# E-READINESS AND TECHNOLOGY ADOPTION LEVEL OF ONION FARMERS IN IN MAGSAYSAY, OCCIDENTAL MINDORO

**Mary Yole Apple Declaro-Ruedas**
Associate Professor V
College of Arts, Sciences, and Technology
Occidental Mindoro State College

## ABSTRACT

This study evaluated the level of adoption of technology and e-readiness among the onion growers in Magsaysay, Occidental Mindoro. The study employed a descriptive-correlational design. Data were gathered from 300 purposively selected farmers using simple random sampling. The result shows a low level of e-readiness in terms of motivational factors, availability, accessibility, and fundamental ICT and internet abilities. However, technology adoption is moderate, with more applications of chemical-based technologies. Financial limitations, lack of access to technology, and a lack of technical knowledge were among the barriers to technology adoption.

Finally, the findings also showed a strong positive correlation between the adoption of technology and education, organization membership, and farm size. These findings reflect Rogers' Diffusion of Innovations theory, which emphasizes how adoption behavior is influenced by perceived relative advantage, compatibility with current procedures, and institutional support.

It indicates that onion farmers are motivated but lack the readiness to capitalize on ICT and modern technology. To address these gaps, there is a need for extension services, capacity-building initiatives, affordable ICT solutions, improved infrastructure, and supportive policies that enhance farmers' digital and technological capabilities.

Keywords: smallholder, adopters, ICT skills

## INTRODUCTION

Technology serves as the primary tool for improving agricultural productivity and reaching strategic objectives in efficient agricultural extension (Mustapha et al, 2021). The use of advanced information and communication technology in agricultural extension is on the rise and is becoming more important for enhancing agricultural productivity and growth. The application of ICT in agriculture offers a more efficient and cost-effective approach to improving information dissemination.

E-readiness denotes an entity's ability to adopt and effectively leverage digital technologies, a concept that is gaining significance in the agriculture sector, particularly in developing countries such as the Philippines. This concept includes various components like infrastructure, technological access, human capital, and socio-economic conditions that collectively affect the ability of farmers and agricultural stakeholders to interact with platforms and digital tools (Adjii-Bamfo et al., 2020). The agriculture sector in the Philippines, rooted in traditional practices, holds significant promise for substantial improvements in production, efficiency, and market access by integrating digital technologies. The importance of e-readiness in agriculture is underscored by its ability to tackle the major challenges faced by the sector. Farmers often face challenges related to limited access to information, including meteorological data, pest management strategies, and market prices, which can adversely affect their decision-making processes (Raaijmakers et al., 2021). The e-readiness framework facilitates immediate access to information, enhancing agricultural practices and fostering a more informed workforce. Moreover, the implementation of electronic remuneration assessments systematically uncovers obstacles to technology adoption, enabling tailored interventions that advance modernization in agricultural practices.

Adji-Bamfo et al. (2020) outline a framework for evaluating e-readiness in the public sector, which can be applied to the agricultural sector to establish a basis for digital transformation. Navarro (2022) highlights the importance of government policy in determining the electronic readiness of the agriculture sector. Current initiatives designed to promote digitization frequently fall short because of insufficient implementation frameworks. Lack of coordinated efforts among government entities obstructs advancements in improving e-projects. Lim et al. (2023) emphasizes the importance of comprehensive political reforms focused on enhancing infrastructure and educational programs designed to elevate farmers' technological skills. The present condition of electronic readiness within the agricultural sector of the Philippines reveals significant opportunities for productivity improvement via digitization; however, it faces challenges including infrastructure shortcomings and a lack of digital literacy.

Reyes et al (2022) provide evidence that e-readiness can significantly improve agricultural production. The study examined the differences in productivity between farmers in areas that have adopted mobile technological solutions, like SMS-based information sharing, and those who depend exclusively on conventional agricultural extension services. The findings revealed that farmers employing mobile technologies experienced a production increase of as much as 20%. Access to agricultural market data and meteorological alerts has empowered farmers to optimize their sowing schedules and resource allocation, thereby boosting overall production. Tolentino and Miguel (2021) examined the relationship between digital literacy and agricultural productivity in various provinces of the Philippines. The increase in digital literacy, fostered by government-led seminars and training sessions, showed a significant correlation with effective farming

practices and results. This study assessed the extent to which technology is adopted and the readiness for electronic integration among onion growers in Magsaysay, Occidental Mindoro.

## METHODOLOGY

The study employed a descriptive-correlational design. Data were gathered from 300 purposively selected farmers in Magsaysay, Occidental Mindoro using simple random sampling from the Registry System for Basic Sectors in Agriculture from 2025-2026. The selection criteria for the sample were: 1. Owned the land they till, 2. Planted onion for five consecutive years and 3. Attended at least three trainings on onion technology. The sample size was determined by the epinfoTM software with 95% confidence level. Informed consent was sought before the conduct of the study ensuring that a voluntary decision whether to participate in the study was made by the respondents.

A structured questionnaire was used in gathering data. Triangulation was done through interviews of the respondents. Descriptive statistics such as mean, frequency, and percentage was used to descriptive and quantify the variables. While, Chi Square was used to test the relationship between the variables.

## RESULTS

### *Profile of the onion farmers in Magsaysay, Occidental Mindoro*

The mean age of 51.6 years reveals that mid- to late-career farmers dominate. The largest age group is 50–59 (34.67%), followed by 40–49 (30%). Only 5% are early career farmers (20–29 years old), indicating that elder generations are dominating farming. As fewer young people pursue farming, a generational gap may form in the agricultural workforce. Unless support services, training, and incentives attract younger farmers, agricultural sustainability may be threatened. Male farmers dominate female farmers 60% to 40%. Women work in agriculture, but societal and cultural constraints may limit their land ownership, decision-making, and resource access. To increase women's farming participation and leadership, gender-responsive policies are essential. Majority (71.67%) of farmers are living in poverty, illustrating the farming sector's economic weakness. Despite their vital role in food production, most farmers are poor due to limited markets, uncertain commodity prices, and expensive input costs. Likewise, most of the farmers in onion-producing regions like Nueva Ecija, Philippines studies show that a significant number of onion farmers are aged between 15 and 55, highlighting a combination of youthful energy and seasoned expertise in the industry (Nurvia & Hidayati, 2017). The observed age distribution indicates a shift, with a growing number of younger individuals entering the field of onion farming, likely influenced by the economic benefits associated with this crop.

Result shows that almost 90.67 percent of farmers possess fewer than 5 hectares, with an average of 3.75. Small farms could hinder mechanization, competitiveness, and economies of scale. Increasing productivity is challenging. Average farming experience is 15.2 years, and 78% have been farming for 10–19 years. It shows an experienced farming population with traditional knowledge. It also suggests that farming practices may be reluctant to change, making agricultural extension services essential for bridging old and new technologies.

It could also be noted that the onion farmers are literate had reached a certain level of education from formal schooling. The attainment of this educational level is essential for effectively embracing contemporary agricultural methods (Sanglestsawai et al., 2015;). Farmers who possess higher levels of education tend to adopt innovative agricultural technologies, including Integrated Pest Management (IPM) practices, which have shown beneficial effects on productivity and sustainability (Sanglestsawai et al., 2015; Armas et al., 2023). Understanding the significance of education, initiatives focused on training and extension services for farmers are essential in improving the knowledge and effectiveness of these individuals in the area (Lirag et al., 2023).

Majority (93.33%) of farmers have organizations and 85% receive extension services from Agricultural Extension Workers. This is beneficial because collective organizations provide social capital, negotiating leverage, and training. Farmers also learn new technology, methods, and market knowledge from extension programs, which can improve their socioeconomic status. Additionally, agricultural extension services are important. Improved agricultural extension frameworks can help farmers accept digital tools. Farmers benefit from technological education programs like market price and pest management smartphone apps (Helmi et al., 2019).

Table 1. Profile of the onion farmers.

| Profile | Category | Frequency (n=300) | Percentage (%) |
|---|---|---|---|
| Age | Early Career Farmer (20-29 years old) | 15 | 5.00 |
| | Prime Working Age Farmer 30-39 years old) | 72 | 24.00 |
| | Experienced Farmer (40-49 years old) | 90 | 30.00 |
| | Mid-late Career Farmer (50-59 years old) | 104 | 34.67 |
| | Pre-Retirement Farmer (60-69 years old) | 12 | 4.00 |
| | Senior Farmer (70-79 years old) | 7 | 2.33 |
| | Mean-51.60 Range-30- 72 | | |
| Sex | Male | 180 | 60 |
| | Female | 120 | 40 |
| Income | Below Poverty Threshold (less than ₱26,661.00/pax) | 215 | 71.67 |
| | Above Poverty Threshold (More than ₱26,661.00/pax) | 85 | 28.33 |
| Education level | Primary | 25 | 8.33 |
| | Secondary | 223 | 74.33 |
| | Tertiary | 52 | 17.33 |
| Farm Size | Small (Below 5 hectares) | 272 | 90.67 |
| | Large (6 hectares and above) | 28 | 9.33 |
| | Mean-3.75 Range-1- 12 | | |
| | Short (0-9 years) | 15 | 5.00 |
| | Moderate (10-19 years) | 234 | 78.00 |

| | | | | |
|---|---|---|---|---|
| Number of years in Farming | Long (20 years and above) | | | |
| | | | 51 | 17.00 |
| | | Mean-15.20 | Range-8- 42 | |
| Membership to Organization | Yes | | 280 | 93.33 |
| | No | | 20 | 6.67 |
| Regular Access to Extension Service | Yes | | 255 | 85.00 |
| | No | | 45 | 15.00 |

***E-readiness of onion farmers***

The significance of ICT in agriculture is crucial, as it can improve access to agricultural knowledge, market information, and decision support systems, thus enhancing farmers' ability to adopt new technologies and manage resources efficiently (Alam & Shaba, 2022). Result shows that onion farmers in Magsaysay, Occidental Mindoro show low ownership of laptops or computers ($\bar{x}$ =1.12) and similarly low access to internet connections at home ($\bar{x}$ =1.12). The results suggest that a significant number of farmers face challenges in participating in ICT-based learning or adopting farming practices that depend on desktop systems or stable internet access. However, the level of smartphone ownership is notable ($\bar{x}$ =3.78), indicating that mobile devices continue to serve as the most attainable mode for integrating digital solutions for farmers.

Even with access to smartphones, onion farmers exhibit a significantly low ability to utilize computers and associated applications ($\bar{x}$ =1.35), accompanied by similarly low operational skills. Their willingness to participate in e-courses is notably low ($\bar{x}$ =2.45), suggesting a degree of hesitance or uncertainty regarding the use of online learning platforms. This indicates that although technology is available, a significant obstacle lies in digital literacy. It is essential for training programs to first focus on foundational ICT skills prior to the introduction of more complex applications.

It is interesting to note that onion farmers demonstrated a willingness towards adopting new technology, with a mean score of 4.20 for both their willingness to learn and their perceived usefulness of technology. The results underscore their willingness to embrace digital transformation and acknowledge the potential of ICT to enhance agricultural practices. Nonetheless, their capacity to overcome physical and psychological problems ($\bar{x}$ =2.40) is assessed as low, indicating potential issues such as anxiety about errors, diminished self-assurance, or challenges in adapting to swift technological advancements.

Table 2. E-readiness of onion farmers.

| Level of E-readiness of onion farmers | Mean | Interpretation |
|---|---|---|
| *Availability of ICT at individual level* | | |
| Ownership of laptop/computer | 1.12 | Very low |
| Internet connection at home | 1.12 | Very low |
| Ownership of smart phone | 3.78 | High |
| *ICT experience* | | |
| Capability to use computers/laptop and its accessories | 1.35 | Very low |

| | | |
|---|---|---|
| Operational skills to navigate computer application | 1.35 | Very low |
| Ready to join e-course | 2.45 | Low |
| *Motivational dynamics* | | |
| Overcoming physical/psychological problems | 2.40 | Low |
| Willingness to learn new technology | 4.20 | High |
| Perceived usefulness of the technology | 4.20 | High |
| **Grand mean** | **2.44** | **Low** |

Legend: 0.50-1.50-very low; 1.51-2.50- low; 2.51-3.50-Neutral ;3.51-4.50-high;4.51-5.00-very high

***Technology Adoption Level***

The findings indicate that onion farmers demonstrate a selective approach to adopting agricultural technologies, maintaining a substantial reliance on traditional chemical inputs while largely lacking awareness or interest in contemporary mechanized and digital advancements. The overall grand mean of 2.50 suggests a moderately aware but not interested, indicating that although certain technologies have made their way into onion farming practices, the majority of advanced or emerging tools are still not being fully utilized.

Short-day onion cultivars ($\bar{x}$ =3.56) and seed treatment ($\bar{x}$ =4.12) are occasionally used by farmers. This indicates a willingness to employ crop establishment and yield-boosting methods. However, adoption is still irregular, suggesting they need more proof of their benefits. Awareness of agricultural mapping mobile apps ($\bar{x}$ =2.23) is slightly greater but still low. This shows that farmers prefer manual preparation and are wary of expensive or complicated technologies.

Onions are rarely produced with modern irrigation and monitoring systems. Farmers are unaware of drip irrigation, automatic irrigation systems, soil moisture monitors, and hydroponics. Onion cultivation requires efficient water and nutrient management; thus, this is a major gap. Chemical fertilizers ($\bar{x}$ =4.80) are widely used and recommended by farmers. This dependence on chemical inputs shows how accessible and reliable conventional farming practices are compared to other innovative technologies. Farmer acceptance of chemical-based and integrated pest management is high. They employ and advocate Integrated Pest Management ($\bar{x}$=4.58), pheromone lures, and chemical insecticides ($\bar{x}$ =4.80). Occasionally using fertilizer smartphone apps ($\bar{x}$ =3.56) suggests a rising knowledge of digital crop management tools, although its use is still low.

Farmers are not aware of modern mechanized solutions include onion harvesters ($\bar{x}$ =1.00), grading and sorting equipment ($\bar{x}$ =1.52), and solar-powered curing systems. Although, farmers started using occasionally a better onion warehousing ($\bar{x}$ =3.12) and cold chain logistics ($\bar{x}$ =4.12) to maintain product quality and decreasing post-harvest losses. Likewise, digital marketing platforms ($\bar{x}$ =1.00) like e-commerce has yet to reach them. Some have started adopting processing technologies ($\bar{x}$ =3.51), indicating interest in value-added activities that boost income and market potential.

Table 3. Technology adoption level.

| Onion Technology | Mean | Interpretation |
|---|---|---|
| *Seed and variety* | | |
| Short day onion varieties | 3.56 | Started using occasionally |
| Seed treatment | 4.12 | Started using occasionally |
| *Land preparation* | | |
| Mechanized onion planters | 1.00 | Not aware |
| Plastic mulching | 1.52 | Moderately aware but not interested |
| Agri mapping mobile app | 2.23 | |
| *Water and Nutrient Management* | | |
| Drip Irrigation | 1.12 | Not aware |
| Automated irrigation systems | 1.00 | Not aware |
| Soil moisture sensors | 1.00 | Not aware |
| Hydroponics | 1.00 | Not aware |
| Remote Sensing & Drones | 1.00 | Not aware |
| Use of chemical fertilizer | 4.80 | Regularly using and recommending to others |
| *Crop Protection Technologies* | | |
| Integrated Pest Management | 4.58 | Regularly using and recommending to others |
| Fertilizer mobile applications | 3.56 | Started using occasionally |
| Use of pheromone lures | 4.58 | Regularly using and recommending to others |
| Use of chemicals in crop protection | 4.80 | Regularly using and recommending to others |
| *Harvesting and Post harvest* | | |
| Onion harvesters | 1.00 | Not aware |
| Grading and sorting machines | 1.52 | Moderately aware but not interested |
| Solar powered curing system | 1.00 | Not aware |
| Improved onion warehouses | 3.12 | Started using occasionally |
| Cold chain logistics | 4.12 | Started using occasionally |
| *Marketing and Value adding* | | |
| Digital marketing platforms | 1.00 | Not aware |
| Processing technologies | 3.51 | Started using occasionally |
| **Grand mean** | **2.50** | **Moderately aware but not interested** |

Legend: 0.50-1.50-Not aware; 1.51-2.50- Moderately aware but not interested; 2.51-3.50-Interested but not yet using;3.51-4.50-Started using occasionally;4.51-5.00-Regularly using and recommending to others

***Challenges in E-readiness and technology adoption among onion farmers***

The main challenges to e-readiness include poor internet connectivity ($\bar{x}$=4.58), costly subscription fees ($\bar{x}$=4.58), and smartphones ($\bar{x}$=4.53), all of which are considered very highly serious challenges. These highlight the structural and economic obstacles that hinder farmers from using ICT in agriculture. Furthermore, farmers indicated a significant concern

regarding the limited availability of localized digital platforms ($\bar{x}$ =4.24, Highly serious), implying that although digital tools are present, they may not adequately meet the specific needs and contexts of farmers. In the meantime, cultural resistance to new technology ($\bar{x}$=3.48) and low digital literacy ($\bar{x}$=3.45) were assessed as moderately serious. This indicates that, although attitudes and skills are notable concerns, cost and connectivity issues are significantly more critical in hindering farmers' digital adoption.

Table 4. Challenges in e-readiness and technology adoption among onion farmers.

| Challenges | Mean | Interpretation |
|---|---|---|
| *E-readiness* | | |
| Poor internet connectivity | 4.58 | Very highly serious |
| High costs of internet subscriptions | 4.58 | Very highly serious |
| High costs of smartphones | 4.53 | Very highly serious |
| Limited availability of localized digital platforms | 4.24 | Highly serious |
| Cultural resistance to new technology | 3.48 | Moderately serious |
| Low digital literacy | 3.45 | Moderately serious |
| *Sub mean* | *4.14* | *Highly serious* |
| *Technology Adoption* | | |
| Lack of access to technology | 4.78 | Very highly serious |
| Lack of technical knowledge and training | 4.64 | Very highly serious |
| Financial constraints | 4.52 | Very highly serious |
| Infrastructure constraints | 4.12 | Highly serious |
| Limited government support | 2.46 | Less serious |
| Inadequate research and extension connection | 2.30 | Less serious |
| Limited access to credit and financing | 2.25 | Less serious |
| *Sub mean* | *3.58* | *Moderately serious* |
| **Grand mean** | **3.84** | **Highly serious** |

Legend: 0.50-1.50-not serious; 1.51-2.50- less serious; 2.51-3.50-moderately serious;3.51-4.50-highly serious;4.51-5.00-very highly serious

***Correlation between the profile of the onion farmers and their technology adoption level***

The correlation between farmers' profiles and technology adoption shows that only some factors contribute. The adoption of technology has a significant correlation with education level ($r = -0.198$, $p = 0.017$), farm size ($r = 0.148$, $p = 0.036$), and organization membership ($r = 0.152$, $p = 0.031$). The negative correlation with education shows that farmers with less formal training accept technology more quickly, presumably due to practical reliance on accessible innovations, while those with more education may be more selective. It appears that farmers with larger farms are more able and willing to accept new technologies. Organizational membership increases adoption by increasing information and support. Both age ($r = 0.158$, $p = 0.126$) and access to extension services ($r = 0.182$, $p = 0.072$) are positively correlated, although their significance levels are low.

This is supported with the studies of Jothilkashmi (2022) and Nnodim & Raji (2020) that farmers who possess advanced education tend to embrace innovative technologies more readily, attributed to their enhanced comprehension and greater access to information. Likewise, age has been identified as an important variable, with younger farmers showing a greater propensity to

embrace innovations in contrast to older farmers, who often adhere to more established traditional practices. Furthermore, extension services and farmer groups provide information and training to help farmers adopt technology (Mailumo & Onuwa, 2022), while strong farmer organizations are linked to technology adoption because they facilitate knowledge exchange (Singh & Singh., 2024).

On the other hand, sex, monthly income, number of years in farming, and number of years in onion farming have no significant association with technology adoption, suggesting that these criteria do not directly affect farmers' willingness to adopt new methods.

Table 5. Correlation between the profile of farmers and the level of technology adoption of onion farmers.

| Independent Variable (Profile of Farmers) | Dependent Variable | r-coefficient | p-value | Interpretation |
|---|---|---|---|---|
| Sex | Technology Adoption Level | -0.048 | 0.632 | not significant |
| Age | Technology Adoption Level | 0.158 | 0.126 | **significant** |
| Monthly income | Technology Adoption Level | -0.078 | 0.231 | not significant |
| Education Level | Technology Adoption Level | -0.198 | 0.017 | **significant** |
| Farm size | Technology Adoption Level | 0.148 | 0.036 | **significant** |
| Number of Years in Farming | Technology Adoption Level | -0.061 | 0.537 | not significant |
| Number of Years in Onion Farming | Technology Adoption Level | 0.105 | 0.121 | not significant |
| Membership to organization | Technology Adoption Level | 0.152 | 0.031 | **significant** |
| Access to Extension Service | Technology Adoption Level | 0.182 | 0.072 | **significant** |

*Legend:* *$p < 0.05$ is significant; **p < 0.01 is highly significant.*

## DISCUSSION

The results indicate that onion farmers demonstrate overall low levels of e-readiness exhibiting minimal ownership of laptops, computers, and internet access, predominantly depending on smartphones as their primary digital resource. Even with limited ICT skills, including challenges in operating computers and a low readiness for e-course participation, there is a notable level of motivation, eagerness to learn, and an acknowledgment of the benefits of technology. The readiness of onion farmers to engage with electronic resources is a complex matter that encompasses the integration of technology and the pursuit of information, both of which are essential for enhancing agricultural methods and productivity. Despite issues like lack of operating knowledge and maintenance costs, technology adoption boosts productivity (Kale et al., 2024). Technical and cost effectiveness of onion production in Ethiopia depends on household head age and education, extension contacts, and irrigated land area. This shows how information

and education boost e-readiness (Ayen et al., 2025). Biofertilizer adoption by Saudi onion farmers shows the importance of information-seeking, with mobile apps and extension institutes being the main sources. ISB is key to biofertilizer adoption, suggesting that boosting farmers' access to reliable and relevant information can boost this technique (Kassem et al., 2021). Self-efficacy, performance expectancy, and social influence determine technology comprehension and use, especially in South Africa's informal sector. These factors also affect farmers' readiness to adopt new agricultural technologies (Etim & Daramola, 2023).

Technology may improve agricultural output, but knowledge gaps and maintenance costs prevent widespread use (Kale et al., 2024). The results demonstrate moderate awareness but minimal interest in technology adoption, indicating significant hurdles in integrating ICT and modern farming instruments into production systems. Chemical fertilizers, insecticides, and integrated pest management remain essential for farmers. Seed advancements, treatment methods, storage, and cold chain logistics are rarely used. However, mechanized equipment, modern irrigation systems, hydroponics, remote sensing, drones, and internet marketing platforms are still poorly understood. Onion farmers are positive about technology advances, but limited resources, low digital literacy, and insufficient exposure to modern procedures limit their capacity to implement it. This emphasizes the need for targeted training, accessible ICT solutions, and increased institutional assistance to boost onion sector productivity and competitiveness.

Finally, education, farm size, and organizational participation affect agricultural technology adoption, especially among onion producers. Studies show that higher education motivates technology adoption but does not reduce technological ready inhibitors. This paradox highlights the necessity for farmer-specific, accessible education (Yap et al., 2023). Education is crucial to farmers' ability to understand and use new technologies. Multiple studies show a positive association between education and agricultural technology adoption. This shows that education equips farmers to understand and implement complex practices in agriculture (Zeleke et al., 2024; Kale, 2024). Farm size helps because larger farms have more resources and can invest in and benefit from new technologies. Cost efficiencies in extensive agricultural operations make technological integration more affordable (Ma & Abdulai, 2019). Organizations like cooperatives and farmer-based associations provide critical knowledge, resources, and supportive networks to help technology adoption. These organizations often transmit knowledge and ideas, helping farmers adopt new practices (Asante et al., 2024). Farmers need information and training to embrace new technology, therefore social participation and extension connections are important (Kale et al., 2024).

## CONCLUSIONS

The results concludes that onion farmers show low levels of e-readiness and moderate awareness, coupled with low technology adoption. This suggests a farming community that is willing and motivated, yet hindered by institutional and economic challenges. Farmers utilize cellphones as a digital resource; however, challenges such as poor internet connectivity, high subscription costs, and a lack of digital literacy hinder their ability to adopt ICT-based farming solutions. Conventional inputs such as fertilizers, insecticides, and integrated pest management are widely utilized, whereas contemporary mechanization, irrigation technologies, and digital platforms see lower adoption rates.

Additional correlation analysis revealed that factors such as education level, farm size, and organizational membership significantly impact technology adoption, highlighting the critical role of knowledge, resources, and institutional support in the decision-making processes of farmers. The association was not substantial concerning gender, income level, or duration of farming experience. The findings suggest that onion farmers are motivated but lack the readiness to capitalize on ICT and modern technology.

## RECOMMENDATIONS

Farmers show strong motivation; however, they encounter challenges related to skills, costs, and infrastructure. To increase their level of adoption from "moderately aware but not interested" to "occasionally or regularly using," interventions must include training, affordable measures, organizational support, and improved access to technology.

## REFERENCES

Armas, K. L., Lorenzo, E. G., & Cruz, C. D. (2023). Financial viability of business models for engineered vertical hydroponics systems for sustainable onion production in the philippines. Journal of Applied Engineering and Technological Science (JAETS), 4(2), 864-872. https://doi.org/10.37385/jaets.v4i2.2040

Asante, B.O., Ma, W., Prah, S. & Temoso, O. (2024). Farmers' adoption of multiple climate-smart agricultural technologies in Ghana: determinants and impacts on maize yields and net farm income. Mitig Adapt Strateg Glob Change 29, 16

Ayen, K., Kidane, T. & Wubet, A. (2025). Technical and cost efficiency analysis of irrigated onion production insight from smallholders irrigated onion farmers in north East Amhara National Regional State, Ethiopia. Front. Sustain. Food Syst. 8:1495820. doi: 10.3389/fsufs.2024.1495820

Etim, E., & Daramola, O. (2023). Investigating the E-Readiness of Informal Sector Operators to Utilize Web Technology Portal. *Sustainability*, *15*(4), 3449. https://doi.org/10.3390/su15043449

Jothilkashmi, M. (2022). Experiences in promoting ensiling of onion crop residue among smallholder dairy farmers in namakkal district of tamil nadu. Indian Research Journal of Extension Education, 22(4), 27-31. https://doi.org/10.54986/irjee/2022/oct_dec/27-31

Kale, R.B., Gavhane, A.D., Thorat, V.S. *et al.* (2024). Efficiency dynamics among onion growers in Maharashtra: a comparative analysis of drip irrigation adopters and non-adopters. *BMC Plant Biol* **24**, 237. https://doi.org/10.1186/s12870-024-04875-2

Kassem, H. S., Alotaibi, B. A., Aldosri, F. O., & Muddassir, M. (2021). Exploring the Relationship between Information-Seeking Behavior and Adoption of Biofertilizers among Onion Farmers. *Agronomy*, *11*(6), 1258. https://doi.org/10.3390/agronomy11061258

Lakshmi, K. , & Punima, K. (2018). Assessment of e-readiness of extension functionaries of southern states of India in agricultural technology dissemination. Journal of Krishi Vigyan, 7(1), 20-24.

Mailumo, S. & Onuwa, G. (2022). Adoption index of recommended onion production practices and correlation of multivariate factors among smallholder farmers. Turkish Journal of Agriculture - Food Science and Technology, 10(sp2), 2926-2930. https://doi.org/10.24925/turjaf.v10isp2.2926-2930.5619

Ma, W., & Abdulai, A. (2019). IPM adoption, cooperative membership and farm economic performance. *China Agricultural Economic Review*, *11*(2), 218–236. https://doi.org/10.1108/CAER-12-2017-0251

Mustapha S, Man N, Shah JA, Kamarulzaman NH & TafidaAA 2021. Factors influencing the adoption of ICT'S in extension service delivery among the extension agents inNorth-East, Nigeria. Sarhad Journal of Agriculture 38:149-159. 10.17582/journal.sja/2022/38.1.149.159

Navarro, A. M. (2022). School infrastructure in the Philippines: Where are we now and where should we be heading? (No. 2022-10). PIDS Discussion Paper Series.

Nnodim, A. & Raji, W. I. (2020). Assessment of agricultural technology adoption behaviour among crop farmers in ikwerre local government rivers state. Asian Research Journal of Agriculture, 16-26. https://doi.org/10.9734/arja/2020/v12i230079

Nurvia, L. & Hidayati, D. R. (2017). Farmers characteristics in planting onion and non-onion (allium ascalonicum l.) at rejoso district of nganjuk regency. Habitat, 28(2), 69-74. https://doi.org/10.21776/ub.habitat.2017.028.2.10

Pal, A., Singh, D., & Kaur, G. (2023). Understanding communication behaviour of farmers and barriers to their e-readiness. Journal of Agricultural Development and Policy, 33(1), 85-94.

Sachitra, V., & Padmini, C. (2021). Conceptualising the scale to quantify E-Readiness of farmers: Sri Lankan view. Asian Journal of Advances in Agricultural Research, 17(4), 30-42.

Sanglestsawai, S., Rejesus, R. M., & Yorobe, J. M. (2015). Economic impacts of integrated pest management (ipm) farmer field schools (ffs): evidence from onion farmers in the philippines. Agricultural Economics, 46(2), 149-162. https://doi.org/10.1111/agec.12147

Singh, A., & Singh, M. (2024). Perceived Attributes and E-Readiness of Extension Personnel to Use ICTs. Archives of Current Research International, 24(4), 135-141.

Yap, C. S., Keling, W., Ho, P. L., & Omar, Q. (2023). Technology readiness of farmers in sarawak: the effect of gender, age, and educational level. Information Development, 41(1), 37-47. https://doi.org/10.1177/02666669231194712