrastructure, their adoption of VFFS is significantly higher. Similarly, monitoring and evaluation by agricultural extension workers also has a strong positive correlation ($r = 0.724$), highlighting the importance of consistent support and feedback. The provision of inputs for crop production ($r = 0.646$) and training assessment ($r = 0.534$) also show moderately strong

correlations, indicating that when farmers view training and input support positively, they are more likely to adopt VFFS. Lastly, while facilities, materials, and food show a weaker but still significant correlation ($r = 0.296$), they remain an important factor in adoption.

Table 7

Relationship Between Level of Perception on the Hindrances and Level of Adoption on the Implementation of VFFS

Level of Perception		Level of Adoption	Hypothesis
Connectivity	Pearson Correlation	0.790	Reject
	Sig. (2-tailed)	0.000*	
	N	90	
Assessment of the Training	Pearson Correlation	0.534	Reject
	Sig. (2-tailed)	0.000*	
	N	90	
Facilities, Materials and Food	Pearson Correlation	0.296	Reject
	Sig. (2-tailed)	0.005*	
	N	90	
Provision of Inputs for Crop Production	Pearson Correlation	0.646	Reject
	Sig. (2-tailed)	0.000*	
	N	90	
Monitoring and Evaluation of AEWs	Pearson Correlation	0.724	Reject
	Sig. (2-tailed)	0.000*	
	N	90	

Note. Correlation is significant at the 0.05 level (2-tailed).

Farmers' positive perceptions of support such as good connectivity, quality training, sufficient inputs, and strong extension services are closely linked to their likelihood of adopting the VFFS. To boost adoption rates, efforts should prioritize improving these key areas. This is supported by Dujali et al. (2025), who found that reliable connectivity enhances participation in digital agriculture, and by the World Bank (2021), which identified poor digital infrastructure as a major barrier to innovation in rural areas. Strengthening rural connectivity is essential for expanding programs like the VFFS.

Conclusion

The results indicate that while most socio-demographic and farming characteristics had limited influence on adoption levels, certain factors stood out as significant. Notably, age and participants' perceptions of the VFFS played meaningful roles in shaping adoption behavior. A weak but statistically significant negative correlation was observed between age and adoption level, indicating that younger farmers were generally more likely to adopt virtual practices. However, this does not mean that older farmers were entirely unable to participate. With adequate support and training, many older participants can still engage with virtual learning and apply new practices, albeit to a lesser extent. More importantly, a strong positive correlation emerged between farmers' perceptions of the training and their level of adoption. This suggests that perceptions related to the quality of support, connectivity, and relevance of the training are critical in influencing how well digital agricultural practices are embraced. These findings underscore the importance of attitudinal and experiential factors in the success of virtual extension programs, beyond just demographic or farming-related variables.

Recommendations

Based on the findings and the partial rejection of the hypothesis, the study recommends improving digital infrastructure in rural areas to ensure reliable internet connectivity and promote digital literacy

among farmers—particularly older participants—to enhance their capacity to engage in virtual platforms. Sustaining and institutionalizing the VFFS programs post-pandemic is also encouraged, especially in remote or underserved communities where face-to-face training remains difficult. A hybrid training model that combines online and in-person sessions is suggested to accommodate diverse learning preferences and further improve training effectiveness.

To strengthen the impact of VFFS, the study also recommends enhancing the performance and follow-up support of Agricultural Extension Workers (AEWs), as their technical assistance and regular monitoring were found to be critical for adoption. Additionally, given the relatively low adoption of certain practices such as soil testing and consistent farm record-keeping, further emphasis on these components should be integrated into future training cycles. Improving access to affordable soil analysis services and providing user-friendly recordkeeping tools could encourage broader adoption.

Lastly, to foster sustainability and generational continuity in agriculture, the study suggests encouraging youth participation in digital agriculture programs. This may be achieved through school-based agricultural curricula or the promotion of youth-led agri-enterprises aligned with virtual learning platforms.

For future research, scholars may consider exploring the long-term behavioral and productivity impacts of VFFS, conducting comparative studies on the effectiveness of hybrid versus traditional extension models, analyzing how various demographic factors influence technology adoption, and assessing the scalability and cost-efficiency of VFFS in other regions or crop sectors. These directions can help refine virtual extension strategies and inform more inclusive and sustainable agricultural development policies.

References

- Dujali, I. L., Inutan, S. M. B., Bacus, M. S., Quijano Pagutayao, A. S., & Sarita, V. B. (2025). Transforming agricultural extension in the digital age: A review of ICT-based approaches and innovations. *International Journal of Research and Scientific Innovation*, 12(3), 840–851. <https://doi.org/10.51244/IJRSI.2025.12030064>
- Guay, C. M. B., Esteban, J. C., Bacus, M. S., & Quijano-Pagutayao, A. S. (2025). Factors influencing farmers' adoption of digital extension services in Kibanggay, Lantapan, Bukidnon, Philippines. *International Journal of Research and Innovation in Social Science*, 9(5), 3677–3681. <https://doi.org/10.47772/IJRISS.2025.905000278>
- Launio, C. C., & Abyado, R. A. (2023). Farmer-led small-scale irrigation systems management in highland vegetable farming in the Cordillera Region, Philippines. *Journal of Economics, Management & Agricultural Development*, 9(1), 43–56. <https://jemad.cem.uplb.edu.ph/articles/farmer-led-small-scale-irrigation-systems-management-in-highland-vegetable-farming-in-the-cordillera-region-philippines/>
- Maghinay, J. M., & Guro, A. A. B. (2024). Implementation of farmers field school (FFS) among rice farmers at Claran, Calamba, Misamis Occidental. *Greener Journal of Agricultural Sciences*, 14(2), 58–66. <https://www.gjournals.org/GJAS/Publication/2024/2/HTML/041324048%20Maghinay%20and%20Guro.htm>
- Palanca-Tan, R., & Gio, L. F. (2021). Small farm households' vulnerabilities in South Cotabato, Philippines. *Agricultural Sciences*, 12(3), 247–258. <https://doi.org/10.4236/as.2021.123016>

- Red, F. S., Amestoso, N. T., & Casinillo, L. F. (2021). Effect of Farmer Field School (FFS) on the knowledge, attitude, practices and profitability of rice farmers. *Philippine Social Science Journal*, 4(4), 145–154. <https://doi.org/10.52006/main.v4i4.420>
- Salar, G. I. N. (2020). *Analysis of rice farmers' adoption of Farmers Field School rice crop management practices in selected towns of Laguna, 2019* (Undergraduate thesis). University of the Philippines Los Baños. <https://www.ukdr.uplb.edu.ph/etd-undergrad/10646/?utm>
- Salvador, J. V., & Casco, V. (2025). Assessment and field validation of the Farmer Field School (FFS) as a training platform for farmer beneficiaries of the Rice Competitiveness Enhancement Fund (RCEF). *International Network for Natural Science*, 26(6), 1–10. <https://dx.doi.org/10.12692/ijb/26.6.1-10>
- The World Bank. (2020). *Transforming Philippine agriculture during COVID-19 and beyond*. <https://documents1.worldbank.org/curated/en/614671593417939107/pdf/Transforming-Philippine-Agriculture-During-COVID-19-and-Beyond.pdf>
- Wagayen, L. M. (2024). Gender participation in the sustainable management of resources within upland agroforests in La Union, Philippines. *Ignatian International Journal for Multidisciplinary Research*, 2(4), 1310–1357. <https://doi.org/10.5281/zenodo.11046372>
- Velza, J. F. P., Ibañez, R. Y., Jr., Clores, N. R., & Valler, D. L. (2023). Socio-demographic characteristics and perceived constraints of the farmers to crop production in selected barangays of Cawayan, Masbate, Philippines. *Zenodo*. <https://doi.org/10.5281/zenodo.7772805>