UNLOCKING THE DIGITAL POTENTIAL: EVALUATING SMARTPHONE-BASED DIGITAL COMPETENCE AMONG CAMBODIAN FARMERS.

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Abstract: Agriculture sector was identified to be vulnerable to climate variability and change. The utilization of digital technology holds significant promise in facilitating and advancing sustainable socio-economic development, inclusivity, and resilience. It achieves this by generating novel avenues for economic expansion, improving the productivity and effectiveness of all industries, and offering alternative solutions and innovative approaches to address prevailing global challenges such as pandemic and climate change. The research aims to assess the farmers' basic knowledge of digital literacy competence level and to examine the association between gender, education, and age group to the foundational digital literacy of farmers in using a smartphone. The Cohran formula of an unknown population was used to determine the appropriate number of farmers to be interviewed. 400 farmers within 10 districts were randomly chosen with gender balance. KoboToolBox and SPSS IBM 25 were adopted to collect and analyse the data. The findings revealed that Farmers are mostly working-age (31-64) and the majority of farmers have primary education. While more women have greater secondary education, more men have bachelor's degrees. Female farmers have an average education of 1.39, whereas male farmers have 1.41. Male farmers had a somewhat higher education standard deviation than female farmers. On average, farmers possess 3 smartphones. In social media and content creation, women thrive in digital literacy. Male farmers are better at connecting to the internet and integrating smartphone links. Digital literacy abilities are lower in older people (> 65) than working-age and youth groups. Higher education correlates with improved smartphone abilities and digital literacy. Farmers with less education may need more digital literacy training, especially for smartphone activities. Pearson Chi-Square Tests show no significant association between gender and age and basic digital literacy. Education level is significantly associated with social media app competency and smartphone app installation/use (*p-value* = 0.000).

Keywords: Digital literacy, Digital competence, Smartphone-based evaluation, Technology adoption.

1. INTRODUCTION

Cambodia is currently making intensive efforts to modernize its agriculture sector in order to enhance production in its primary exporting crops. This is being achieved through the utilization of sophisticated farming techniques, mechanization, and the adoption of novel crop varieties (World Bank, 2020).

In recent years, Cambodia has seen a significant increase in agricultural digitalization research and studies (TSC, 2023). From this standpoint, the incorporation of digital technology and the advancement of digital applications have progressively become more prevalent in farming practices, with the goal of enhancing agricultural productivity and supporting the well-being of farmers. These technologies encompass a diverse range of tools, including smart

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irrigation systems that utilize soil sensors for detection, drones guided by Global Positioning Systems (GIS), and enhanced net-house facilities. Automatic irrigation systems and advanced net houses have been extensively implemented in vegetable production on a huge scale. Additionally, certain regions of the country have utilized drones in rice production. This trend indicates a strong acceptance of current technologies, representing a significant change from primarily conventional farming methods to a more advanced and updated approach. The proliferation of digital technology has undergone fast advancements and achieved global ubiquity. Cambodia, similar to other nations, utilizes sophisticated technologies to enhance economic growth. The influence on government services, poverty rates, employment prospects, and the structure of the labor market in Cambodia has been substantial (STI, 2023).

Digital technology has rapidly advanced and become globally ubiquitous. Cambodia, similar to other countries, employs cutting-edge technologies to foster economic expansion. The Digital Economy and Society Policy Framework 2021-2035, as a component of the post COVID-19 economic recovery plan, is an essential part of the Pentagonal Strategy of the Royal Government of Cambodia - Phase I. It primarily emphasizes the development of digital infrastructure, attracting investments, promoting start-ups, enhancing productivity, and improving economic competitiveness. The framework places significant emphasis on five key priorities: developing robust digital infrastructure and fostering trust and confidence in digital systems as foundational elements, while also promoting the development of digitally literate individuals, expanding the reach of digital government services, and providing support for digital enterprises as essential pillars. The framework encompasses the process of modernizing the agriculture sector (MEF, 2021). The primary objective of the pentagonal plan is to elevate Cambodia's economy to the status of an upper middle-income nation by 2030, with the aim of achieving high-income country status by 2025.

Currently, there has been limited research conducted on the effects of adopting digital technology on smallholders, especially in Cambodia. Quantifying these effects using data from smallholder farmers is notably challenging because they are less apparent. This study aims to address the existing gaps.

1.1. Digital landscape in Cambodia

Cambodia has experienced a tremendous acceleration in the adoption of digital technology, resulting in significant advances during the previous several years. The extensive use of digital technology has been driven by various factors, such as the involvement of prominent private sector entities, the presence of a tech-savvy youthful population, and the support of the government. Regarding the adoption of digital technology in Cambodia, there are several important aspects to consider. Firstly, there are 11.37 million internet users, which accounts for a 67.5% internet penetration rate. Additionally, there is a widespread use of social media applications, with 10.95 million users, representing 65% of the total population. Furthermore, Cambodia has rapidly digitalized key sectors such as finance, e-commerce, and e-governance (STI, 2023).

A study completed by the Techo Startup Center in 2022 reveals that the tech startup ecosystem in the nation consists of over 300 firms, including those in the fields of Fintech, E-commerce, disruptive models, and Agri-tech (TSC, 2022). These companies mostly specialize in providing services for consumer technology rather than focusing on machine learning or big data platforms. Cambodia has continually embraced the presence of international and local technology companies, including Grab, Uber, Food Panda, Alipay, PayPal, and others. The international traders offer various opportunities for Cambodia, such as enhancing its appeal as an investment location, expediting the adoption of technologies and the expansion of the digital economy, and providing local startups with chances to develop new products and services by utilizing the platforms and technologies of global and regional tech companies (AQUARII, 2023).

1.2. Research objective

Multiple studies have been undertaken on the adoption of digital technology in various sectors in Cambodia including agriculture, financial services, e-commerce, health, education, and enterprises. The lens of attention is directed towards intellectuals. The studies focus on examining the digital challenges and opportunities faced by

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agricultural input suppliers. They aim to empirically assess the current obstacles and advantages of adopting digital payment and e-commerce for business transactions. Furthermore, they seek to identify the implications of these practices for the economy of Cambodia. This study aims to assess the impact of digital technology adoption on the performance of tourism Micro, Small, Medium Enterprises (MSMEs). It also examines the potential of wearable health monitors in strengthening health systems and explores the opportunities and challenges of technology adoption in the country. Additionally, it considers contextual factors that may influence product uptake and integration into the health system. This study examines the user perspective on the adoption of digital financial services in Cambodia, specifically focusing on factors that influence the adoption of services such as mobile banking, mobile money, and digital wallets. It also investigates the factors that influence the adoption of e-commerce platforms among small and medium-sized enterprises (SMEs) in Cambodia, as well as the challenges they face. Additionally, it explores the views of Cambodian youth on digital skills and employability, including the digital skills gap, the availability of digital training programs, and the impact of digital skills on youth employment. The research on farmers' usage of digital technologies is disregarded. Hence, it is imperative to conduct a study on the level of digital literacy among farmers about the fundamental usage of smartphones. The current study addressed the following research objectives.

1. To assess the knowledge (competence level) in basic digital literacy of farmers in utilizing a smartphone.
2. To examine the association between gender, education, and age group to the foundational digital literacy competence level of farmers in using a smartphone.

1.3. Research hypothesis

Smart phones owned by farmers are at least 2 per household, fee for accessing the internet is reasonable, the internet coverage is almost nation-wide, and the Royal Government of Cambodia supports policy frameworks and mechanisms in digital technology adoption. We hypothesized that:

- Farmers will learn the basic digital literacy of using a smartphone due to smartphone prices have become accessible, internet connectivity is nearly nationwide, and a robust government support for digital technology adoption following the implementation of a digital economy and society policy framework from 2021 to 2035.

2. MATERIALS AND METHODS

2.1. Selection of study sites

Cambodia has three sub-national administrations: capital city/province, district/municipality/khan, and sangkat/commune. Cambodia's capital is Phnom Penh. The capital city has khans and sangkats. Provinces have municipalities and districts. Districts have communes and sangkats, while municipalities have sangkats. The kingdom has a capital, 24 provinces, 159 districts, 26 municipalities, 12 khans, 1406 communes, and 227 sangkats. National territorial government does not include villages. The Ministry of Interior counts 14,168 villages (ODC, 2015).

8 provinces out of 24 provinces were randomly selected. These 8 provinces consist of 66 districts and within 66, 10 districts were randomly chosen. Data collection was conducted from January to February 2024.

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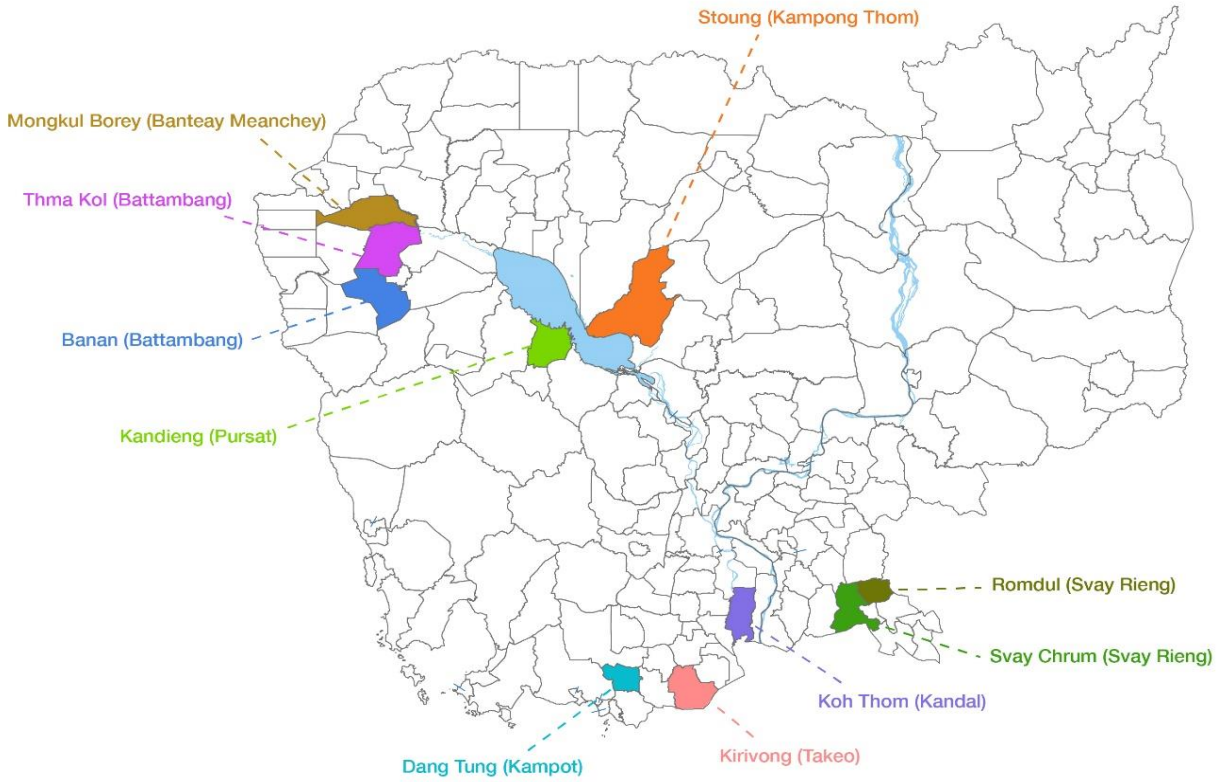

Figure 1. Data collection in randomly selected provinces and districts across Cambodia

2.2. Determination of sample size

Assume there is a large population and we do not know the variability in the proportion that will adopt the recommended practice, therefore, we assume p = 0.5 (maximum variability). Furthermore, suppose we desire a 95% confidence interval (interpreted Z value of 95% C.I from z-table = 1.96) and ± 5% precision. Therefore, Cochran's formula is considered especially appropriate in situations with a large population/unknown population which could be calculated a sample for proportions as the following:

$$n = \frac{z^2 \times \hat{\rho}(1-\hat{p})}{\varepsilon^2}$$

Where:
z is the z score
ε is the margin of error
n is the population size
ρ̂ is the population proportion

$$n = \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2} = 385$$

The research aims at randomly interviewing 400 farmers within the 10 districts of the randomly selected 8 provinces. The number of male and female sample farmers were equally chosen (50% each of the gender category). The age of respondent farmers was grouped into 3 categories to comply with the Cambodia's Ministry of Planning for farmers' age grouping. KoboToolBox was employed to collect data from household interviews then analyzed using IBM SPSS Statistics 25 to check for the normality of datasets, examine descriptive stastistics, and analyze the association between categorical variables of gender, age group, and education level.

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2.3. Preparation of questionnaire

To begin, the researchers combed through existing literature to define digital literacy. According to the Partnership on Measuring ICT for Development's "Core List of ICT Indicators for Measuring Digital Literacy" published by the International Telecommunication Union, this helped to identify seven variables that were utilized to guide the research of digital literacy. In order to understand each component and find elements that characterized it, we conducted a comprehensive literature review. We used these items as a basis for developing questions that tested individual's digital literacy across all 7 domains. To determine the basic digital literacy level of farmers, 7 variables were used: information access, management, interpretation, integration, communication, evaluation, and creation. The prepared questionnaire was tested with 30 farmers prior to the deployment to check for smoothness and coherence.

3. RESULTS

A total of 400 farmers within 10 provinces across the nation were interviewed. The numbers of male and female farmers are equally selected at 200 respondents. Age distribution of farmers reveals that working-age individuals (31-64) constitute the majority of farmers, followed by youth (15-30) and a small number of older persons (> 65). Mean age of farmers shows that the average age of female farmers is approximately 35.86 whereas for male farmers it is around 42.66. Education levels of farmer indicates that the primary education is the most common among farmers, followed by lower secondary and higher secondary education levels. More men than women hold bachelor's degrees, while a higher number of women have attained higher secondary education. Educational mean signified that the average education level among female farmers is 1.39 and 1.41 among male farmers, on a scale and the educational deviation demonstrates that there is a slightly higher standard deviation in education levels for male farmers compared to female farmers (Table 1).

Table 1: Demographic characteristics of farmers

Descriptive Statisticsa

		Gender of farmers	
		Female	Male
Charateristics		Count	Count
Age of farmers	Older persons (> 65)	1	6
	Working age (31-64)	87	131
	Youth (15-30)	112	63
	Mean	35.86	42.66
	Std. Deviation	9.55	11.37
Education level	Bachelor's degree	2	1
	Higher secondary	15	21
	Lower secondary	53	51
	Master's degree	1	0
	None	18	16
	Primary education	111	111
	Mean	1.39	1.41
	Std. Deviation	.89	.82

a. Age of female and male farmers (Mean = 35.86 & 42.66, Std. Deviation = 9.55 & 11.37) and Education level of female and male farmers (Mean = 1.39 & 1.41, Std. Deviation = 0.89 & 0.82).

Mobile phone ownership in the study areas was very high at 99.2% out of 400 farmers possessed a smartphone. The mean of smartphone owned by farmer family members is 2.77 and the standard deviation of 1.314. (Figure 2).

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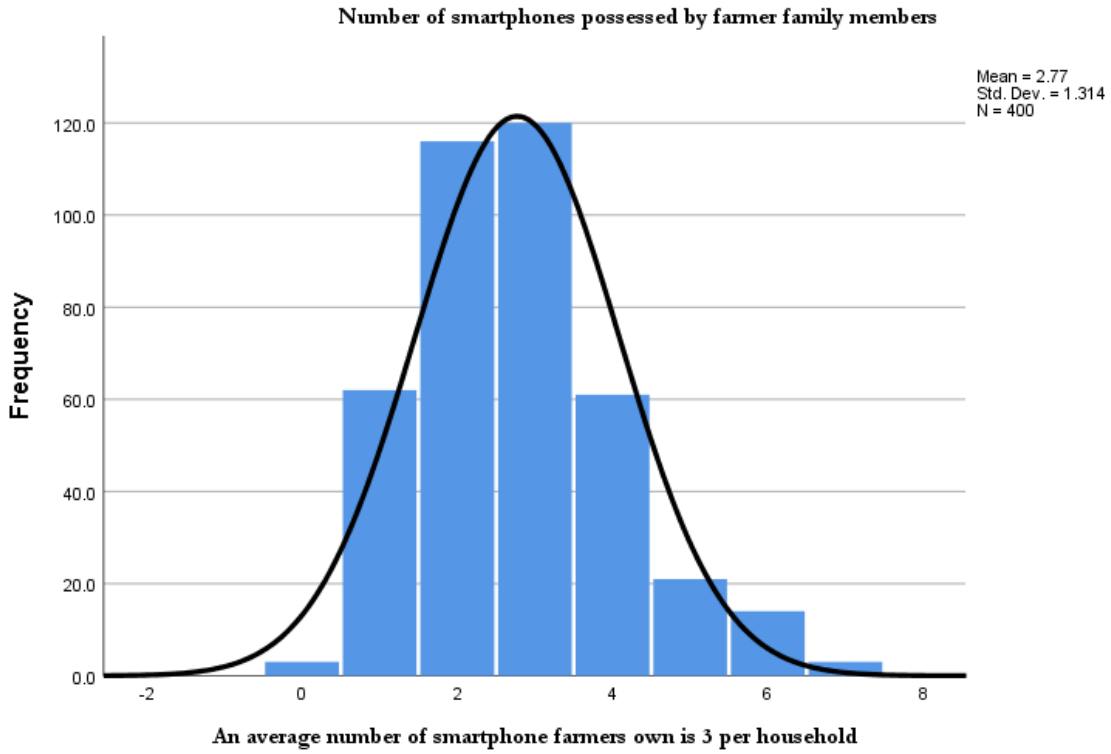

Figure 2: Smartphone owns by farmers

Numerous questions, related to various tasks that can be performed on a smartphone to assess the competence level of farmers in utilizing a smartphone for foundational digital literacy, were developed. The data is structured in a table format where each row corresponds to a specific task and each column represents different categories such as gender, age group, and education level of the farmers (Table 3).

Gender:

Female Farmers:

Show a higher level of proficiency in various digital literacy skills, including using social media apps, producing content for social media, and evaluating information.

Females tend to excel in tasks related to social media and content creation on smartphones.
Male Farmers:

Demonstrate better competence in areas such as connecting to the internet and integrating external links to social media.

Males may need further improvement in tasks related to social media management and content creation.
Age Group:

Older Persons (> 65):

Exhibit lower levels of proficiency in most digital literacy skills, indicating potential challenges in utilizing smartphones effectively.

Working Age (31-64) and Youth (15-30):

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Show higher proficiency in tasks related to smartphone usage, social media management, and content creation. Younger age groups tend to be more adept at using and navigating smartphone applications.

Education Level:

Farmers with Bachelor's or Master's Degrees:

Display advanced skills in utilizing smartphones for various tasks such as social media management and content creation.

Higher education levels correlate with increased digital literacy proficiency.

Farmers with Primary Education or Lower Secondary Education:

Exhibit lower levels of digital literacy skills, particularly in tasks requiring advanced smartphone usage.

Those with lower educational backgrounds may benefit from additional training or education on smartphone functionalities.

Table 2: Assessment of gender, age group, and education level of farmers on a basic digital competence using a smartphone.

Descriptive Statisticsa

		Gender of farmers		Age group of farmers			Education level					
		Femal e Count	Male Count	Older persons (> 65) Count	Working age (31-64) Count	Youth (15-30) Count	Bachelor's degree Count	Higher secondary Count	Lower secondary Count	Master's degree Count	None Count	Primary education Count
Do you know how to connect to the internet using your smartphone ?	No	84	96	2	100	78	1	6	49	0	20	104
	Yes	116	104	5	118	97	2	30	55	1	14	118
Do you know how to use and manage social media apps on your smartphone ?	No	175	166	6	187	148	1	17	85	1	32	205
	Yes	25	34	1	31	27	2	19	19	0	2	17
Do you	No	84	96	2	100	78	1	6	49	0	20	104

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know how to produce a content for posting in your social media using a smartphone ?	Yes	116	104	5	118	97	2	30	55	1	14	118
Do you know how to integrate external links to your social media page using a smartphone ?	No	175	166	6	187	148	1	17	85	1	32	205
	Yes	25	34	1	31	27	2	19	19	0	2	17
Do you know how to install and use other applications (such as agri-apps) on your smartphone ?	No	193	190	7	211	165	1	24	101	1	34	222
	Yes	7	10	0	7	10	2	12	3	0	0	0
Do you know how to chat and make video calls via social media using your smartphone ?	No	53	51	2	52	50	0	3	27	0	15	59
	Yes	147	149	5	166	125	3	33	77	1	19	163
Do you know how to evaluate whether the information you read is a fact or a fake?	No	175	166	6	187	148	1	17	85	1	32	205
	Yes	25	34	1	31	27	2	19	19	0	2	17

a. Competence level in basic digital literacy of farmers in utilizing a smartphone.

Pearson Chi-Square Tests analysis offers insights into the association between gender, age group, education level, and digital literacy skills related to smartphone usage among farmers (Table 4). The data analysis is summarized as follows:

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Connecting to the Internet:

There is no significant association between gender, age group, and education level in knowing how to connect to the internet using a smartphone.

Education level shows significance with a p-value of 0.008, indicating that education level may impact the ability to connect to the internet via smartphone.

Using and Managing Social Media Apps:

Similarly, no significant associations were found between gender, age group, and education level in knowing how to use and manage social media apps on a smartphone.

The p-value for education level is 0.000, suggesting a significant relationship between education level and proficiency in using social media apps on smartphones.

Producing Content for Posting on Social Media:

The chi-square test did not reveal significant associations between gender, age group, and education level in knowing how to produce content for posting on social media using a smartphone.
Education level was found to be significant with a p-value of 0.008.
Integrating External Links to Social Media:
There were no significant associations between gender, age group, and education level in knowing how to integrate external links to social media pages using a smartphone.
Education level shows significance with a p-value of 0.000.
Installing and Using Other Applications:
A significant association exists between education level and the ability to install and use other applications on a smartphone with a p-value of 0.000.
Chatting and Making Video Calls via Social Media:
Gender, age group, and education level did not show significant associations with the ability to chat and make video calls via social media using a smartphone.
Evaluating Information for Fact or Fake:
Education level was found to be significant with a p-value of 0.000 in the skill of evaluating whether the information read is a fact or fake.

Table 3: Examining an association between gender, age group, and education leve of farmers to the 8 foundational digital literacy competence level utilizing a smartphone.

Pearson Chi-Square Tests

		Gender of farmers	Age group of farmers	Education level
Do you know how to connect to the internet using your smartphone?	Chi-square	1.455	.843	15.779
	df	1	2	5
	Sig.	.228	.656a	.008a,b,*
Do you know how to use and manage social media apps on your smartphone?	Chi-square	1.610	.114	60.036
	df	1	2	5
	Sig.	.204	.945	.000a,b,*
Do you know how to produce a content for posting in your social media using a smartphone?	Chi-square	1.455	.843	15.779
	df	1	2	5
	Sig.	.228	.656a	.008a,b,*
Do you know how to integrate external links to your social media	Chi-square	1.610	.114	60.036
	df	1	2	5

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page using a smartphone?	Sig.	.204	.945	.000a,b,*
Do you know how to install and use other applications (such as agri-apps) on your smartphone?	Chi-square	.553	1.811	115.432
	df	1	2	5
	Sig.	.457	.404b	.000a,b,*
Do you know how to chat and make video calls via social media using your smartphone?	Chi-square	.052	1.148	13.084
	df	1	2	5
	Sig.	.820	.563	.023a,b
Do you know how to evaluate whether the information you read is a fact or a fake?	Chi-square	1.610	.114	60.036
	df	1	2	5
	Sig.	.204	.945	.000a,b,*

Results are based on nonempty rows and columns in each innermost subtable.

*. The Chi-square statistic is significant at the .01 level.
a. More than 20% of cells in this subtable have expected cell counts less than 5. Chi-square results may be invalid.
b. The minimum expected cell count in this subtable is less than one. Chi-square results may be invalid.

4. DISCUSSION

The research aimed to evaluate the proficiency of farmers in employing a smartphone for basic digital literacy and to investigate how gender, education, and age group are associated with the level of basic digital literacy competence among farmers when using a smartphone. There were 400 farmers from 10 provinces surveyed, with an equal split between male and female respondents. Most farmers fall in the working-age group (31-64), followed by youth (15-30) and a smaller number of older individuals (> 65). The average age of female farmers is approximately 35.86, while male farmers have an average age of around 42.66. Primary education is the most common among farmers, followed by lower secondary and high secondary education levels. More men have bachelor's degrees, while a higher number of women have completed higher secondary education. The average education level among female farmers is 1.39, compared to 1.41 among male farmers on a scale. The standard deviation in education levels is slightly higher for male farmers compared to female farmers (Table 1). Mobile phone ownership is very high among farmers, with 99.2% owning smartphones. On average, each household possesses 3 smartphones (Figure 2). Kanna Nova (2022) reported that the widespread availability of low-cost smartphones and reasonable data plans in developing countries provide an opportunity to extend the benefits of digital information accessible to a wider range of people, especially to new users such as rural farmers. Christine L. Bogmann (1996) argues that previous methods involved traditional sources of information were stored in hardcopies including books, libraries, and experts in the field, along with digital platforms designed for people who are skilled in reading and technology. New users experience difficulties with these tactics due to their low literacy levels and limited proficiency in navigating text-based digital interfaces. The method is justified due to the need to reevaluate design paradigms to accommodate the specific demands of these consumers.

The results of the proficiency in digital literacy skills varies based on gender, with females excelling in social media tasks and content creation. Male farmers show better competence in tasks like connecting to the internet and integrating external links on smartphones. Older individuals (> 65) exhibit lower proficiency in digital literacy skills compared to working age and youth groups. Education level impacts digital literacy, with higher education levels correlating with advanced smartphone skills. Farmers with lower educational backgrounds may need additional training to improve their digital literacy skills, especially in tasks requiring advanced smartphone usage (Table 2). UNDP's assessment report on the digital literacy for employability and entrepreneurship among Cambodia youth in 2020 found that more than 90% of Cambodian youth own smartphones, they mainly engaged in social networking, entertainment, and news reading on smartphones. Youth in highly urbanized areas demonstrated higher literacy levels compared to rural individuals. However, among age groups, youth showed a low to below-average digital literacy level, with an average score between 47 to 51 percent. The most concerning point was the internet surfing safety competence area received the lowest scores among the tested areas. In addition, Chan et al. (2020) revealed that there were low digital literacy rates for the provincial agricultural input suppliers despite significant

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advancements in digital infrastructure, the utilization of digital payment and e-commerce among the agricultural input suppliers examined remains limited.

The result of Pearson Chi-Square Tests indicates that there is no significant association between gender, age group, and education level in connecting to the internet via smartphone. Education level impacts the ability to connect to the internet (p-value = 0.008). In addition, there are no significant associations found in using and managing social media apps based on gender and age group. Likewise, there are no significant associations between gender and age group in producing content for social media using a smartphone. Education level significance in producing content for social media (p-value = 0.008). However, there is a significant relationship between education level and proficiency in using social media apps (p-value = 0.000) and a significant association between education level and installing/using other applications on smartphones (p-value = 0.000) (Table 3). Pheakdey Heng (2019) reported that there is a requirement for a thorough examination of particular digital abilities and present deficiencies, which emphasizes the difference between existing skills and those necessary for the future workforce. Addison et al. (2024) found that in many regions of Ghana, male farmers may have greater access to digital technologies compared to female farmers due to societal norms and gender roles. This can affect the level of exposure and practice with digital tools. In term of training and support, men and women might have different opportunities for training and support in using digital technologies. Women often have limited access to educational resources and training programs, which can impact their digital literacy levels. In contrary, women might face additional barriers, such as restrictions on mobility or time constraints due to household responsibilities, which can limit their engagement with digital learning platforms due to cultural norms. Bai et al. (2023) researched on Digital literacy and farmers' entrepreneurial behavior—Empirical analysis based on CHFS2019 micro data suggested that male farmers have higher digital literacy levels than female farmers, primarily due to better access to technology and training. Zhao et al. (2022) conducted research on the Impact of Digital Literacy on Farmer Households' Green Cooking Energy Consumption: Evidence from Rural China found that younger farmers consistently show higher digital literacy levels compared to older farmers, attributed to greater exposure to digital technologies. Lilian Anthonysamy (2020) performed the Digital Literacy Deficiencies in Digital Learning Environment among University Students found that there is a strong correlation between higher education levels and higher digital literacy. Farmers with more schooling are generally more comfortable using digital tools.

CONCLUSIONS AND RECOMMENDATIONS

This study offers an investigation of the digital literacy of farmers in their agricultural activities and seeks to examine the association of gender, age group, and education level to digital literacy of farmers in using a smartphone. Throughout the research, we acquired fresh data pertaining to the digital literacy of farmers. Farmers, possessing diverse demographic attributes, exhibit varying degrees of digital literacy. Academics have recognized that education has the potential to enhance digital literacy. An effective approach to address this issue is to integrate ICT curriculum into primary and secondary education, as the majority of farmers possess educational qualifications at these levels. The Cambodian government has recommended including ICT as a subject in primary and secondary school curricula as a strategy to enhance human capital in the field of ICT. However, the progress of implementing this proposal has not been evaluated yet.

Digital literacy encompasses a dynamic fusion of mentality, behaviors, and skills that are utilized to improve the literacy levels of farmers. Digital literacy refers to the capacity to effectively and consciously employ digital information, technology, and media for the purposes of accessing, managing, integrating, assessing, creating, and communicating. An evaluation of these elements revealed challenges in effectively organizing, integrating, assessing, and generating digital information. Enhancing digital literacy can be initiated by considering these criteria.

Given that the 2013 agricultural policy recognized the utilization of ICT for gathering, evaluating, and sharing agricultural information with stakeholders in the sector, the present moment is opportune for its implementation. The competent ministry can establish these systems and also guarantee that extension officers and farmers are adequately trained and proficient in utilizing ICTs in their agricultural activities. Information systems that offer extension services, climatic information, and agricultural market information can greatly benefit rural farmers. Information systems enable farmers to receive guidance on agricultural concerns and facilitate the transition from

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traditional to contemporary farming practices. Agricultural producers can get access to lucrative markets, resulting in more income. By adopting this approach, farmers have the potential to enhance agricultural output and revenue, so enabling the agricultural sector to generate additional employment opportunities and make a substantial contribution to national economic growth. The outlined discussions and drawn conclusions can serve as a foundation for further research on the digital literacy of farmers, particularly their online behaviors and actions. This research can help identify the needs of farmers and enhance their digital literacy, as well as motivate them to improve their proficiency in using digital technologies. This research aims to quantify digital literacy while also emphasizing the various settings that contribute to evaluating the digital literacy of farmers. The task of creating a uniform tool to assess the digital literacy of farmers still persists. The models should be inclusive, communication-centric, creation-oriented, and interdisciplinary models. The significance of enhancing the digital literacy of farmers in today's times is evident, regardless of the methodology employed and the outcomes achieved. Dhaygude., M and Chakraborty., D. (2020) pointed out that identifying trust, external invisibility, and understanding the role of peers and family as critical factors for the uptake of digital platforms among new users and/or farmers.

Limitation and areas for further research

The research undertaken within the chosen population may not comprehensively capture the incentives, obstacles, intricacy, and varied character of adopting digital technologies. Variables such as socioeconomic level, educational attainment, cultural factors, and geographic location can exert a substantial impact on adoption rates. Relying exclusively on demographic factors may oversimplify the research. It may not be applicable to different populations or contexts. It is advisable to utilize mixed-method approaches, which involve the combination of quantitative and qualitative methodologies, in order to obtain a more comprehensive knowledge of the adoption of digital technology. In addition, considering several aspects outside demographics, such as individual attitudes, social networks, and institutional contexts, might offer a more comprehensive perspective on the adoption process.

Ethical statement

The authors follow the guidelines of the Social Research Investigators and Key Personnel for Human Research issued by the Collaborative Institutional Training Initiative under Purdue University.

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The researchers hereby declare that there were no conflicts of interest of any kind in the study and its stated conclusions.

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