Thai Agriculturists Use of and Experience with Digital Technology

Maneerat Manyuen[1*], Surapon Boonlue[2], Jariya Neanchaleay[3]
and Elizabeth Murphy[4]

[1] Phd. Candidate, Learning Innovation and Technology, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, Thailand.

[2] Assoc. Prof. Dr., Learning Innovation and Technology, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, Thailand.

[3] Assoc. Prof., Learning Innovation and Technology, Faculty of Industrial Education and Technology, King Mongkut's University of Technology Thonburi, Thailand.

[4] Prof. Dr., Faculty of Education, Memorial University of Newfoundland, Newfoundland and Labrador, Canada.

[*] Corresponding author, E-mail: maneerat.man@kmutt.ac.th

Abstract

Stepping into Thailand 4.0, agriculturists need to use digital technology to communicate and manage their farms. The purpose of this study was to survey agriculturalists' use, knowledge of and experience with digital technologies (DT) (Internet, social media, e-learning, online commerce, online farm management tools) for learning, for work and for social networking. Participants were 1,068 agriculturalists in Thailand recruited from the Kasettakorn Facebook Page through the accidental sampling technique. Data collection relied on an online survey using Google Forms with 30 items. The results revealed that more males than females used the DT. The highest percentage of users were 21-40 years old. The main devices used were smartphones. The primary source of learning to use DT was self-learning. Social networks appeared to be more popular for communication. Problems included slow internet connections and lack of knowledge.

Keywords: Online Technologies, Digital Technology, Agriculturalists, Thailand

Introduction

Agriculturist facing an ever-changing world: the seeds that worked for generations may not be the seeds that work today due to climate change, soil degradation, and water constraints. They can no longer rely on historical calendars and generational knowledge to drive decisions about purchases, seeds to plant, and mulches and fertilizers to use. They need more timely and responsive support. The hopes and expectations for digitalization of agriculture are high. Using mobile tools, data can be directly collected from the farmers using their own mobile tools. Data management processes can exceed the capacities of typical processes in the past. Data is being used to create robust farmer profiles in real-time by multiple service providers—such as financial services providers, input suppliers, agro-processors, and farmer cooperatives—to understand and engage with farmers better. USAID (2018) Estimated that by 2020, almost three-quarters of the world's population 5.7 billion people would subscribe to mobile services (GSMA, 2017). The next wave of mobile connections is expected to come mainly from rural areas (Palmer & Darabian, 2017 was mentioned in USAID, 2018) where those engaged in agriculture live.

Burke and Sewake (2008) observed that computer and networked technology use among agriculturalists continues to grow as broadband accessibility increases. However, Burke and Sewake also noted that researchers' knowledge about technology use and adoption is lacking even though such knowledge is necessary in order to better inform the efforts of those working in agricultural extension. In Thailand where this study was conducted, Thai Ministry of Information and Communication Technology (2016) has created a Digital Development Plan for Economic and Social Development. Their goal is to create a society of equal quality through digital technology (DT). This plan aims for all citizens (including agriculturalists) to be aware of their knowledge and understanding of digital technology. However, not much is currently known about agriculturalists current use of DT. It is with this gap in mind that this study was conducted.

Objectives

Regarding agriculturalists use and experience of DT (Internet, social media, e-learning, online commerce, online farm management tools), identify as follows; user characteristics, device use and access, purpose for using DT, problems faced using DT, time spent using DT and social networks use.

Conceptual theory

Orlikowski (2000) explained regarding technology use that those who use technology may not always use it the same way that the developers intended. Orlikowski (2000) provided the example of software for preparing taxes whereby, instead of using the software on the computer or online, the user may simply print off the form and enter the information manually even though the software is not intended to be used in this way. Similarly, the users may choose to not even use the technology at all. Thus, in spite of developers' intentions, there are no actual predetermined uses of the technology. Instead the use (frequency and type) depends on users in given context. This is why it is useful and relevant to study technology use in different contexts and with specific groups of individuals such as agriculturalists.

Use of technology is important in all sectors including agriculture. Yet, it has largely been "left aside in terms of the application of new technologies" (Karetsos, Costopoulou, & Sideridis, 2014, p. 2). Jain, Kumar, and Singla (2014) argued that although farmers require certain types of specialized and precise knowledge and information to make decisions, they cannot always easily access it. Not surprisingly, agriculturalists are using more and more information and communication technologies (ICTs). For example, American farmers use smartphones more than the general public not for entertainment but for industry-related reasons (Doering, 2013; Walter, 2011). Karetsos et al. (2014) explained that farmers use DT-connected devices, especially their phones for communicating via email, verifying weather reports and for text messaging.

Technology use and mobile phones in particular are very important for agriculturalists in developing countries (Chhachhar & Hassan, 2013). According to Chhachhar and Hassan (2013), the advantage of mobile phones includes giving farmers better access to market information, communication with other farmers, weather reports and for solutions to problems.

Darabian (2016) reported that problems faced by Thai agriculturalists are similar to those of other countries yet the growth of mobile use is similar to that of developed markets. Darabian (2016) added that the agricultural sector includes approximately seven million households that depend on farming and that this situation prompted an Internet provider (dtac) to play a role in technology use with farmers in this country. In 2008, dtac

started a "mobile agricultural advisory service" using SMS to update farmers on such information as weather, techniques and prices. In Thailand where this study was conducted, technology has a significant role to play in helping agriculturalists with their trade. However, not a lot is known about how these individuals use or do not use technology. It is in recognition of this gap in the literature that the study was undertaken.

Materials and Methods

Participants

The participants were 1,068 Thai agriculturalists (male, 639; female, 396; other, 33) recruited through the accidental sampling technique from the Kasettakorn Facebook page which has a total of 182,712 members. The sample size was based on the table of Yamane (1973).

Data collection

Data were collected using a fixed-response survey administered online using Google Forms. The survey consisted of 30 items in two sections. Section 1 consisted of 10 items pertaining to user characteristics as follows: gender, age, region, level of education, type of agriculture, experience with agriculture, sources of learning about agriculture, family members involved in agriculture; individual monthly income and; total household income.

Section 2 consisted of 20 items pertaining to DT background as follows: user characteristics; device use and access; purpose for using DT; problems faced using DT; time spent using DT; social networks use.

These items were adapted from Electronic Transactions Development Agency (ETDA) (2016).

Data analysis

Data analysis involved descriptive statistics.

Results

Regarding agriculturalists use and experience of DT (Internet, social media, e-learning, online commerce, online farm management tools), identify:

Table 1: User characteristics

Item	Frequency	Percent
1.1 Sex		
Male	639	60
Female	396	37
Other	33	3
1.2 Age		
21-40 years	744	70
41-60 years	259	24
Less than 20 years	65	6
1.3 Education level		
Bachelor	595	56
Secondary	238	22
Primary school	167	16
Higher than bachelor's degree	55	5
Diploma	13	1
1.4 Domicile		
North East	542	50
South	286	27
North	142	13
Central	98	9
1.5 Type of agriculture		
Farming	596	56
Integrated agriculture	378	35
Fishery	75	7
Livestock	14	1
Forestry	5	1
1.6 Experience in agriculture		
1-5 years	476	45
Less than 1 year	262	25
6-10 years	196	18
More than 10 years	134	13

Item	Frequency	Percent
1.7 Sources of knowledge of agriculture		
Self-learning.	906	32
Transfer knowledge from family members.	615	22
Sharing knowledge from people in the community.	462	17
Study from agricultural learning sources.	445	16
Learning in educational institutions.	372	13
1.8 Family member who engaged in agriculture		
Father / Mother	766	44
Relatives such as uncle, aunt, uncle in law	656	38
Brethren	290	17
1.9 The average income per month received from an agricultural career		
10,001-30,000 baht.	562	53
30,001-50,000 baht.	212	20
More than 50,000 baht.	186	17
Less than 10,000 baht.	108	10
1.10 The average income per month for household received from the agricultural occupation		
More than 100,000 baht.	361	34
50,001-100,000 baht.	314	30
30,001-50,000 baht.	228	21
Less than 30,000 baht.	165	15

Analysis of demographic data revealed that respondents were male (60%), female (37%), and other (3%). The age ranged from 21-40 years (70%), 41-60 years (24%) and less than 20 years (6%). The majority of respondents held a Bachelor's degree (56%). Participants were located in northeastern (50%), southern (27%), and northern and central (22%) areas of Thailand. Participants were engaged in farming (56%), integrated agriculture (35%) and, fishery livestock management, and forestry (9%). Their agricultural experience was from 1-5 years (45%), less than 1 year (25%), 6-10 years (18%), and more than 10 years (13%).

Sources of learning included, being self-taught (32%), from family members (22%), community learning (17%), learning resources (16%), and educational institutions (13%). Family members involving in agriculture were fathers/mothers (44%), relatives (38%), siblings and children (17%). The average monthly personal income from agriculture was 10,000-30,000 baht (53%), 30,001-50,000 baht (20%), more than 50,000 baht (17%), and less than 10,000 baht (10%). The average monthly household income from agriculture was more than 100,000 baht (34%), 50,001-100,000 baht (30%), 30,001-50,000 baht (21%), and less than 30,000 baht (15%).

Table 2: Device use and access

Item	Frequency	Percent
2.1 Kinds of technology device use (Answer more than 1 item)		
Smart Phone	1,067	36
Notebook	880	30
Tablet	547	19
Computer PC	460	16
2.2 Ability level to use technology devices		
Can use it fluently	602	57
Fairly	466	44
2.3 Kinds of technology devices for personal use (Answer more than 1 item)		
Smart Phone	1,068	47
Notebook	614	27
Computer PC	306	14
Tablet	275	12
2.4 Technology devices used to access the Internet most often		
Smart Phone	989	93
Notebook	79	7
2.5 Sources of received knowledge through digital technology (Answer more than 1 item)		
Learn and practice by yourself.	805	28
School / institution	757	27
Broadcast and recommended by friends.	384	13
Training organized by private sector agencies.	375	13
2.6 Places to access the internet most often		
Home	622	58
Workplace / agricultural farm area	430	40
Shops / location with internet service	16	2
2.7 Internet services providers (Answer more than 1 item)		
Mobile internet such as DTAC, TRUE, AIS etc.	796	30
WiFi at home, such as TT&T, 3BB, CAT etc.	738	28
Internet in schools / Educational institutions	632	24
Free WiFi (Tourist attractions / Shops)	480	18
2.8 Kinds of digital technology used (Answer more than 1 item)		
Internet usage	915	18
Computer usage	815	16
Communication via social media	813	16

In terms of DT use, the smartphone had the highest frequency of use (36%), followed by notebooks (30%), tablets (19%), and PCs (16%). In terms of ability level to use DT 57% reported fluent ability, 44% indicated that they had fair ability. In relation to technology ownership, 100% indicated that they own a smartphone, while 27%, 14%, and 12% own a notebook, computer, and tablet respectively. Ninety-three percent indicated that they most often use a smartphone to access the DT. Regarding where they learned to use technology, participants could select more than one response. Self-learning was the most common form (28%). School/institution was 27%. The lowest one was the digital community center (6%).

In relation to where users accessed DT, the highest frequency was at home (58%) while 40% indicated that they accessed it in the workplace. Internet was accessed from the following sources: mobile (30%), home WIFI (28%), school WIFI (24%), and free public WIFI (18%). Regarding their purpose for using DT, 18% use the Internet while 16% use a computer, and 16% use for communication via social media.

Table 3: Purposes for using DT

Item	Frequency	Percent
2.9 Purpose for using DT (Answer more than 1 item)		
Social networks (Facebook, Line, WhatsApp, Google+)	1,033	26
Online Learning (e-Learning, MOOC)	946	24
Social Media (YouTube)	865	22
Online commerce	596	15
Online farm management tools	465	12

The purpose of using DT was for social networking (26%), online learning (24%), social media (22%), e-commerce (15%), and agricultural management (12%).

Table 4: Problems faced using DT

Item	Frequency	Percent
2.10 Problems faced using DT (Answer more than 1 item)		
Slow internet connection.	824	26
Lack of knowledge about practices and responsibilities in digital society	795	25
Fear of being violated by personal information over the internet	739	23
Lack of skills in using digital technology device	528	17
Not sure whether the information displayed on the internet is reliable or not.	296	9

Problems faced using DT included slow connections (26%), lack of knowledge about practices and responsibilities (25%), fear of being violated (23%), lack of skills (17%), and uncertainty about the reliability of information (9%).

Table 5: Time spent on DT

Item	Frequency	Percent
2.11 Time spent using the Internet (Day) (Answer more than 1 item)		
Every Day	847	60
Thursday	165	12
Wednesday	151	11
Friday	141	10
Saturday	33	2
Sunday	33	2
Tuesday	25	2
Monday	22	2
2.12 Time spent using the Internet (hours).		
2-3 hours/day	480	45
More than 5 hours/day	377	35
4-5 hours/day	211	20
2.13 The period of time to use the Internet. (Answer more than 1 item)		
Activate the internet for 24 hrs.	440	24
6pm-11pm	439	24
8am-12am	318	18
1pm-6pm	209	12
3am-8am	159	9
12am-1pm	158	9
11pm-3am	81	5
2.14 The average amount of time spent using the Internet		
31-60 minutes	450	42
15-30 minutes	364	34
More than 60 minutes	175	16
2.15 Time spent change compared to the previous year		
Increased	803	75
Unaltered	265	25

In terms of time spent on DT to access the Internet, everyday use accounted for 60% with the highest daily use on Thursday (12%), Wednesday (11%), and Friday (10%). The duration of use was 2-3 hours/day (45%), more than 5 hours/day (35%), and 4-5 hours/day (20%). The period of time to use the DT included 24 hours per day (24%), from 6pm-11pm (24%), 8am-12pm (18%), 1pm-6pm (12%), 3am-8am (9%), 12pm-1pm (9%), and 11pm-3am (5%). The average amount of time spent online was 31-60 minutes

(42%), 15-30 minutes (34%), more than 60 minutes (16%), and less than 15 minutes (7%). Relative to the previous year, respondents accessed the DT more often (75%), equal (25%).

Table 6: Social networks use

Item	Frequency	Percent
2.16 Types of social networks used (Answer more than 1 item)		
Line	1,055	24
Facebook	986	22
Google+	758	17
WhatsApp	640	14
2.17 Ways to solve agricultural problems (Answer more than 1 item)		
Search for information to study by yourself via Google, Yahoo etc.	1,054	43
Post questions / share messages / images / video clips problems	791	33
Transfer the knowledge you have as text / images / video clips.	585	24
2.18 Ways to exchange and share knowledge through social networks (Answer more than 1 item)		
Facebook	939	43
Line	839	39
WhatsApp	140	6
Google+	129	6
2.19 Ways to create new knowledge		
Facebook	556	52
Line	437	41
Google+	43	4
Instagram	32	3
2.20 Development of knowledge skills and the use of digital technology to help agriculture. What information are you interested in? (Answer more than 1 item)		
Production management	961	11
Production Technology / Productivity	944	11
Technology / Innovation in Agriculture	937	11
Marketing management	930	11

Social networks use included Line (24%), Facebook (22%), Google+ (17%), WhatsApp (14%). When encountering agricultural problems, respondents use DT to search for information for self-study (43%), post questions (33%), and exchange and share knowledge (24%). Ways to exchange and share knowledge through social networks were Facebook (43%), Line (39%), WhatsApp and Google+ (6%). Among these social networks, respondents use Facebook (52%) to exchange and create new knowledge most often, Line (41%) was the second, then Google+ (4%) and Instagram (3%). The main

areas for which respondents used social networks to develop knowledge and skills, included: production management, production technology/productivity, and technology/ innovation in agriculture, and marketing management, accounting for 11% each.

Discussion

The results revealed that more males than females used DT. This result is consistent with other studies. George and Barnabas (2015) found that more male than females used the DT in Nigeria. The authors argued that females should have equal access because such use represented a tool for empowerment. The largest group of DT users were those aged 21-40 years old. This finding is in accordance with the survey result that Thai people using social media via Facebook mostly aged 18-44 years old (Digital Solution, 2018). The result revealed that this was because this group was Gen X and Gen Y growing with technology and facilities and being enthusiastic generation who applied knowledge to improve themselves. These results are similar to those of a study by the Thai Ministry of Digital Economy and Society for the Thai population in general, see (ETDA, 2017). Results showed that, in terms of device ownership and use, the smartphone was the most common. This result is consistent with Schultz (2018) who found that 92% of individuals 18-29 years old have a smartphone. Similarly, ETDA (2016) survey amongst Thai users found that smartphones were the most commonly used devices (85.5%).

Respondents in this study used DT more on weekdays and forty-five percent used the Internet 2-3 hours/day. This is less than the results for the general population. ETDA (2017) results showed that Internet use was slightly higher on the weekend with an average for both weekend and week days at six hours per day. This difference in results may be because agriculturalists are working and therefore do not have as much time as the general population to devote to Internet and DT use.

Respondents primarily use the Internet and DT at home. This result is important for governmental policy in terms of ensuring that there is widespread Internet access in homes in rural as well as urban areas. Likewise, the ETDA found that approximately 86% of users accessed the Internet at home.

In terms of problems encountered by respondents, Internet access was important. Sixty-three percent of Thai users also reported this problem (ETDA, 2017). Respondents also noted that lack of knowledge is a problem. This experience is similar to that of the general population. ETDA (2017) reported that 40% did not know where to ask for help with DT problems.

Social networks use is prominent among the agriculturalists surveyed in this study as it is among the general population with an average of 3.5 hours per day (ETDA, 2017).

In general, the widespread use of social networking sites by agriculturalists such as Facebook and Line may indicate that use is not agriculture related. Once again, this use mirrors that of the general population. Brand Buffet (2017) reported that Thailand ranks ninth in the world for Facebook use.

Conclusion

The purpose of this study was to survey agriculturalists' use, knowledge of and experience with DT. (Internet, social media, e-learning, online commerce, online farm management tools) for learning, for work and for social networking. Participants were 1,068 agriculturalists in Thailand recruited from the Kasettakorn Facebook page. Data collection relied on an online survey using Google Forms with 30 items. Data analysis involved descriptive statistics.

The results revealed that Thai agriculturists' uses and problems were very similar. Results also revealed high use among agriculturalists. These results suggest that, from a policy perspective, government officials should provide supports in terms of finance and access in order to support agriculturalists.

Moreover, the results indicated that most agriculturists used the Internet to access social media such as Facebook and Line, in order to communicate, share knowledge, learn online and watch video clip on YouTube.

The researcher will organize an online learning course using video clips to teach how to use DT to Thai agriculturists via Thai MOOC and provide them more opportunities to communicate on Facebook and Line for the purpose of solving agricultural problems. Therefore, a model of community of practice should be developed through social networks so as to serve the needs of Thai agriculturists in the digital age.

References

Brand Buffet. (2017). 5 Reasons why Thailand become one of the world top ten countries in social network addition. Retrieved from https://www.brandbuffet.in.th/2017/08/thailand-and-bangkok-top-of-social-media-users/

Burke, K., & Sewake, K. (2008). Adoption of computer and internet technologies in small firm agriculture: A study of flower growers in Hawaii. *Journal of Extension, 46*(3), 1–11.

Chhachhar, A. R., & Hassan, M. S. (2013). The use of mobile phone among farmers for agriculture development. *International Journal of Scientific Research, 2*(6), 95–98.

Darabian, N. (2016). How dtac is enabling digital transformation for Thai farmers.
        Retrieved from
        https://www.gsma.com/mobilefordevelopment/country/thailand/dtac-enabling-
        digital-transformation-thai-farmers/

Digital Solution. (2018).   Part 2 Digital in 2018 in Thailand. Retrieved from
        http://bit.ly/digitech-solution

Doering, C. (2013). Farmers growing comfortable with mobile devices. Retrieved from
        https://www.usatoday.com/story/news/nation/2013/03/03/farming-technology-
        ipad-apps/1959139/

Electronic Transactions Development Agency. (2016). Thailand DT User Profile 2016.
        Retrieved from https://www.etda.or.th/download-publishing/69/

Electronic Transactions Development Agency. (2017). Thailand Internet User Profile 2017.
        Retrieved from https://www.etda.or.th/download-publishing/123/

George, T. O., & Barnabas, S. (2015). *ICT and the gender question: prospects and
        challenges for the knowledge economy in the 21st century*. Paper presented at
        the 2nd Covenant University Conference on African Development Issues (CU-
        ICADI), Nigeria.

GSMA. (2017). The Mobile Economy 2017. Retrieved from
        https://www.gsmaintelligence.com/research/?file=9e927fd6896724e7b26f33f61db
        5b9d5&download

Jain, L., Kumar, H., & Singla, R. K. (2014). Assessing mobile technology usage for
        knowledge dissemination among farmers in Punjab. *Information Technology for
        Development, 21*(4), 668–676.

Karetsos, S., Costopoulou, C., & Sideridis, A. (2014). Developing a smartphone app for m-
        government in agriculture. *Agrárinformatika Journal of Agricultural Informatics,
        5*(1), 1–8.

Orlikowski, W. J. (2000). Using technology and constituting structures: A practice lens for
        studying technology in organizations. *Organization Science, 11*(4), 404–428.

Thai Ministry of Information and Communication Technology. (2016). Digital development
        for economic and social development plan. Retrieved from
        https://www.ega.or.th/th/profile/2035/

Walter, J. (2011). Smartphones a big trend. Retrieved from
        https://www.agriculture.com/farm-management/technology/cell-phone-and-
        smart-phones/smartphones-a-big-trend_325-ar20351

Yamane, T. (1973). *Statistics: An Introductory Analysis* (3rd ed.). New York: Harper and
        Row Publication.