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ASSOCIATION BETWEEN SOCIO-DEMOGRAPHIC FEATURES AND INTENTION OF FARMERS TO USE ICTS FOR AGRICULTURAL RISK MANAGEMENT IN MALAYSIA

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ABSTRACT

Farmers intention'to use ICTs for agricultural risk management is increasing not only in Malaysia but also in Asia and other parts of the world. Although much research has been conducted to examine association between socio-demographic characteristics of farmers and behavioral intention to use ICT in various contexts but less attention has been paid towards farmers intention' to use ICTs in the perspective of agricultural risk management. Therefore, present study was conducted in three zones of Malaysia where natural disasters like floods and landsliding had caused serious concern. The data were collected from 360 farmers through structured questionnaire by using multistage cluster sampling technique. The collected data were analyzed by uing SPSS as data analysis tool. The results reveal that there is positive and significant association between education (P< 0.00), size of dependents (P< 0.00), land ownership (P< 0.02) and annual income (P< 0.00) with intention of farmers to use ICTs for the management of agricultural risk (s). Conversely, there is no significant association between age, experience and farm size with intention of farmers to use ICTs for agricultural risk management. In conclusion, education, dependents size, land ownership and annual income were important factors which affected utilization of ICTs for agricultural risk management in Malaysia. The study recommends that more research should be conducted in other parts of the country. Moreover, all stakeholders and particularly agricultural extension officers should actively work to scale up ICT usage in the agricultural sector.

Keywords: agricultural risk management, intention, ICTs, Malaysia, socio-demographic

INTRODUCTION

Information and Communication Technologies (ICTs) are playing an important role in the management of agricultural risks. Farmers are also inclined towards ICT usage in the crop and livestock sectors. The use of ICTs has not only bridged digital gaps but also help farmers to improve their socio-economic status. In this context, Ali (2012) highlighted that socio-demographic factors are likely to affect ICT usage in the agricultural sector. Additionally Moghaddam and Khatoon-Abadi (2013) advocated that ICT is considered as a community development tool as it has assisted farmers to improve livelihoods, ensured food security and enhanced income level. Furthermore, Ali *et al*. (2018) stated that farmers face various issues due to climate changes so digital technologies could assist farmers to address these issues quickly. Rehman *et al*. (2016) in this point added that these digital technologies would enhance food production and ensure sustainability in the agricultural sector. Thus, ICTs could offer various uses and advantages to the users in the agricultural sector of developing world. Njoh (2018) in the context of Africa stated that there is a positive link between ICTs and development of Africa. Additionally, ICTs help farmers to improve their knowledge for application of right agricultural inputs (Kante *et al*., 2018). Likewise, ICTs have proven positive contribution even in the sustainability of agro-food systems (El Bilali and Allahyari, 2018). Hudson *et al*. (2017) stated that due to various advantages of ICTs, these are widely and quickly penetrating among the agricultural community. According to Janssen *et al*. (2017), people use ICTs for not only obtaining quality information, but also for making informed decisions. In addition, adoption of new technologies helps farmers to increase their incomes (Gao *et al*., 2018). So, it reflects that ICTs play contributing role not only in the agricultural sector but also influence the socio-economic condition of farmers.

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The previous work has corroborated that there is an influence of socio-economic characteristics on adoption of technologies (Nabhani *et al*., 2016; Kabbiri *et al*., 2018). However; it is still unclear in the context of Malaysia that what are the personal factors which could portray association between socio-demographic characteristics of farmers and intention to use ICTs for agricultural risk management. Therefore present research was formulated to empirically examine the significant association of socio-economic characteristics and intentions from the lens of farmers and following hypotheses were designed. Moreover, the research findings would be useful for a variety of stakeholders such as farmers, agro-advisory service providers, researchers, academia and importantly the policy makers.

The following hypotheses were designed to examine the association between socio-demographic characteristics of farmers and their intention to use ICTs for agricultural risk management:

- H_a: There is positive and significant association between age of the farmers and their intention to use ICTs for agricultural risk management.
- H_a: There is positive and significant association between education of the farmers and their intention to use ICTs for agricultural risk management.
- H_a: There is positive and significant association between dependent size of the farmers and their intention to use ICTs for agricultural risk management.
- H_a: There is positive and significant association between experience of the farmers and their intention to use ICTs for agricultural risk management.
- H_a: There is positive and significant association between land ownership of the farmers and their intention to use ICTs for agricultural risk management.
- H_a: There is positive and significant association between farm size of the farmers and their intention to use ICTs for agricultural risk management.
- H_a: There is positive and significant association between annual income of the farmers and their intention to use ICTs for agricultural risk management.

RESEARCH METHODOLOGY

The research was carried out in three zones of Malaysia, namely East zone (Pahang, Terrengganu), South zone (Johor) and North zone (Kedah). A total of 360 farmers were selected through multistage cluster sampling technique from the four areas of three zones. At the first stage, the clusters were chosen geographically. At the second stage, three states were selected and then, the areas from each state were chosen randomly. At last, the respondents were selected through simple random sampling technique. The survey technique of face to face was used to collect data from the farmers. In this regard, the structured questionnaire was used. The research instrument was tested through a pilot survey in which data were collected from 50 farmers to examine the reliability and validity of the research instrument. The results of pre testing unveiled that alpha was more than 0.6 which means that items in the questionnaire were reliable and validity was confirmed through expert consultation. These 50 farmers were not considered in the final analysis. By employing pre-testing, the research instrument was improved and finally vetted through expert consultation. The research instrument was designed in English lanaguage, but the langauge of the questionnaire was changed into the native language (*Bahasa Melayu*) for convenience of the respondents. The team of local enumerators helped in the data collection from the field. The team was trained to collect data from the farmers. The respondents were also briefed about the aim of research. Lastly, in order to analyze the data, SPSS (version 21) was used to generate descriptive and chi square statistical results. The values were entered in the SPSS and labelled accordingly. In order to obtain chi square result, alpha (confidence level) was set at 0.05 and Guildford rule of thumb was used as yardstick to measure strength of the relationship between the independent variables (socio-demographic) and dependent variable (intention). In this regard, command was given to SPSS to generate cross tabulation results. At last, conclusion was made based on statistical results.

RESULTS AND DISCUSSION

Socio-demographic profile of the farmers

The profile of the respondents, including socio-demographic characteristics contributes significantly in the use of ICTs for agricultural risk management. In this regard, the results about socio-demographic characteristics of farmers are displayed in the Table 1. Based on the results, the average age of the farmers was 47 years. Moreover, among these 360 farmers, 35.3% of the farmers were between the age bracket of 35 to 52 years, while 33.1% of the farmers were

between the ages of 53 to 69 years. Whereas, 26.4% of the farmers were between the ages of 20 to 34 years and only 5.3% of the farmers were above or equal to 70 years. The results further reveal that 37.5% of the farmers had secondary education, 19.75% of the farmers obtained standard 6 education, 18.25% of the farmers received primary education, 8.6% of the farmers had diploma level education, 3.1% had religious education and only 5.25% of the farmers did not have any formal education or were illiterate. Thus, it can be gathered that most respondents had secondary education in the study area.

The respondents were asked about experience in the agricultural sector. In this regard, 29.4% of the farmers had experienced 5 or below 5 years. While 19.4% of the farmers had experienced between 21 to 30 years. Similarly, 13.6% of the farmers had 16 to 20 years and almost similar percentage of farmers had 6 to 10 years (12.8%), 11 to 15 years (12.5%) and 31 years and above (12.2%). Thus, most farmers had experienced 5 or below 5 years in the farming sector. The farmers were asked about the number of dependents and based on the results, slightly more than half of the research population had 3 to 5 number of dependents. Moreover, 27.2% of the farmers had less than 3 dependents and the remaining respondents (9.7%) had dependent size more than 6 along with 11.1% farmers no children at all. So, the majority of the respondents had dependents between 3 to 5 in the family. The results about land ownership reveal that most of the farmers (69%) were the owners of their land. Likewise, 20.5% of the farmers were tenants and 10.5% were owner-cum-tenants. Therefore, nearly 3 quarters of the respondents had land ownership. Furthermore, out of 360 farmers, more than half of the research population (55.8%) had farm size 5 acres or below whereas, 29.4% had 6 to 10 acres and the remaining 14.7% of the farmers had 11 and above acres. In conclusion, more than half of the respondents had farm size 5 acres and below. These findings support the research by Hu *et al.* (2019) who have conducted research in China and found that there was a positive and significant influence of farm size with willingness to adopt novel agricultural technologies. On top of that, 42.5% of the farmers had monthly income between 3501 to 4500 MYR (Malaysian Ringgit) which is followed by 29.4% of the farmers whose monthly income were between 2001 to 3500 MYR and 23.9% of the farmers were earning less than 2000 MYR on a monthly basis. However, only 4.2% of the farmers disclosed monthly income more than 4501 MYR. So, the most farmers had monthly income between 3501 to 4500 MYR.

Table 1. Socio demographic profile of respondents (n=360)

Characteristics	Frequency	Percentage
Age		
20-34	95	26.4
35-52	127	35.3
53-69	119	33.1
≥ 70	19	5.3
Mean	46.93	
Standard Deviation	14.48	
Level of education		
Illiterate	19	5.25
Religious Education	11	3.1
Primary until standard 6	71	19.7
SRP/PMR	66	18.25
SPM/STPM/SPMV	135	37.5
Diploma	31	8.6
Certificate/Bachelor	20	5.6
Master degree	02	0.5
Doctorate	00	00
Any other	05	1.4
Year of experience in agriculture		
5 years and Below	106	29.4
6-10 years	46	12.8
11-15 years	45	12.5
16-20 years	49	13.6
21-30 years	70	19.4
31 years and above	44	12.2
Mean	3.18	
Standard Deviation	1.816	
Dependent size		
No child	44	11.1
<3	98	27.2
3-5	187	51.9
≥6	35	9.7
Land ownership		
Owner	276	69
Owner-cum-tenant	42	10.5
Tenant	82	20.5
Owner	276	69
Farm size		
5 and below	201	55.8
6-10 acres	106	29.4
11 and above	53	14.7
Mean	1.59	
Standard Deviation	0.734	
Monthly income		
≤2000	86	23.9
2001-3500	106	29.4
3501-4500	153	42.5
≥4501	15	4.2
Mean	3192.50	
Standard Deviation	1853.21	

*Answered more than one Source: Field Survey
Note: Malaysian Academic Qualification-SRP (Lower Certificate of Education)/ PMR (Lower Secondary Assessment) SPM (MalaysianCertificate of Education)/STPM (pre-university examination) SPMV (MalaysianCertificate of Vocational Education)

Association between socio-demographic features and intention of farmers to use ICTS for agricultural risk management

The association between socio-demographic characteristics and intention of farmers to use ICTs for agricultural risk management was examined through chi square analysis. In this regard, socio-demographic characteristics such as age, education, experience, size of dependents, land ownership, farm size and monthly income were taken as independent variables and intention of farmers to use ICTs for agricultural risk management was considered as the dependent variable. So, the results are shown in the following Table (2). Based on the results, it is clear that education, dependent size, land ownership and income have significant association ($P< 0.05$) with intention to use ICTs for agricultural risk management. Conversely, there is no significant association between age, experience and farm size of the respondents and intention of respondents to use ICTs for agricultural risk management.

According to Ali and Kumar (2011), the socio-economic profile of the farmers plays important role in the use or adoption of new technology, but the users might not get equal benefits due to different capabilities and implementation. Like Aldosari *et al.* (2017) highlighted that there is a positive correlation between age of farmers and adoption, diffusion or transfer of agricultural technologies. However, it may vary from area to area, nature and perceived use of technology and even the level of competency by a different age bracket of the farmers to use ICTs in various contexts. Like in this study, there is no association between age of the farmers and intention of the farmers to use ICTs for agricultural risk management. Conversely, the result about age contradict with the study by other authors like Mwombe *et al.* (2014), who have conducted the study in Kenya to assess ICTs utilization by the banana farmers found that age was one of the factors which influenced utilization of ICTs by the small scale banana growers. The results are contrary with Moyo and Salawu (2019) who have found that the age of the farmers was associated with preference of communication media in Zimbabwe. On the other hand, Ali (2011) also could not find an association between the age of the vegetable farmers in India and adoption of mass media information by employing chi square method.

Moreover, numerous studies showed that education plays vital role in the usage or adoption of technologies. At this point, Agwu *et al*. (2008) and Habib *et al*. (2007) highlighted that educated people are likely to possess a favorable attitude for knowledge, skills and information in the agricultural sector as compared to less educated or illiterate individuals. Indeed, increase of educational level could positively affect the intention of farmers to use or adopt more technologies for better farming practices. Kumar *et al*. (2017) lead a study in Haryana, India and found that educational level revealed a significant and positive association with ICT usage among the farming community. So, the results of this study also support that there is a positive association between educational level and utilization of ICTs for agricultural risk management by the farmers in Malaysia. Nevertheless, there are issues like English medium embedded in the various ICTs for which farmers are not fully equipped to easily use on the basis of low level of education as stated by the Malaysian author (Hassan *et al.,* 2009).

Another socio-demographic factor which exhibits significant association is family size. The number of dependents could influence intention of farmers to become risk takers for timely and appropriate management of agricultural risks by using ICTs. Additionally, increase in the number of dependents may also sensitize and realize farmers to use digital interventions for quick management of agricultural risk (s).The result is in line with other researchers like Chikaire *et al*. (2017), Olaniyi (2013) and Jain *et al*. (2012). Olaniyi (2013) stated that increase in size of dependents means-an increase in understanding and ICT utilization. So, similarity in these findings reflects that dependents could also assist in accessing valuable agricultural information by using digital means. As a matter of fact, farmers try to take care of their family and family also assist them whenever possible in facilitating agricultural activities or even obtaining the right information at the right time. Thus, size of dependents also affects behavioral intention of farmers to use ICTs for agricultural risk management not only in Malaysia but also in other parts of the world.

The findings further reveal that land ownership carries intention to use ICTs for agricultural risk management. It may be due to the fact that the land ownership gives a sense of possession and protection to farmers. Although the results of this study reveal an association between land ownership and intention to use ICTs, but the results contradict with the findings of Armstrong *et al*. (2012) whose study was concentrated on the use of ICTs by the rural

farmers in India. Furthermore, the results reveal that farmers with higher income had higher intentions to use ICTs for management of agricultural risks. Likewise, Mittal and Mehar (2016) conducted a study in India to evaluate factors influencing adoption of various ICTs and gathered that age, educational level and size of the farm influenced the behavior of the Indian farmers in this regard. Chikaire *et al*. (2017) and Ali and Kumar (2011) pointed out that there is an essential association between income level of the farmers and use of ICT because whenever the income level is likely to increase then information access could be easy which could lead to appropriate agricultural decisions. From the lens of Malaysia, farmers with good income also depict affordability of using ICTs and could keep on using for better risk management in the agricultural sector. In a nutshell, the intention of the farmers to use ICTs is associated with income level.

Table 2. Result of Association between Socio-demographic characteristics and Intention of Farmers to Use ICTs for Agricultural Risk Management

Socio-demographic characteristics	Chi square	d.f	Significant	Decision
Age	11.782	6	0.067	Fail to reject H_0
Education	28.534	8	0.000	Reject H_0
Experience	8.806	10	0.551	Fail to reject H_0
Dependent Size	39.791	6	0.000	Reject H_0
Land Ownership	16.583	4	0.002	Reject H_0
Farm Size	8.158	4	0.086	Fail to reject H_0
Income	26.123	6	0.000	Reject H_0

CONCLUSION

In conclusion, various ICTs are being used by farmers on account of their significance in the agricultural sector. The intensity would increase in the future as farmers in the developing countries including Africa are setting their minds to explore potential of ICTs in the crop and livestock sectors. Based on the current research, it is easily understood that intention of farmers to use ICTs for agricultural risk management is associated with socio-demographic characteristics, namely education, size of dependents, ownership of agricultural land and income level. However, age, experience in the agricultural sector and farm size could not reveal association with intention of farmers to use ICTs for agricultural risk management in the context of Malaysia. The study recommends that there is a need to conduct more research in other areas (like West zone) for proper understanding of socio-demographic factors affecting ICT usage in the agricultural risk management sector. The study also recommends that extension service providers should encourage and promote farmers to harvest the potential of digital technologies in order to become resilient. It is expected that the findings would be useful for policy makers, extension service providers, academia and researchers to better understand the existing situation about ICT usage in the domain of agricultural risk management and how characteristics of farmers affect their decisions to incorporate digital interventions.

The public and private sector has encoluraged and supported to use ICTs in agricultural sector. However, there is a need to do more in the perspective of agricultural risk management to resolve problems like climate change. In addition, the policies which could support and motivate farmers to manage their risks at their own level are needed by public and private sector. The clear policies and policy guidelines are still unclear. Importantly, ICTs may be considered as an important tool in agricultural sector general and in risk management particular. These tools would surely help in the effective, efficient and quick communication process among various development actors. The integrated mechanism of information and technology transfer would give boost to the agricultural development process and timely taking measures for management of agriculture related risks.

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