Social Media Application in Agriculture Extension Programming for Small Scale Rural Farmers: Is Knowledge Impeding the Lack of Adoption?

Stephan Moonsammy
University of Guyana

Donna Marie Renn Moonsammy
Pensa Fuori Concepts

Abstract

The purpose of this study was to assess the knowledge level of farmers on basic computer literacy, social media use, and to explore which social and demographic factors affected their knowledge capacity. The study had a final sample of 176 participants from the northern, southern and central regions of Trinidad and Tobago. A survey instrument comprising of 14 multiple-choice questions with one accurate response was developed to decrease bias of farmers randomly selecting the accurate response. The questions addressed knowledge on basic computer and social media literacy. Analysis was conducted using one-way ANOVA with post-hoc testing. Results indicated that there were significant differences in farmers' performance in the knowledge test based on characteristics such as age, education, and household use of social media and the internet. Based on the findings, minimal training in computer and social media literacy did not impede the farmers' use of the computer or social media. These discoveries highlight the potential of extension programs using the internet and social media applications to improve communication efficiency among agricultural stakeholders within farming communities.

Keywords: agriculture, computer literacy, Extension, knowledge, social media

Introduction

The global access to information amongst rural agricultural communities has increased significantly in the past 15 years. It is estimated that mobile phone access has infiltrated over 90% of rural communities globally with the most recent 1 billion connections predominantly occurring in some of the poorest socio-economic groups (Food and Agriculture Organization [FAO], 2015). Such changes in technological penetration have resulted in the emergence of several initiatives that fuse Information Communication Technologies (ICTs) with agriculture extension programming. Programs such as e-Agriculture itemized in the plan of action at the World Summit on the Information Society in Geneva (2003) and Tunis (2005) and the diffusion of mobile applications such as AgriApp available through the Google Play Store are now integral tools used in agricultural and rural development planning and policies globally.

Despite the expanse in technological access globally, many agricultural communities in rural areas are still subject to the digital divide for several socio–economic, geographic, cultural and demographic reasons (Chinn &Fairlie, 2007; Roberts, Beel, Phillip,& Townsend, 2017; Rotz et al., 2019; Salemink, Strijker,& Bosworth, 2017). The premise behind ICT based agriculture programs is that increasing access to information technology should enhance knowledge through an improvement of communication efficiency, leading to an improvement in public sector engagement and a modernization of traditional practices to boost productivity (Adenle, Wedig, & Azadi, 2019; Steinmuller, 2001). Even with global efforts by governments, non-governmental organizations [NGOs], the FAO, extension practitioners, and the global reach of technologies, many small-scale farmer holdings especially in rural communities have limited access to ICT based agriculture programs primarily caused by an absence of facilitation or underutilization of the available technological resources (FAO, 2012).

A study conducted amongst rural farmers in Tamil Nadu, India showed that farmers primarily sourced information from newspapers and television broadcasts despite having access to mobile technology with broadband (Babu, Glendenning, Asenso – Okyere, & Govindarajan, 2012). The farmers did not utilize the internet or mobile technology for accessing information related to their production system. An ICT intervention in extension programming especially for small scale farmers in rural communities needs to infuse the technologies with the culture and social networks existing in that community. For example, the Digital Green Project in India observed an increase in adoption practices of six to seven times over the traditional extension to farmer interface because the ICT intervention was designed as a tool to expand and deepen the connections within the social network of the rural farming communities visited (Gandi, 2007). Visualizing farmers' social networks equips policy makers and programmers in identifying key social relationships within communities that can be strategically used to increase farmer capacity for knowledge sharing and networking (Shikuku, 2019; Thuo et al., 2013).

With the rapid emergence of mobile applications, a new platform for extension programming on social media now provides the opportunities for farmers to enhance the social networks within their communities and to even extend the reach of these communities. Using social media applications such as Facebook, Twitter, Instagram and Pinterest allows for a pluralistic interface between stakeholders along the agriculture value chain (Garcia, Dev, McGinnis, & Thomas, 2018). More farmers especially large scale operators from developed countries are actively engaging in social media platforms such as YouTube for educational purposes with an estimated 44% of farmers using it for learning materials (Walter, 2016). With the philosophy of social media in strengthening the connections between people, social media applications are now an intricate tool in many business models (Barnes & Barnes, 2009; Yao, Shanoyan, Peterson, Boyer, & Baker, 2019). Many extension professionals in developed countries are now using social media applications to reach and remain relevant with their clientele (Gharis, Bardon, Evans, Hubbard, & Taylor, 2014; Rotz et al., 2019). For instance, extension officers using weblogs to disseminate information to stakeholders in the turf grass industry in the United States (Jones, Kaminski, Christians, & Hoffmann, 2011) and the University of Minnesota Equine Extension Program and Michigan State University Online Horse Management program developed interactive communication streams to horse breeders using Facebook (Martinson, Skelly, & Fisher, 2011). In Sri Lanka, extension agencies adopted ICT technology stewardship models using messenger platforms such as What's App to promote knowledge sharing amongst farming communities (Jayathilake, Jayasinghe-Mudalige, Perrera, Gow, & Waidyanatha, 2017).

Several studies have highlighted the possibilities and potential benefits of social media applications incorporated in extension programming. Gharis, Bardon, Evans, Hubbard, and Taylor (2014) described social media as a cost-effective tool, in most cases only costing the broadband services fee within the country, that can provide real time information in a timely manner from anywhere in the world. Kante, Oboko, and Chepken (2019) asserted that ICT and social media tools assist users to learn and share agriculture information keeping abreast of the latest innovations and technologies in the sector. Morrone (2017) stated that social media applications in extension are a rapidly growing field that can enhance group interaction and strengthen participatory linkages.

Despite the successes and benefits outlined in the literature, there are many barriers affecting social media use in extension programming in many countries with large rural farming populations even with expanding technological and broadband infrastructure (Awan, Ahmed, & Hashim, 2019; Lwoga & Chigona, 2019; Saravanan, 2010). There are many studies that demonstrate the application of social media in extension programming (Barau & Afrad, 2018; Jayathilake et al., 2017; Thomas & Laseinde, 2015; Zipper, 2018) but very few studies that empirically establish the inhibiting factors that prevents the prevalent use of social media in extension programming especially amongst small scale rural farmers (Beza et al., 2018; Newbury, Humpreys, & Fuess, 2014). Some studies have attributed that the lack of ICT adoption such as the internet and social media in extension programming for small scale rural farming communities is due to a lack of education and training in ICTs and low computer literacy levels amongst farmers (e.g. Aldosari, Al Shunaifi, Ullah, Muddassir, & Noor, 2017; Mwalupaso, Wang, Alavo, & Tian, 2019; Medhi –Thies, Ferrera, Gupta, O'Neill, & Cutrell, 2004; Rahaman, Barau, & Norman, 2019; Rege & Nagakar 2010; Smith, Morrison-Paul, Goe, & Kenney, 2004). This preliminary study will explore the basic knowledge, training and use of computers, the internet and social media within a specific community of practice, in this case, small-scale vegetable farmers in the rural communities of the Caribbean island of Trinidad and Tobago to determine if the lack of training and knowledge levels are the potential reasons for the lack of adoption.

Theoretical Framework and Review of Literature

ICT adoption in rural farming communities are constrained by complex and interconnected barriers at the domestic, regional and international levels influenced by socio-cultural and environmental factors with the lack of knowledge and attitude being the key inhibitors (Aldosari et al., 2017, Imran, 2009; Lwoga & Chigona, 2019). In the diffusion of innovation theory, knowledge and several socio economic characteristics such as family structure and community groups are a key characteristic of the persuasion stage in the adoption process hence a knowledge based community influences a constructive attitude towards ICT innovations (Rogers, 1995). According to Bloom's taxonomy of cognitive learning, knowledge is the embodiment of information that a person possesses in a subject matter and this information comes from a combination of formal education training and life experiences (Alexander & Jetton, 2000). Bourdieu (1977) postulated the theory of practice which stated that a social life is a constant struggle to construct using the cultural resources and social experiences of individuals. Through this socialization dilemma within the social construct of the community, individuals will be predisposed to act a certain way.

All these theories essentially address the perspective that knowledge or a lack of knowledge is not a sole contributor impacting a technological adoption and that the adoption process is influenced by the social networking experiences of individuals sharing their knowledge. Theoretically, this disposition shifts from the conventional idea that lack of knowledge of ICTs such as the internet and social media causes a lack of adoption. If the social environment allows for knowledge sharing, then the adoption process may not be impacted by the lack of knowledge but rather a lack of culturing the technology within the community of practice.

Research conducted by Strong, Ganpat, Harder, Irby, and Linder (2014) concluded that extension officers in the Caribbean use ICT technologies including social media for personal use but revert to traditional methods when engaging farmers, even though their findings suggested that ICTs increases the productivity of extension officers. Mendoza (2016) highlighted that farmers' livelihoods tend to depend on a range of inputs and factors with regards to pest management, farming practices from sowing to harvesting, and the willingness of the consumers to purchase produce at quality prices. However, many of the mechanisms used to attain these outlets have remained static through old-fashioned avenues such as spoken communication, informal settings in the field or with resident organizations. Mendoza (2016) outlined the perspective of the founder and chief executive of 8 Villages, Sanny Gaddafi, who operates a rural marketing system to corporate clients using ICTs. Gaddafi's perspective is that farmers are disinclined to the possibility of accepting modern technologies which results in the delay of application. Gaddafi goes further to state that in his experience, 75% of farmers are resistant to the use of technology as a means of enhancing their farming prospects. Smith, Morrison-Paul, Goe, and Kenney,(2004) asserted that adoption of computers and the internet amongst farmers depends on their exposure to the technology through training, employment experience outside of farming, age, influence from their friends, family, and other peers. Kante, Oboko, and Chepken (2019) shared a similar perspective to Smith et al. (2004) that people in a community interact due to common interests as such the nature of interaction of farmers in their community is a major key to successfully implementing ICT technology. Shikuku (2019) conducted a study on agriculture technology adoption in Uganda and concluded that the social distance shapes the diffusion of agricultural knowledge and social learning can address the informational constraints in the adoption of agriculture technology.

Medhi-Thies, Ferrera, Gupta, O'Neill, and Cutrell (2014), whose research was conducted with a low-literate rural farming community in India, outlined other hindrances to the application of technology and social networking systems. Digital literacy, the cost of devices, network activities, and location as well as the cultural and social environment also contribute to the low applicability of social networking systems. Despite the decrease in the cost of mobile devices and connectivity, android operating systems proficiency in running non-textual apps functional for low-literate communities are still difficult for low-income people to attain. In order to bridge the gap between digital literacy and application of social networking systems, there needs to be support given by personnel who are more digitally literate, and who use social networks for social links, collective characteristics, content, exploration, surfing and status updating (Medhi-Thies et al., 2014). This process provides motivation and with continuous support can change the perception and use of social networking systems overtime. Disseminating information and expertise within the targeted community in which people acquire knowledge within their social network, can create an opportunity to progress personally and professionally and therefore change the social norm of adoption (Lave & Wenger, 1991). In essence, culturing a technological practice within a community should be done by knowledge sharing mechanisms that clearly shows the incentives in adopting through formal and non-formal learning platforms. This study proposes that the lack of knowledge and training is not the limiting factor to the lack of adoption and that many small scale rural farmers have at least a basic working knowledge of computers, the internet, and social media influenced by their social environment.

Purpose & Objectives

The purpose of this study was to identify the knowledge levels and influencing factors of small scale vegetable farmers across several rural communities in the country of Trinidad and Tobago on the rudimentary principles of using a computer, the internet, and social media by measuring their performance in a basic computer and social media literacy test. The specific study objectives were:

1. To outline the basic knowledge levels on the use and applicability of computers and social media amongst small scale vegetable farmers from rural communities within the island state of Trinidad and Tobago.
2. To compare the performances between these farmers in a basic knowledge test based on their age, educational background, and household use of computers and social media.

Methodology

Prior studies on knowledge levels of a population have used a varied set of approaches with mixed results. Capturing knowledge is challenging with most researchers resorting to a format that encourages the participant to self-report his or her knowledge level on a given topic within a specified domain (Mautone & Mayer, 2001). This maybe a convenient and cost-effective method of measuring knowledge, but researchers have argued that this approach is more a measure of perception or confidence in a subject matter rather than an observable or indexed measure of knowledge (Lawless, Kulikowich, & Smith, 2002). As such, the survey instrument designed for this study used an examination format like that of the formal education system.

A questionnaire consisting of 14 multiple choice questions was administered to the sample population. A four-response multiple choice format with one correct response was adopted to minimize the bias to a one in four chances of the respondent randomly choosing the correct answer, unlike formats that adopt a true or false method which has a one in two chances of a respondent randomly choosing the correct answer. The questions were adapted by the researchers from established computer and social media literacy testing sites and articles (see Ashley, Maksl & Craft, 2013; Criteria Corporation, 2015, Computer Literacy and Internet Knowledge Test; The Job Network, 2015, Computer Literary 101; Seneta, 2015) specifically to assess the knowledge on basic computer functions such as turning on and off a computer, common computer symbols, the function of computer hardware and software such as the keyboard and Microsoft Office, sending emails and email attachments, the function of various social media sites, and recognizing various social media logos. For example the respondents were asked how do they properly turn-off a computer and were given the options of either, 1) pressing the power button on the computer and monitor, 2) by closing all window screens on the computer and it will eventually shut down, 3) pressing ALT+CTRL+DELETE and clicking log off or 4) going to the Start Menu and pressing Shutdown. For an example related to social media use, respondents were asked which of the social media site is mainly used to stream and watch videos and were given the options of either, 1) YouTube, 2) Instagram, 3) Twitter or 4) What's App. These questions covered a basic working knowledge of computers and social media use and therefore can be assessed as a basic measure of computer and social media literacy. It was critical that the researchers developed an instrument to assess the basic levels as unraveling the issue of knowledge must start at the most fundamental level according to Bloom's Taxonomy (Krathwohl, 2002).

The questionnaire captured information about prior computer training, computer use, internet use, and social media use by farmers and their respective households and other demographic information such as age, education levels, and household size. These variables were identified as key points of comparison since the theories and literature on knowledge and computer literacy outlined them as influential (e.g. Hsu, Hou, Chang, & Yen, 2009; Smith et al., 2004). Two pretests were conducted after the preliminary questionnaire was developed. The pretests were conducted to ensure that the questions stated were clearly understood by respondents and there was no ambiguity between the correct response and the incorrect responses in the multiple-choice questions. The pretests were conducted initially with 10 students at a tertiary institution and then 10 farmers from a rural farming community. The student pretest was conducted first to clarify any ambiguities within the multiple-choice responses. This group was identified for the pretest given their familiarity with the multiple choices testing format. Once the necessary adjustments were made after the first pretest, the second pretest was conducted to ensure that the sample population correctly interpreted the questions asked. After the pretests and necessary adjustments were made, the final questionnaire was administered to six rural farming communities across Trinidad and Tobago in March 2015.

From a list of rural farming communities identified by the Agricultural Society of Trinidad and Tobago, two farming communities were randomly chosen from the northern, central, and southern regions of the country. Across these six communities, the researchers targeted a sample of 300 farmers. This sampling framework used for Trinidad and Tobago was similar to one used in the study done by Roberts, Ganpat, Narine, Heinert, and Rodriguez (2015) and was deemed as acceptable in that study. The researchers used a transect walk within each community. The farmers were given the option to answer the questionnaire on their own merit or be interviewed by an administrator. The collected questionnaires were screened and collated to ensure consistency in responses. Several farmers did not complete the multiple-choice test adequately, so their responses were omitted from the data set. Only the questionnaires from farmers who attempted to answer all questions were included in the data set in order to reduce any non-response errors within the dataset. In order to minimize on the possibility of non-response errors further, each farmer was asked to consent to participating, were guaranteed confidentiality upon participation and were encouraged to attempt to answer the questionnaire to the best of their ability. The administrators' role was to clarify any ambiguities the farmers had with any question. Administrators gave the farmers the option to either complete the survey themselves or to be interviewed by the administrator and have their responses recorded. If farmers chose to be interviewed, the administrators were under a strict protocol to adhere to the questions asked in the survey without deviating from its terminology that would change the structure of the question. After the six transect walks were completed, a total of 207 farmers were surveyed. The farmers in the community indicated that several farmers were not in their fields at the time of the transect walks because they were engaged in market activities.

In terms of response rates, 61 farmers chose to be interviewed and 146 farmers completed the survey on their own. There were 61 complete responses by farmers who chose to be interviewed by an administrator and 105 completed surveys (41 incomplete surveys). Surveys were omitted based on the criteria of attempting to answer all questions. Individuals that did not provide an answer to a question were omitted from the final dataset because the researchers could not establish empirically if the non-response was due to the lack of knowledge, if the respondent genuinely missed the question or if they did not have time to complete the questionnaire properly. With the number of participating farmers from the six transect walks and the number of inadequate questionnaires omitted from the data set, the study had a final sample size of 176 completed survey which was 59% of the initial target of 300.

The data were analyzed using a combination of descriptive statistics and mean comparison testing. Frequency counts were used to tabulate the extent of computer, internet and social media use by the farmers and their households. For the samples' performance in the multiple-choice test, a percentage of correct responses were tallied. The average percentages received were tabulated across the entire sample. Comparisons were then made in the performances of the farmers based on their age, education level, household size, and household use of the internet and social media. These comparisons were analyzed using one-way Analysis of Variance testing (ANOVA). To determine in which of the subcategories the differences were occurring, ANOVA models with more than two subcategories required a post hoc test. The post hoc test compares the mean difference of each subcategory at 5% significance. The Tukey HSD, Dunnett T3 and Bonferroni post hoc tests were implemented to assess where the mean differences were occurring. The models were assessed for equal variances using Levine's test of Equality in Variances.

Findings

Computer Training and Social Media Use

The questionnaire itemized the farmers' exposure to computer training, contact with extension support for computer use, the extent of computer and social media use by farmers and farmer households and the extent for which computers and social media are used for agriculture related activities. These variables were identified as important markers of computer literacy and by extension social media use according to the literature (e.g. Hsu, Hou, Chang, & Yen 2009). The items were represented as either a binary variable or on a four-point Likert scale. Questions related to computer training and extension support with computers were coded as a binary variable and questions relating to computer use, internet use and social media use by farmers and farmer households were coded on a four-point scale with 4 representing *high frequency of use* and 1 representing *low frequency of use*.

A frequency count was applied to highlight the key markers of knowledge based on computer literacy within the sample and the amount of exposure to online activities that the farmers' face daily. The results showed that 38.7% of farmers sampled received some form of computer training prior with 9.6% indicating that training was provided by extension services. Despite the percentage of farmers receiving computer training, 52.6% indicated that they used the computer frequently with 47.4% and 34.7% indicating frequent use of the internet and social media respectively. In relation to computer and internet use for agriculture, the results showed that 35.3% use the internet for agriculture purposes with 15.6% using social media for agriculture purposes. Household use showed a different trend in comparison to farmer use whereby 74.0% of the farmers indicated that their household use the internet more than one hour daily and 70.3% indicated that their households frequently use social media.

The variables observed in the data correspond with the findings of Smith et al., (2004) which highlights that training and constant exposure from the surrounding environments has an impact on knowledge. Even though farmer use of social media was significantly low, the household use was notable. The following sections will identify what are the subsequent effects of their use, training, exposure and other demographic factors on the farmers' performance in a basic computer and social media literacy test.

Demographic, Social and External Influences on Test Performance

The differences in performances were compared against the farmers' age group, farmers' education level, family size and household use of computers and social media. All these variables showed significant results when comparisons were made with the farmers' performance in the knowledge test.

According to Table 1, there was a statistical difference at 1% significance between the average score received in the knowledge test and the farmers' age range ($F = 19.727$; $p = 0.00$). The Levine's test of equal variance indicated that the subcategories had at least one with a different variance. ANOVA tests used to compare mean differences can still be interpreted if the subcategories have different variances but to determine where these differences occur required a post hoc test such as the Dunnett T3 test which assumes unequal variance in the ANOVA model. The results of the Dunnett T3 post hoc tests showed a statistical difference at 1% significance in the average score received in the knowledge test for farmers within the 18 – 25 and 46 – 60 (Mean Difference = 28.49); 18 – 25 and 61 and over (Mean Difference = 55.28); 26 – 35 and 46 – 60 (Mean Difference = 19.08); and, 26 – 35 and 61 and over (Mean Difference = 45.87) age ranges. A statistical difference at 5% significance in the average score received in the knowledge test were observed between the 18 – 25 and 36 – 45 (Mean Difference = 18.25) age ranges. A statistical difference at 10% significance in the average score received in the knowledge test were observed between the 36 – 45 and 46 - 60 (Mean Difference = 10.24) age ranges. Additional model diagnostics was conducted with the Bonferroni post hoc analysis which yielded similar significant findings as the Dunnet T3. Therefore, comparing the mean scores from Table 1 shows an inverse relationship between age and the test performance. The younger farmers in the sample consistently performed better in the knowledge test when compared to the older farmers.

Table 1
Difference in Test Performances Based on Farmers' Age Range

Independent Variable	Subcategories	*n*	*M*	*SD*	Partial Eta Sq.
Age Grouping	18-25	18	84.92	13.39	0.267
	26-35	21	75.51	15.74	0.214
	36-45	54	66.68	22.46	0.201

	46-60	60	56.43	25.49	0.119
	61 and over	29	29.64	18.14	0[a]
*F = 19.727; p = 0.00***; Model Effect Size = 0.21*					

Note. 0[a] = effect size reference group; ***p < .001.

According to Table 2, there was a statistical difference at 1% significance between the average score received in the knowledge test and the farmers' education level (F = 14.596; p = 0.00) despite the distinct difference in the size of each subcategory. According to Keppel (1993), unequal sample sizes may affect the homogeneity of variance assumption but as an ANOVA test for comparing means, the resulting comparisons can hold. The Levine's test of equal variance indicated that the subcategories had at least one with a different variance. The results of the Dunnett T3 and Bonferroni post hoc tests showed that there was a statistical difference at 1% significance between all the education groups. Therefore, the higher educational level the farmer achieved, the better their performance in the knowledge test.

Table 2
Difference in Test Performances Based on Farmers' Education Levels

Independent Variable	Subcategories	*n*	*M*	*SD*	Partial Eta Sq.
Education	Primary	26	45.61	29.84	0.130
	Secondary	108	59.85	23.94	0.078
	Tertiary	25	81.14	13.81	0[a]
F = 14.596; p = 0.00; Model Effect Size = 0.21					

Note. 0[a] = effect size reference group.

According to Table 3, there was a statistical difference at 1% significance between the average score received in the knowledge test and the farmers' family size (F = 4.216; p = 0.007). The Levine's test of equal variance indicated that the subcategories had at least one with a different variance. Observing the sequence of the means for each subcategory in Table 3, there seem to be a random relationship between family size and test performance. The results of the Dunnett T3 and Bonferroni post hoc tests showed that there was a statistical difference at 5% significance only between the subcategory of farmers with a household of four persons and over five persons. There were no statistical differences in the means between the other subgroups. The post hoc tests does not provide sufficient evidence to conclude that family size has any implications on the farmers' basic knowledge, but Table 3 also shows that the farmers' with more than five members in their household performed the best in the basic knowledge test on average.

Table 3
Difference in Test Performances Based on Farmers' Family Size

Independent Variable	Subcategories	*n*	*M*	*SD*	Partial Eta Sq.
Family Size	Up to 2 Members	49	56.12	30.13	0.031
	3 Members	48	68.01	25.13	0.001
	4 Members	33	52.60	23.68	0.041

	Over 5 Members	43	68.44	20.28	0[a]
F = 4.216; p = 0.007; Model Effect Size = 0.07					

Note. 0[a] = effect size reference group.

According to Table 4, there was a statistical difference at 1% significance between the average score received in the knowledge test and internet and social media use in the farmers' household (F = 12.136; p = 0.00 and F = 5.59; p = 0.001 respectively). The Levine's test for equality indicated that the subcategories for the variable internet use at home all had equal variances. In this case, ANOVA models with equal variances require a different post hoc test. The Tukey HSD post hoc test was then implemented to determine which subcategories the mean differences were occurring. The post hoc test revealed that households that have no internet use significantly scored lower than households that use the internet regardless of the frequency. The post hoc test could not infer a statistical mean difference between the houses that use the internet rarely and regularly. For the variable on social media use at home, the Levine's test indicated that there was at least one subcategory with an unequal variance. The Dunnett T3 and Bonferroni post hoc tests revealed that there was a statistical difference at 1% significance with the mean scores between the subcategories of farmers who indicated their households never use social media and the households that use social media very often. Both ANOVA tests indicate that the frequency of internet and social media use in the households has some impact on the farmers' performance in a basic knowledge test of computers and social media.

Table 4

Difference in Test Performances Based on Internet and Social Media Use at Farmers' Home

Independent Variable	Subcategories	N	M	SD	Partial Eta Sq.
Internet Use	Never	27	38.98	27.62	0.317
	Rarely	18	58.73	25.05	0.023
	Often	54	61.64	24.44	0.017
	Very Often	74	71.04	21.51	0[a]
F = 12.136; p = 0.000; Model Effect Size = 0.363					
Social Media Use	Never	38	50.19	31.79	0.220
	Rarely	13	53.85	25.86	0.018
	Often	52	61.26	23.85	0.003
	Very Often	69	69.98	21.52	0[a]
F = 5.592; p = 0.001; Model Effect Size = 0.271					

Note. 0[a] = effect size reference group.

Conclusions, Recommendations, and Implications

Despite minimal formal training in computer literacy and prior assumptions in the literature of farmers' minimal literacy in computers and social media (Medhi-Thies et al., 2014), the use of the ICT technology was not impeded due to a lack of knowledge. The farmers' household use of the internet and social media was notable even though the farmers usage themselves vary and their usage for agricultural purposes was low. This coincides with the theoretical perspective that farmers are hesitant to using computer and computer systems as they prefer the traditional practices to enhance their farming commerce (Gaddafi, 2016). According to Smith et al. (2004), age, education and family are some of the factors that influence the exposure and adoption of technology. The findings of this study supports the perspective of Smith et al., (2004), as the results of the knowledge test highlight the significance of these factors.

The overall performance of the farmers in the knowledge test was moderate but clear distinctions were observed in the performance of younger farmers around the ages of 18 - 35 compared to the farmers over 50. An inverse relationship was also observed with regards to farmers' performance in the knowledge test and their education level. With respect to family influence, the number of family members in the household did not seem to have an effect on farmers' knowledge, however households' use of the internet and social media had a direct relationship with the farmers' performance on the test. Indication of frequent use of the internet and social media by farmers at a household level showed a significantly higher performance in the knowledge test compared to farmers who indicated minimal use of internet and social media at a household level. These findings suggest that computer and social media knowledge is inclined by the social life and experiences of farmers which align with the theoretical perspective of Bourdieu (1997) and the theory of practice.

Despite the moderate overall performance of farmers, the results of the study highlights that the farmers have a basic working knowledge of computers and social media especially the younger and educated farmers. The issue of adoption of ICT technology in Trinidad and Tobago does not appear to be a challenge associated with the knowledge of farmers. Further research is needed to assess farmers' applied knowledge of social media and computers as well as to determine the social networking systems that affect farmer attitudes and behavior within their community of practice. This study can serve as a baseline assessment to serve a wider discourse into understanding why the underutilization of the internet and social media in rural small scale farming extension, but there is still room for improving its quality. Ideally, there is a lot more needed in measuring reliability and validity. The literature searches for this study did not reveal any studies testing farmers' computer and social media literacy in a format where convergent validity and construct validity testing was possible. More importantly, the commitment of farmers answering the question can be challenging with farm gate interviews due to the farmers' work schedule. Thus, longer questionnaires which can provide insights for reliability testing was a limiting factor for this initial study. Further work is also needed with larger samples, more communities and larger farming operations.

The establishment of extension programs geared towards making use of social media and the internet as communication and information sharing tools for agricultural purposes is a plausible reality that will not be constrained by the lack of farmers' knowledge on the technology in Trinidad and Tobago. This is a similar disposition to Medhi – Thies et al. (2014) who believed that the gap in perception of ICTs and social media use within the extension officer to farmer interface can be bridged with continuous support by extension officers in developing the competency of farmers in different applications of social media and internet technology. Extension programmers should consider training programs with social media and internet applications for accessing and sharing agricultural information with farmers and their households based on the observable effects of the household on farmers' knowledge. Given the young and educated farmers consistently performed better in the knowledge test than the older and less educated farmers in this study, extension personnel should also consider engaging the younger and educated farmers within a community of practice as technology stewards for applying internet and social media technologies on farms.

In essence, farmers in Trinidad and Tobago are competent enough to apply social media and internet technology more on farms. The issue for the lack of adoption appears to be more an issue of extension personnel understanding the social dynamics of the farmers with respect to ICT use. The farmers' knowledge of computers, the internet and social media is not a constraining factor to adopting social media in extension but a potential avenue to improve the communication efficiency with all stakeholders within farming communities.

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