

FARMERS' USE OF SOCIAL MEDIA AND ITS IMPLICATIONS FOR AGRICULTURAL EXTENSION: EVIDENCE FROM THAILAND

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ABSTRACT

Social media are viewed as having potential for agricultural extension. This study therefore surveyed social media use by farmers in a developing country, and their role as a source of agricultural information. To this end, 365 farmers in Chiang Mai, Thailand, were sampled and interviewed using a questionnaire. The findings revealed that the majority of respondents (81.92%) did not adopt social media and, these remained marginal as a source of agricultural information for farmers. Those using social media (18.08%) employed certain applications, i.e., LINE, Facebook and YouTube, mainly for communication, new updates and entertainment. Younger farmers and farmers with a higher formal education related to social media use significantly. To fully harness the potentials of social media for agricultural extension, more farmers need to be encouraged to use them, while relevant agencies also are required to provide support for this effort, such as staff training in social media use, and enabling a social media policy.

Contribution/Originality: This study is one of the first attempts to explore social media use by farmers in Thailand. It employed a survey approach and found that most respondents did not adopt social media. This finding indicates a challenge for relevant public agencies in harnessing social media potential for agricultural extension.

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1. INTRODUCTION

Social media such as Facebook, Twitter, and YouTube have become an integral part of human life. Countless individuals globally use these applications in their daily life for communication and entertainment, among other activities. Meanwhile, practitioners in both the public and private sector employ social media platforms to perform their tasks in serving their organizational objectives and goals in various areas, including marketing (e.g., (Rodriguez-Moran, 2020; Stelzner, 2021)), local and public governance (e.g., (Bonsón, Royo, & Ratkai, 2017; Khan, 2017; Zavattaro & Bryer, 2016)), crisis communication and management (e.g., (Holderness & Turpin, 2015; Muniz-Rodriguez et al., 2020; Shemberger, 2017)), education (e.g., (Davis III, Deil-Amen, Rios-Aguilar, & González Canché, 2015; Green, McMillan, Munn, Sole, & Eady, 2020; Sterling, Leung, Wright, & Bishop, 2017)), and healthcare (e.g., (Bond, Merolli, & Ahmed, 2016; Smailhodzic, Hooijsma, Boonstra, & Langley, 2016; Willman, 2020)). A number of researches have continuously explored innovative ways in order to make use of social media tools and their data, as in the case of alcohol abuse (Crawford, Daniel, Yakubova, & Peiris, 2020), mental health promotion (O'Reilly et al., 2019), and national

happiness (Wang, Al-Rubaie, Hirsch, & Pole, 2021) for instance. Thus, at present, there seem to be fewer questions as to whether social media should be adopted and used, and the issue now is rather how to harness their full potential and for what purposes they should be utilized.

Like other fields mentioned, practitioners and scholars involved in agricultural extension have paid increasing attention to social media (Andres & Woodward, 2013; Kinsey, 2010; Lubell & McRoberts, 2018; Parsons, 2015; Saravanan, Suchiradipta, Chowdhury, Hall, & Odame, 2015), where they are perceived as “innovative extension tools for building knowledge networks, coordination, communication, outreach and education” (Andres & Woodward, 2013; Kinsey, 2010; Lubell & McRoberts, 2018; Parsons, 2015; Saravanan et al., 2015). These new tools are believed to have specific potential for the essential functions of agricultural extension: for example, awareness creation, information dissemination, individual and mass advisory services, technology transfer, and market access facilitation (Saravanan et al. (2015) cited in Barber, Magnus, and Bitzer (2016)). Recent studies have reported social media use in this agricultural extension context.

According to Suchiradipta and Saravanan (2016), a majority of their survey respondents used social media to find and share agricultural information, as did their organizations in order to link with clients. They also found that Facebook was the most popular platform for both individual and organizational users, as well as other social media applications employed by these users, including Google+, Twitter, and Blogs for example. Moreover, social media platforms, such as Instagram (Stock, 2020) and WhatsApp (Thakur & Chander, 2017), were found to be useful as extension tools. Apart from extension professionals and their organizations, farmers themselves also can utilize social media to foster farmer-to-farmer extension, where online groups using applications such as Facebook, Twitter and WhatsApp are created and farmer participants exchange agricultural information (Lee & Suzuki, 2020; Mills, Reed, Skaalsveen, & Ingram, 2019; Phillips, Klerkx, & McEntee, 2018; Thakur & Chander, 2018).

Similar to other countries around the globe, Thailand has witnessed increasing popularity of the Internet and social media over the past two decades. In early 2021, 48.59 million (69.5%) and 55 million (78.7%) of the country's approximately 70 million population were active Internet and social media users, respectively, with YouTube, Facebook, Facebook Messenger, LINE, Instagram, Twitter, and Tiktok being the most popular applications (DataReportal, 2021). Therefore, access to the Internet and social media is common practice for the general public in Thailand, except for those living in extremely remote areas. Thus far, numerous studies have investigated various aspects of social media use in the country: for example, education (Buraphadeja & Prabhu, 2020; Jaimunk & Sureephong, 2013; Seechaliao, 2014), marketing (Chanthinok, Ussahawanitchakit, & Jhundra-indra, 2015; Tantipongnant & Laksitamas, 2016; Tarsakoo & Charoensukmongkol, 2020), and disaster management (Gunawong & Jankananon, 2015; Gunawong, Thongpapanl, & Ferreira, 2019; Ling, Pan, Ractham, & Kaewkitipong, 2015). However, research focusing on utilization of social media in the context of agricultural extension is still very limited (see e.g., (Sriboonruang, Isarakul, & Siripipattanakul, 2020)).

Therefore, this study aimed to fill the gap with the object of exploring whether farmers in Thailand accept social media, and if so, for what purposes they employed their applications. In addition, sources of agricultural information were also explored to examine whether social media tools have played any role in providing such data. The results gained from this study shed some light on the use of social media by farmers in a developing country, where smallholders are still predominant (Attavanich, Chantararat, Chenphuengpaw, Mahasuweerachai, & Thampanishvong, 2019).

They also provide empirical evidence of the actual roles of social media in agricultural extension in the context of these farmers. Thus, more understanding and insights should be added to research and practices concerning social media use in general for agricultural extension, particularly in Thailand. Ultimately, the understanding and insights obtained would contribute to harnessing fully the social media potential that benefits farmers, especially smallholders in developing countries.

2. RESEARCH METHODOLOGY

This research was conducted in Hang Dong district, which is located in the northern province of Chiang Mai, Thailand and comprises eleven sub-districts. Hang Dong is characterized by rural and peri-urban settings, a scene generally found in most districts across the country. Rice and longan (*Dimocarpus longan*) are the main crops in the area, where 4,021 farm households were registered with the Hang Dong Agricultural Extension Office in 2017. Regarding the Internet, which is the *sine qua non* of social media, it is safe to assume that people living in Hang Dong district have no difficulties in accessing its services, as this area is located adjacent to the capital of Chiang Mai province.

To explore the social media used by farmers and their agricultural information sources, a survey approach was employed to obtain empirical data from farmers who were members of registered farm households. By following Yamane's formula (Yamane, 1973), a sample size of 365 farmers was specified. Proportionate sampling was then applied to determine the number of samples from randomly selected villages situated in each of the eleven Hang Dong sub-districts.

In total, 66 villages (approx. 60%) from a total of 109 were covered. Trained enumerators conducted a structured interview with farmers using a questionnaire. As a complete list of individual farmers was unavailable, the enumerators employed convenience sampling to identify farmers from various sections across selected villages in order to achieve a certain level of representation. The interviews were conducted in December 2017. Descriptive statistics, including frequency distribution, means, and percentages, were performed to analyze data on the farmers' socioeconomic characteristics, social media applications used, and purposes, as well as their sources of agricultural information. In addition, binary logistic regression was employed to identify factors that influenced the farmers to adopt social media.

3. RESULTS AND DISCUSSION

3.1. Socio-demographic Information on Farmers

Table 1 shows a summary of the farmers' socio-demographic information including sex, age, education, farming experience, farming areas, farm income, main crops, and group memberships. It was found that nearly three-quarters of the respondents were male (69.86%). With the average age of farmers being 58 years, it is evident that they are part of an aging society. Indeed, a number of the respondents were aged between 51 and 60 years (44.66%), followed by those aged between 61 and 70 (33.97%). When taking into account those respondents aged 51 years or more, they made up the majority of 82.47%. It has been reported by others (Attavanich et al., 2019; Jansuwan & Zander, 2021; Rigg, Phongsiri, Promphakping, Salamanca, & Sripun, 2020) that farmer aging is prevalent across Thailand. This situation could affect farmers' use of social media, as age is a determining factor for adoption of new technologies (Folitse, Manteaw, Dzandu, Obeng-Koranteng, & Bekoe, 2019; Nzie, Bidogeza, & Azinwi Ngum, 2018). The age of the respondents also reflects their farming experience, which averaged around 27 years, while approximately one-quarter of them had farming experience of between 21 and 30 years. In fact, the respondents could be seen as veterans because more than half of them had practiced agriculture for 21 years or more. Farming is undeniably their livelihood and this is unlikely to change in the foreseeable future.

It was apparent that the respondents had a low level of formal education. A majority of them only had primary school education (81.92%), which is below the country's basic education level. Some had no formal education (3.29%), and only a fraction obtained basic upper secondary school education or more (3.29% and 0.82%, respectively). According to Attavanich et al. (2019), young Thai farmers had gained more education, thereby improving the prospect for introducing modern technology into the field. However, the fact remains that farmers are largely part of the elderly group, and they possess limited formal education. Thus, the introduction of new technology may be challenging for them. The findings on the farmers' use of social media applications presented below help to prove this point.

Table-1. Socio-demographic information on farmers.

Variables	Frequency	%
Sex		
Male	255	69.86
Female	110	30.14
Age (years)		
≤40	8	2.19
41–50	56	15.34
51–60	163	44.66
61–70	124	33.97
≥71	14	3.84
Education		
No formal education	12	3.29
Primary education	299	81.92
Lower secondary education	39	10.68
Upper secondary education	12	3.29
Others (e.g., tertiary education)	3	0.82
Farming experience (years)		
≤10	71	19.45
11–20	88	24.11
21–30	115	31.51
31–40	73	20.00
≥41	18	4.93
Farming area (Rai)		
≤10	339	92.88
≥11	26	7.12
Farm income (Baht/year)		
≤50,000	196	53.70
50,001–100,000	113	30.96
≥100,001	56	15.34
Main crops		
Rice	161	44.11
Longan	191	52.33
Others (e.g., maize, banana, and soybean)	13	3.56
Group memberships		
Yes	338	92.60
No	27	7.40

Source: Field survey, 2017

The majority of the respondents were smallholder farmers, as most had farming areas of 10 *Rai* (approx. 1.6 ha) or smaller (92.88%), with an average size of 5.68 *Rai* (approx. 0.91 ha). Many of them grew longan and rice as the main crops (52.33% and 44.11%, respectively), while only a few mainly produced other crops such as maize, banana, and soybean. By being endowed with only a small piece of land, it is no surprise that around half of the respondents earned an annual farm income of 50,000 *Baht* (approx. 1,530 US\$) or less. In fact, with an average annual farm income of 75,258.90 *Baht* (approx. 2,306 US\$), the respondents did not earn or save much money from farming. This situation is widespread in Thailand, and farmers have to rely ever more, or even depend, on income generated by off-farm activities or sources (Chiengthong, 2014). Group memberships also may indicate the financial situation faced by farmers. Nearly all of the respondents (92.60%) were members of at least one community group, with the main ones being funeral groups, groups for agricultural bank customers, and village funds, for example. These community groups provide financial support for their members in one way or another.

3.2. Farmers' Use of Social Media

Regarding social media use, it was discovered that only 18.08% of the respondents adopted these applications (Table 2). This figure was rather low against the backdrop of social media applications known widely for their easy access and use (Khan, 2017; Suchiradipta & Saravanan, 2016). Moreover, the number of active Internet and social media users in Thailand is relatively high, accounting for more than 60% of Thailand's total population in 2017 and rising (e.g., DataReportal, 2017, 2018). However, this number does not seem to trickle down to farmer users. The types of social media adopted also were limited. The respondents employed only three applications, i.e., LINE, Facebook, and YouTube, with the first being the most popular, as almost all the respondents concerned employed this application (98.48%).

In addition, it was seen that the respondents tended to use more than one social media application, particularly the combination of Facebook and LINE (33.33%), or Facebook, LINE, and YouTube (31.82%) (Table 2). This may be because each application has different features, such as LINE for messaging and YouTube for publishing videos (see Van Looy (2015)). Different social media applications were employed accordingly to suit the respondents' varied purposes, of which the main ones included communication (96.92% for LINE, 86.05% for Facebook), news updates (97.67% for Facebook) and entertainment (89.29% for YouTube) (Table 3). However, it can be seen that only some respondents used social media applications for news updates on agricultural issues: for example, 37.21% for Facebook and 28.57% for YouTube (Table 3). Apparently, social media are not the farmers' first choice for agriculture-related news, and certainly not their source of agricultural information either, as revealed below.

Table-2. Farmers' social media adoption.

Social media adoption	Frequency	%
Yes	66	18.08
No	299	81.92
Total	365	100.00
Social media applications adopted	Frequency*	%
LINE	65	98.48
Facebook	42	63.64
YouTube	28	42.42
Social media applications adopted by each respondent	Frequency	%
Facebook and LINE	22	33.33
Facebook, LINE, and YouTube	21	31.82
LINE and YouTube	6	9.10
LINE	16	24.24
YouTube	1	1.51
Total	66	100.00

Note: *Multiple responses

Source: Field survey, 2017.

Table-3. Purposes of social media use by farmers.

Purpose	Social media					
	LINE (n = 65)		Facebook (n = 42)		YouTube (n = 28)	
	Frequency*	%	Frequency*	%	Frequency*	%
News updates	42	64.62	42	97.67	13	46.43
Agriculture-related news updates	9	13.85	16	37.21	8	28.57
Communication	63	96.92	37	86.05	1	3.57
Entertainment	15	23.08	18	41.86	25	89.29

Note: *Multiple responses.

Source: Field survey, 2017.

As discussed above (see Table 2), 66 respondents (18.08%) adopted and used social media. Binary logistic regression analysis was thus performed to find factors that may influence this action, using independent variables, as presented in Table 1. It was found that six variables were not significantly related to respondents taking up social

media, including sex, farming experience, farming areas, farm income, main crops produced, and group membership. However, two variables, i.e., age and education, were found to be significant at the 0.001% alpha level (Table 4).

This result revealed that the age of respondents had a significantly (coefficient = -0.143 ; $P = 0.000$; odds ratio = 0.867) negative impact on the acceptance and utilization of social media applications. This indicates that younger farmers appear to have 0.87 times higher probability of embracing social media than older ones. In this study, the respondents who accepted and employed the applications, indeed, tended to be younger with an average age of 50.44 years, compared to the average age of 58 years for all respondents. Nearly 60% of these respondents were aged 50 years or below. Other studies reported similar findings, where older prospective users were related negatively to the adoption of new technology, as in the case of adopting information and communication technologies (ICTs) for farming decisions in India (Ali, 2012), and mobile phones for fruit marketing in Vietnam (Hoang, 2020). According to (Zhu, Ma, & Leng, 2020), skills in using modern technologies were better in younger generations, and more elderly people had limited awareness of the benefits provided from these technologies. This may help to explain the situation.

Results also show that education of the respondents was a significant and positive factor (coefficient = 1.385 ; $P = 0.000$; odds ratio = 3.996), which implies that farmers with higher formal education have around four times higher probability of adopting and using social media applications than those with a lower one. Many of the 66 respondents in this study (approx. 44%) who utilized social media had higher formal education, including upper secondary and tertiary education. This result is consistent with the study of Khan, Gao, Sertse, Nabi, and Khan (2020b), who found a positive relationship between farmers with higher education and their use of mobile phone-based farm advisory services in Pakistan. Feyisa (2020) also reported a positive connection between the education level of household heads and the decision of farmers to adopt agricultural technology in Ethiopia. This positive association exists probably because education improves the knowledge and skills of farmers and their access to information required for adopting new technologies (Reimers & Klasen, 2013; Zhu et al., 2020). With education, farmers increase their appreciation of new technology and its benefits, while they also decrease their perceived level of uncertainty and risk of new innovations (Reimers & Klasen, 2013; Zhu et al., 2020).

Table-4. Factors determining the use of social media by farmers.

Variables	Coefficient	Standard error	Wald	P-value	Odds ratio
Sex	-0.062	0.353	0.031	0.861	0.940
Age	-0.143	0.031	21.394	0.000*	0.867
Education	1.385	0.322	18.454	0.000*	3.996
Farming experience	-0.005	0.019	0.065	0.798	0.995
Farming areas	0.038	0.035	1.182	0.277	1.039
Farm income	0.000	0.000	0.925	0.336	1.000
Main crops					
Rice	0.465	1.077	0.186	0.666	1.592
Longan	-0.357	1.081	0.109	0.741	0.700
Group membership	0.107	0.121	0.781	0.377	1.113
Constant	4.416	2.051	4.637	0.031	82.780

Note: *significant at $P < 0.001$; log likelihood = 240.890; omnibus tests of model coefficients ($\chi^2 = 104.135$ and $P = 0.000$); Hosmer and Lemeshow test ($\chi^2 = 5.279$, $df = 8$, $P = 0.727$); pseudo- R^2 (Cox and Snell $R^2 = 0.248$, Nagelkerke $R^2 = 0.406$).

Source: Field survey, 2017.

3.3. Farmers' Sources of Agricultural Information

Table 5 shows that the farmers relied on various sources of agricultural information, and the results indicate the main ones ranked by respondents. Extension officers and neighbors were found to be important sources for the respondents (24.24% and 22.04%, respectively). This finding is not surprising, as agricultural extension offices are located in every district in Thailand and they regularly provide farmers with agricultural information and assistance on production inputs and relief for harvest damages, for example. Opara (2008) also observed a similar situation in Nigeria, where the majority of farmers indicated that extension officers were their source of agricultural information. As presented above, neighbors of the respondents mainly grew rice and longan and thus it is easy for them to exchange information with others who produce the same crops and live in the same community (after Kavi, Bugyei, Obeng-Koranteng, and Folitse (2018)). This result is congruent with the study of Msoffe and Ngulube (2016) and Kavi et al. (2018), who found that farmers identified fellow farmers, friends, neighbors, or family members as their main sources of agricultural information. Osei, Folitse, Dzandu, and Obeng-Koranteng (2017) likewise reported that a large number of farmers in their study received such information from friends.

In addition, respondents named the broadcasting tower with loudspeaker as a major source of agricultural information (18.18%). It is typical in Thai villages or communities to have these towers, from which village heads, officers from local government organizations, or other community leaders make announcements, including information related to farming activities. The data revealed that 13.77%, 12.95%, and 3.58% of the respondents placed radio, television, and production input shops, respectively, as chief sources of agricultural information, while a few (2.76%) obtained it from other sources (e.g., newspapers and agricultural groups). However, it can be seen that only a few respondents (2.48%) mentioned social media as an important source of agricultural information. As such, social media currently have a marginal role in providing agricultural information to farmers.

Table-5. Farmers' sources of agricultural information.

Source	Frequency*	%
Extension officer	88	24.24
Neighbor	80	22.04
Broadcasting tower	66	18.18
Radio	50	13.77
Television	47	12.95
Production input shop	13	3.58
Social media	9	2.48
Others	10	2.76
Total	363	100.00

Note: *Missing data for two respondents.

Source: Field survey, 2017.

3.4. Implications for Agricultural Extension

This research set out to explore whether farmers who live in a typical district setting in a developing country, and have fairly good access to the Internet, accept and use social media applications. As presented above, social media have yet to become part of farmers' everyday life, as less than one-fifth of the respondents have embraced the applications (Table 2). Those who have accepted them, such as Facebook and LINE, employed them mainly for communication and news updates while only some used them for following agriculture-related news (Table 3). These findings provide a glimpse of reality about the use of social media by farmers in Thailand. This situation may also resemble that in other developing countries, in which farmers share similar socio-demographic characteristics such as aging, limited formal education, and small-sized farms (Table 1; see (HelpAge International, 2014; Isaya, Agunga, & Sanga, 2018; Khan et al., 2020a)). Age and educational factors were indeed found to influence the acceptance of social media by the farmers (Table 4), as well as other new technologies (e.g., (Hoang, 2020; Khan. et al., 2020b; Zhu et al., 2020)).

Social media undoubtedly have potential as 'innovative extension tools' for various purposes such as communication and outreach (Lubell & McRoberts, 2018). They also are deemed to become 'the next big thing' in the field of agricultural extension (Suchiradipta & Saravanan, 2016). However, clearly seen evidence of social media use indicates that any social media-based agricultural extension efforts in Thailand, and in other developing countries, would require serious considerations and sound plans. Concerned government and development agencies would need to take into account the fact that a large number of farmers do not use social media applications in the first place, and many of them continue to rely on typical sources of agricultural information such as extension officers, neighbors, and the radio (Table 5; see (Isaya et al., 2018; Osei et al., 2017)). In addition, improvement in the capacity of effective social media use also is required for extension officers (Suchiradipta & Saravanan, 2016).

In the case of Thailand, it is apparently not the right time at the moment for relevant government agencies to embark on social media-based extension projects. Emphasis should be directed instead on raising farmers' awareness of social media, and their potential contributions to the improvement of their farming practices and other agriculture-related activities (see Zhu et al. (2020)).

This would encourage more farmers to adopt and use social media applications for agricultural production-related purposes as well. At the same time, extension officers could take the lead in using social media applications to communicate and exchange agricultural information with farmers. Meanwhile, the recommendations of Suchiradipta and Saravanan (2016) would be helpful, such as training in social media use for extension officers and their superiors, and, creating appropriate social media policy and guidelines for agricultural extension officers. Once a relatively large number of farmers in a given district or province embrace social media, and appreciate their benefits for their agricultural production, meaningful social media-based agricultural extension efforts, with positive impacts on farmers' livelihoods, could then be initiated and implemented.

4. CONCLUSION

Social media have become a recent point of interest in the field of agricultural extension, where social media-based agricultural extension draws attention from both researchers and practitioners alike. Notwithstanding their popularity, however, it was revealed in this study that the majority of farmers in the study area did not accept or use social media, and they did not play a significant role for them as an important source of agricultural information. These findings reflect the reality of how social media are received in local communities in Thailand, and a similar situation is likely to be found in other developing countries.

Nevertheless, this does not mean that relevant government and development agencies in developing countries should not attempt to use social media in their agricultural extension endeavors. Given the current situation, as observed in this study, a sudden shift to social media for agricultural extension would not be useful for the farmers or the agencies concerned. Instead, a gradual process is preferable in order to induce both the farmers and agencies concerned, together with their staff, to adopt and utilize social media, and later social media-based agricultural extension. In this way, social media potentials may be harnessed fully for agricultural extension that results in benefits for the farmers.

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