International Journal of Agricultural Management and Development
Available online on: www.ijamad.iaurasht.ac.ir
ISSN: 2159-5852 (Print)
ISSN:2159-5860 (Online)

Research Paper *https://dorl.net/dor/20.1001.1.21595852.2022.12.1.3.2*

An Extension of the Technology Acceptance Model: Understanding Farmers' Behavioral Intention towards Using Agricultural E-commerce

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Received: 29 March 2021,
Accepted: 29 May 2021

Abstract

The emergence of agricultural e-commerce can solve the challenges of agricultural marketing, especially in developing countries such as Iran. This study aimed to extend the Technology Acceptance Model (TAM) through adding the variables of social influence and facilitating conditions to understand farmers' behavioral intention towards using agricultural e-commerce. This descriptive-correlational research was conducted by a cross-sectional survey. The statistical population was composed of citrus growers in Jahrom, Iran (N=3566). The stratified random sampling method was used to select 360 respondents for the survey. The research instrument was a structured questionnaire whose face, convergent, and discriminant validity were confirmed. Cronbach's alpha and composite reliability were estimated using SPSS24 and AMOS24 software, respectively, to examine the reliability of research tool ($0.75<\alpha<0.85$). The results showed that the extended form of the TAM constructs was significant in explaining farmers' behavioral intention. Attitude, perceived usefulness, facilitating conditions, social influence, and perceived ease of use accounted for 50.3% of the variance in behavioral intention. The hypotheses of the extended TAM constructs showed that social influence and facilitating conditions had a positive and significant effect on intention towards using agricultural e-commerce. In this context, the government and agricultural e-commerce planners need to raise the awareness of all social influence groups about the benefits of using agricultural e-commerce through all media. In addition, it is recommended to provide farmers with technical and educational e-commerce facilities.

Keywords:
Agricultural e-commerce; technology acceptance model; social influence; facilitating conditions; citrus growers

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INTRODUCTION

The application of IT, particularly the use of the Internet, in business activities has been broadly referred to as electronic commerce (e-commerce) (Al-Busaidi et al., 2009). By definition, e-commerce is the conduct of commerce in goods and services with the assistance of the Internet (Kabugumila et al., 2016). Recent developments in smartphones and online social networks have also contributed to the rapid growth of e-commerce (Lin, 2018). E-commerce is rapidly becoming a viable means of conducting business as evidenced by the tremendous amounts of money spent online (Fayad & Paper, 2015). The growth of Internet users has led many businesses to plan for e-commerce. Agribusinesses, like all other businesses, face the challenge of changing their business model and practices to accommodate and participate in the rapid growth of e-commerce (Henderson et al., 2006; McFarlane et al., 2003).

Agricultural e-commerce is a new way of selling and circulating agricultural products. It may represent a competitive advantage to make enterprises of the agro-food sector more visible to consumers (Bodini & Zanoli, 2011). In addition, according to Montealegre et al. (2007), the high level of fragmentation in the food supply chain reinforces the expectation for agricultural e-commerce. Other agricultural e-commerce benefits are broking the limit of region and time, speeding up information transmission, helping lower transaction cost, reducing inventory, increasing business opportunities, developing the order awareness and brand awareness, improving the quality of agricultural products, promoting the upgrading of the industrialization level of agriculture, and promoting production and farmers' income (Lv & Zhou, 2014). According to McFarlane et al. (2003), the adoption of the Internet and the use of e-commerce strategies would enable farmers to promote their products and interact with each other, suppliers, customers, and intermediaries. To sum up, agricultural e-commerce can play a strong role in improving agricultural development and it can solve the challenges of agricultural marketing, especially in developing countries (Cai et al., 2015; Ma et al., 2020). However, its adoption and level of use are low among farmers. According to Taherdoost (2018), the user's acceptance, considered as the beginning stage of any business, is a crucial factor for the further development of any new technology. Accordingly, agricultural e-commerce must be accepted and used by farmers. Apart from infrastructural, economic, and management factors, behavioral factors can also influence e-commerce adoption (Uzaka et al., 2007).

Although the adoption of Information Technology (IT) has been studied by many researchers, there is only a limited and fragmented understanding of agricultural e-commerce adoption, such as Alavion et al. (2017), Arromdee and Suntrayuth (2020), and Li et al. (2021). It is necessary to understand why and how farmers choose to adopt agricultural e-commerce. This information will afford researchers and e-commerce providers a better understanding of how to facilitate future adoption. In Iran, agriculture is an important sector with the majority of the rural population depending on it. In addition, it represents an important percentage of GDP. Indeed, agricultural products require accurate and well-timed information, and the distribution of the producers (farmers) and buyers (traders and consumers) over a large geographical area has made the agricultural sector a lucrative field for e-commerce intervention (Dsouza & Joshi, 2014). However, despite the significant benefits associated with agricultural e-commerce, it is not developed in Iran. In addition, the number of Internet users in Iran's rural areas has been steadily growing and this growth has provided opportunities for agricultural e-commerce development.

Furthermore, citrus production is of great importance and is considered one of the main resources of wealth development, commercial exchanges, and employment in Iran (Alipour et al., 2013). Fars province is the second-largest citrus producer in Iran, and

Jahrom district is one of the main hubs of citrus production in Fars province. However, citrus growers in Jahrom, like many other Iranian farmers, are struggling with many agricultural marketing problems. For example, most citrus growers are forced to sell their products at low prices to unsuitable marketing agents such as middlemen and lose a significant portion of their marketing profits. So, they suffer from the power of middlemen in the market. Also, small and medium-sized farms cannot compete with the large ones and suffer from low income. According to the cited benefits of agricultural e-commerce, its emergence can solve these challenges and open up new business opportunities for citrus growers. Therefore, to attract more farmers and encourage them to adopt agricultural e-commerce, the agricultural educators and extension services should focus on the improvement of constructs or attributes that influence farmers' behavior to use agricultural e-commerce.

As behavioral intention is a strong predictor of actual behavior, considering farmers' behavioral intention model in the educational and extensional programs can affect the behavior of farmers to use agricultural e-commerce. In Iran, no research has been reported to study farmers' behavioral intention towards using agricultural e-commerce. Therefore, the main objective of this paper is to develop a suitable theoretical framework to understand the behavioral intention of Jahrom citrus growers towards using agricultural e-commerce. In this regard, we extend the Technology Acceptance Model (TAM) by adding the variables of social influence and facilitating conditions to understand farmers' behavioral intention towards using agricultural e-commerce.

Some theoretical models attempt to explain the relationship between user attitudes, perceptions, beliefs, and eventual system use. These include the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), the theory of planned behavior (TPB) (Ajzen, 1991), and the technology acceptance model (TAM) (Davis, 1989). Among these, TAM seems to be more commonly used by researchers to understand behavior in the context of information systems in general (Fayad & Paper, 2015). TAM is an adaptation of TRA developed by Fishbein & Ajzen (1975). TRA is a model developed to predict human behavior in general. However, TAM is considered the most influential and commonly employed theory for describing an individual's acceptance of information systems. In fact, TAM has become so popular that it has been cited in most of the research that deals with users' acceptance of technology (Lee et al., 2003). The purpose of TAM is to illustrate what causes people to refuse or accept information technology (Al-Sharafi et al., 2016). Many studies (e.g., Koufaris, 2002; Hajli, 2012; Lane et al., 2014; Alraja & Aref, 2015; Fayad & Paper, 2015; Mugo et al., 2017; Fedorko et al., 2018) have used the technology acceptance model (TAM) or its extensive format as determinants of information systems acceptance or particular technology such as World Wide Web (WWW). Then, Davis et al. (1989) used TAM to explain computer usage behavior as shown in Figure 1. TAM postulated that computer usage is determined by a behavioral intention to use a system, where the intention to use the system is jointly determined by a person's attitude toward using the system and its perceived usefulness. TAM includes and tests two specific beliefs: perceived usefulness (PU) and perceived ease of use (PEU). PU is defined as the degree to which a person believes that using a particular system would enhance his or her job performance. PEU refers to the degree to which a person believes that using a particular system would be free of effort (Davis, 1989). In TAM, PU and PEU are posited to have a significant influence on attitude toward usage (ATU), which in turn influences the behavioral intention to use (BIU) technology. In addition, PEU has been shown to significantly influence PU on the basis that when users perceive a technology to be easy to use, they are likely to find it useful as well.

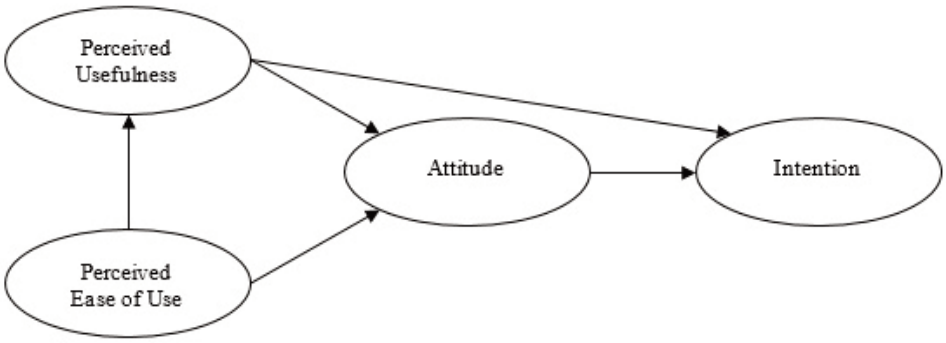

Figure 1. The First Modified Version of the Technology Acceptance Model (Davis et al., 1989)

It is suggested that TAM typically explains approximately 40 percent of the variance in usage intentions and behavior (Venkatesh et al., 2003). In addition, according to Venkatesh (2000), the classical TAM is based only on few variables. The parsimony of this model, while being its strength, is also its weakness. The last two decades have seen user acceptance models being proposed, tested, refined, extended, and unified (Seyal & Rahman, 2009). One distinctive feature of the TAM studies is their attempt to extend the model with external variables to improve the predictive power of TAM. Numerous extended variables have been added to TAM. As the adoption of agricultural e-commerce as a subset of information technology adoption is a complex issue and may depend on various variables. Thus, in this study we have extended the first modified version of TAM proposed by Davis et al. (1989) by adding two additional variables including "social influence" and "facilitating conditions" in order to increase the validity and efficiency of the study.

Overall, TAM omits social factors in explaining IT usage. However, social influence is crucial in shaping user behavior (Hsu & Lu, 2004). Subjective norms in TRA and TPB represent social influence (Cheung et al., 2000; Yu, 2012). According to TRA and TPB, one of the main factors at the base of behavioral intentions is subjective norms, which reflect the person's perception of received social pressures to perform or not to perform that behavior (Guzzo et al., 2016). In addition, the extended TAM (TAM2) proposed by Venkatesh and Davis (2000) incorporates subjective norms as the additional theoretical construct. Furthermore, according to the unified theory of acceptance and use of technology (UTAUT) that was proposed by Venkatesh et al. (2003), social influence has a direct effect on the intention to use the technology. According to the UTAUT, social influence is considered the degree to which an individual perceives that important others believe he or she should use the new system. Thus, we can find mounting evidence for the inclusion of social influence in the original TAM (Hsu & Lu, 2004; Mohd et al., 2011; Beldad & Henger, 2018; Alshurideh et al., 2019; Zhang et al., 2020). In the field of World Wide Web, Cheung et al. (2000) also found that social factor as an individual's internalization of the reference group's subjective culture, and specific interpersonal agreements that the individual has made with others, has a direct effect on the intention to use WWW.

Facilitating conditions are the degree to which an individual believes that organizational and technical infrastructure exists to support the use of the system (Venkatesh et al., 2003). The construct of perceived behavioral control in TPB is theorized to be closely related to facilitating conditions. Perceived behavioral control reflects the perceptions of the internal and external constraints on behavior and consists of self-efficacy, resource facilitating conditions, and technology facilitating conditions (Lee & Mun, 2011). Accord-

ing to the UTAUT, facilitating conditions have a direct effect on behavioral intention. There is also growing evidence for the inclusion of facilitating conditions to the TAM (Cheung et al., 2000; Jones et al., 2002; Teo, 2009; Teo, 2010; Waheed & Jam, 2010; Sadi & Noordin, 2011; Alryalat, 2017; Lavidas et al., 2019; Kamal et al., 2020). Figure 2 illustrates the extended TAM proposed in this study. It asserts that the intention to use agricultural e-commerce is a function of its perceived usefulness by an individual, attitude, social influence, and facilitating conditions. Intention is the extent to which the user would like to use agricultural e-commerce in the future. Perceived usefulness is defined as the degree to which a person believes that using agricultural e-commerce would enhance his or her job performance. Attitude is defined as user preferences regarding using agricultural e-commerce. Social influence describes the extent to which the user perceives that others' opinions will influence the use or non-use of agricultural e-commerce. Additionally, facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support the use of agricultural e-commerce.

The model further indicates that perceived ease of use and perceived usefulness have an indirect effect on the intention towards using agricultural e-commerce through the mediation of attitude. Perceived ease of use refers to the degree to which a person believes that using agricultural e-commerce would be free of effort. We also proposed that perceived ease of use directly affects perceived usefulness and attitude.

In total, the study hypotheses, based on the proposed model, are presented as follows:

Hypotheses for the basic TAM constructs (Davis et al., 1989):

H1: Perceived usefulness will have a positive and significant effect on attitude towards using agricultural e-commerce.

H2: Perceived usefulness will have a positive and significant effect on intention towards using agricultural e-commerce.

H3: Perceived ease of use will have a positive and significant effect on attitude towards using agricultural e-commerce.

H4: Perceived ease of use will have a positive and significant effect on perceived usefulness.

H5: Attitude will have a positive and significant effect on intention towards using agricultural e-commerce.

Hypotheses for the extended TAM constructs:

H6: Social influence will have a positive and significant effect on intention towards using agricultural e-commerce.

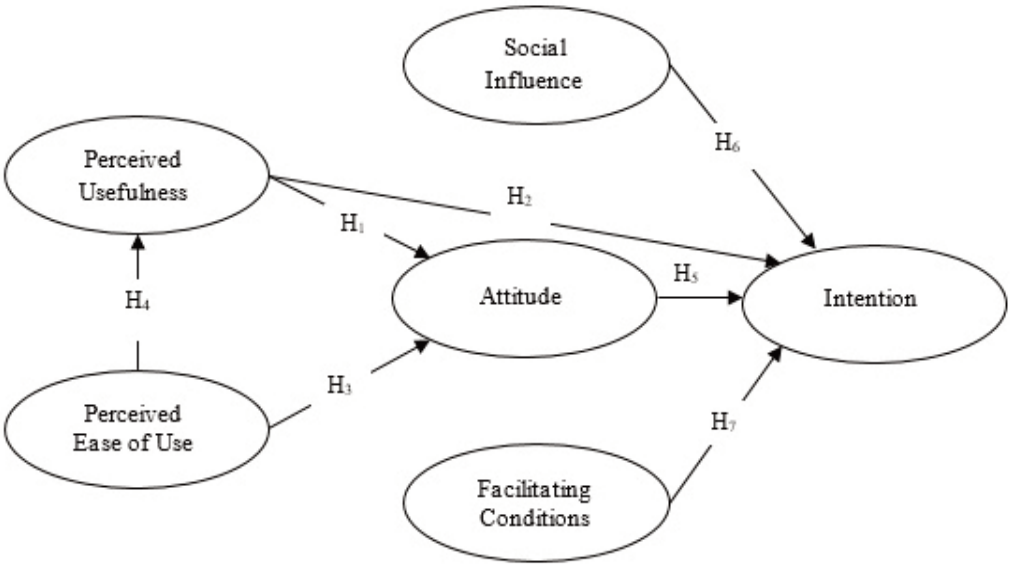

Figure 2. The Proposed Theoretical Model Based on TAM

H7: Facilitating conditions will have a positive and significant effect on intention towards using agricultural e-commerce.

METHODOLOGY

This study is descriptive-correlational research that used a cross-sectional survey through the distribution of a researcher-designed structured questionnaire. The items were used to measure the constructs asking individuals to agree or disagree with statements using a Likert scale of 1-5 with endpoints of "strongly agree". The study population consisted of Jahrom citrus growers in Fars province, Iran (N=3566). As shown in Table 1, 360 respondents selected by stratified random sampling participated in this survey.

The face validity was confirmed by a panel of experts consisted of academic specialists in the fields of agricultural extension and education and e-commerce studies. Cronbach's alpha coefficients were also used to determine the reliability of the study tool. For this purpose, a pilot group, including 30 citrus growers, was selected. Table 2 shows the main variables of the study and Cronbach's alpha coefficients for different parts of the questionnaire. A confirmatory factor analysis (CFA) was used to test the convergent and discriminant validity of the research constructs. The analysis showed that all of the items had factor loadings higher than 0.7 and, accordingly, were significant. The convergent validity was checked by using composite reliability (CR) (above the recommended value of 0.70) and average variances extracted (AVE) (above the recommended value of 0.50) (Hair et al., 2010). The results showed that all composite reliabilities (CR) for the constructs were above 0.70, reflecting the acceptable levels of reliability for each construct and AVE over 0.50. So, all constructs had acceptable convergent validity. For satisfactory discriminant factor analysis, the square root of AVE in each construct should exceed the correlation coefficients of this particular construct with other constructs (Fornell & Larcker, 1981). As shown in Table 3, the results indicate the adequate discriminant validity.

The test of the structural model was performed by the $AMOS_{24}$ procedure, a software package designed to perform the structural equation model approach to path analysis. Path analysis is a variation of multiple-regression analysis and is useful for analyzing a number of issues involved in causal analysis (Stage et al., 2004).

RESULTS AND DISCUSSION

As shown in Table 4, all citrus producers are men. Based on their age, most of the respondents (42.8%) are 33-45 years and the average age of citrus producers is about 43 years. Regarding the educational level, most respondents are under diploma. The results indicate that 30 percent of citrus producers have a diploma or an associate degree and the rest (6.7%) have a bachelor's degree or higher. Regarding the farming experience, the majority (44.7%) have 13-22 years of experience. The average of their monthly income is 1.7 million IRR and most of them (44.4%) earn 2.5-4 million IRR per month. Based on the garden size, the majority of citrus produc-

Table 1

The Size of the Statistical Population and Sample

Region	Population (N)	Sample (n)
Khafr	476	48
Central	430	43
Kordian	760	77
Simakan	1900	192
Total	3566	360

Table 2

Analysis of the Measurement Model

Constructs and indicators	Cronbach's value	λ	CR	AVE
Perceived usefulness	0.81		0.78	0.65
Using agricultural e-commerce can improve farmers' income.		0.86 ***		
Using agricultural e-commerce can facilitate transactions.		0.72 ***		
Agricultural e-commerce contributes to business prosperity.		0.70 ***		
Using agricultural e-commerce can increase farmers' customers.		0.93 ***		
Perceived ease of use	0.75		0.84	0.64
It is easy to set up and manage agricultural e-commerce activities.		0.83 ***		
Agricultural e-commerce is transparent and understandable. Agricultural e-commerce methods and activities are easy to learn.		0.71 ***0.87 ***		
Social influence	0.76		0.74	0.66
People who are important in my decision-making believe that I have to use the Internet to sell agricultural products.		0.86 ***		
Other farmers believe that I should use the Internet to sell agricultural products.		0.79 ***		
My family members encourage me to start agricultural e-commerce.		0.74 ***		
As all transactions around the world are moving towards internet business, I have to start e-commerce.		0.87 ***		
Facilitating condition	0.80		0.86	0.67
I have the proper facilities (such as computers and the internet) to set up e-commerce activities.		0.93 ***		
I can easily provide e-commerce facilities.		0.87 ***		
My family or friends can guide and help me in agricultural e-commerce.		0.75 ***		
I have the knowledge necessary to set up and manage e-commerce activities.		0.71***		
Attitude	0.85		0.94	0.68
I am pleased with using agricultural e-commerce.		0.85 ***		
If I use the Internet to sell agricultural products, I will feel positive and good.		0.94 ***		
I believe that using the Internet to sell agricultural products is a wise decision.		0.87 ***		
I believe that using the Internet to sell agricultural products is effective.		0.76 ***		
I believe that using agricultural e-commerce has great economic value.		0.70 ***		
Intention	0.78		0.87	0.65
I intend to use the Internet to sell my agricultural products in the next year.		0.87 ***		
I intend to use the Internet to sell my agricultural products in the next few years.		0.81 ***		
I will participate in agricultural e-commerce educational programs to increase my knowledge about agricultural e-commerce.		0.72 ***		
If necessary, I will spend to run agricultural e-commerce.		0.75 ***		
If necessary, I will get help from professionals in agricultural e-commerce to become skilled in this field.		0.89 ***		
If the Agricultural organization launches a project to participate farmers in agricultural e-commerce, I will participate in this project.		0.79 ***		

***$p<0.001$

Table 3
The Correlation Matrix for Measurement Scales

Constructs	AVE	PU	PEU	SI	FC	Attitude	Intention
PU	0.65	0.78					
PEU	0.64	0.59**	0.78				
SI	0.66	0.65**	0.42**	0.74			
FC	0.67	0.58**	0.53**	0.30*	0.78		
Attitude	0.68	0.60**	0.52**	0.23**	0.20**	0.86	
Intention	0.65	0.30**	0.50**	0.43**	0.49***	0.64***	0.87

Note: PU: perceived usefulness; PEU: perceived ease of use; SI: social influence; FC: facilitating conditions; Diagonal elements are the square root of the average variance extracted of each construct; Pearson correlations are shown below the diagonal.*p<0.05, **p<0.01, ***p<0.001

Table 4
Demographic Attributes of the Respondents (n=360)

Variables	Percent	Mean
Age (years)		43.2
≤ 32	18.3	
33-45	42.8	
46-58	28.6	
59 or more	10.3	
Education		9.6
Under diploma	63.3	
Diploma and associate degree	30.0	
Bachelor's degree or higher	6.7	
Farming experience (years)		16.7
≤ 12	33.6	
13-22	44.8	
23-32	14.7	
33 or higher	6.9	
Monthly income (million IRR)		1.7
≤ 1	3.3	
1.001- 2.5	40.3	
2.501-4	44.5	
4.001 or higher	11.9	
Garden size (Hectare)		1.4
≤ 5	60.8	
6-11	33.1	
≥ 12	6.1	

ers (60.8%) have under five hectares. In addition, the average size of gardens is 1.4 hectares.

As shown in Table 5, the mean score of most variables is moderate. The lowest mean score of 2.70 goes to social influence, showing that the respondents believe that the social environment is not a strong factor in encouraging them to use agricultural e-commerce. The highest mean score is related to perceived

usefulness. The standard deviation of this variable is 0.84. Thus, it shows that the respondents have an almost similar point of view regarding this variable. This indicates that the respondents recognize the benefits of agricultural e-commerce. Intention as a major independent variable receives a moderate mean score.

Table 6 presents the values of the fit statistics. The results indicate that χ2 /df is below 5, which is acceptable (Wheaton, 1987). GFI score is above the 0.9 threshold suggested by Hu and Bentler (1999). The CFI score of 0.98 is greater than the 0.95 threshold suggested by Kock (2010). The values for NFI and NNFI are both greater than 0.9., which suggests that these are close to the standards suggested by Tucker and Lewis (1973). The root mean square error of approximation (RMSEA) score is below 0.05, which is acceptable (Browen & Cudeck, 1993). Therefore, the model is fitted. It is presented in Figure 3.

Table 7 shows the results of the hypothesis test and path coefficients of the proposed research model. The test of the structural model is performed using the $AMOS_{24}$ procedure, a software package designed to perform the structural equation model approach to path analysis. Path analysis is a variation of multiple-regression analysis and is useful for analyzing a number of issues involved in causal analysis (Stage et al., 2004).

According to Imam (2005), the path coefficient is significant at the 0.05 level when the critical ratio is more than 1.96. As shown in Table 7, all seven hypotheses are generally supported by the data. All the hypotheses relating to TAM variables (H1 to H5) are significant, as well as those of the external variables, social influence, and facilitating conditions (relating to the extended TAM).

Therefore, hypotheses 6 and 7 are supported. These findings support existing research that demonstrates the positive and significant relationship among social influence, facilitating conditions, and intention (Alraja, 2016; Yeop et al., 2019; Doan, 2020; Tam et al., 2020).

Table 5

A Summary of Descriptive Finding. Scale: 1-5

Variables	Mean	Standard Deviation (S.D)
Perceived usefulness (4 items)	3.50	0.84
Attitude (5 items)	3.37	0.84
Intention (6 items)	3.26	0.97
Facilitating conditions (4 items)	3.15	1.11
Perceived ease of use (3 items)	2.97	0.87
Social influence (4 items)	2.70	0.94

Table 6

Cut-offs and Results for Fit Indices

Fit index	Cut-off	Results for the present study
χ2 /df	< 5	3.06
GFI	> 0.9	0.95
CFI	> 0.95	0.98
NFI	> 0.9	0.95
NNFI	> 0.9	0.91
RMSEA	< 0.1	0.041

Table 7
Hypothesis Testing Results

Causal Path	Hypothesis	Expected Sign	β	t-value	Assessment
Perceived usefulness —-> attitude	H_1	+	0.35	4.61	Supported
Perceived usefulness —-> intention	H_2	+	0.21	3.55	Supported
Perceived ease of use —-> attitude	H_3	+	0.32	4.33	Supported
Perceived ease of use —-> perceived usefulness	H_4	+	0.45	6.44	Supported
Attitude —-> intention	H_5	+	0.56	7.85	Supported
Social influence —-> intention	H_6	+	0.37	5.51	Supported
Facilitating conditions —-> intention	H_7	+	0.40	6.01	Supported

Three endogenous variables are tested in the research model. Behavioral intention is predicted by attitude toward usage, perceived usefulness, perceived ease of use, social influence, and facilitating conditions, resulting in an R^2 of 0.503. This means that attitude, perceived usefulness, perceived ease of use, social influence, and facilitating conditions accounted for 50.3 percent of the variance in behavioral intention. Attitude had a large effect on behavioral intention (β= 0.56). This finding supports current research that suggests that a positive attitude toward the use of technology was associated with factors that fostered the continued and sustained use of technology (e.g. Malik et al., 2017; McLean et al., 2020; Zhu et al., 2020). Perceived usefulness, facilitating conditions, social influence, and perceived ease of use were, in turn, the former variables that influence the intention to use agricultural e-commerce, respectively. The other two endogenous variables, attitude toward usage and perceived usefulness, have their variances explained by their determinants in amounts of 41.2 percent and 21.4 percent, respectively.

To assess the extent of influence that each exogenous has on the endogenous variables, the standardized total effects and direct and indirect effects associated with each of the six variables were examined. The most dominant determinant of behavioral intention is attitude toward usage with a total effect of 0.56. This is followed by the perceived usefulness and facilitating conditions with total effects of 0.46 and 0.40, respectively. Social influence and perceived ease of use have 0.37 and 0.17 total effects on intention, respectively. Together, these five variables account for 50.3 percent of the variance in behavioral intention to use agricultural e-commerce. Perceived ease of use has larger effects on attitude toward usage, compared to perceived usefulness. Overall, the two determinants (perceived ease of use and perceived usefulness) account for 41.2 percent of the variance in attitude toward usage. Figure 3 shows the research model with the standardized path coefficient depicting the relationships among the factors.

CONCLUSIONS AND RECOMMENDATIONS

With the expansion of ICT technology, especially in rural areas, agricultural e-commerce has become an inevitable trend with rapid development. Therefore, the main objective of this study was to develop a suitable theoretical framework to understand the behavioral intention of Jahrom citrus growers towards using agricultural e-commerce. This study examined the suitability of the extended form of TAM proposed by Davis et al. (1989) as a model to explain behavioral intention. We added two additional variables (social influence and facilitating conditions) to TAM. Quantitative data were collected by a survey

Table 8

Direct, Indirect, and Total Effects of the Research Model

Outcome	Determinant	Standardized Estimates		
		Direct	Indirect	Total
Behavioral intention (R^2= 0.503)	Attitude	0.56		0.56
	Perceived usefulness	0.35	0.11	0.46
	Perceived ease of use		0.17	0.17
	Social influence	0.37		0.37
	Facilitating conditions	0.40		0.40
Attitude (R^2= 0.412)	Perceived usefulness	0.21		0.21
	Perceived ease of use	0.32	0.09	0.41
Perceived usefulness (R^2= 0.214)	Perceived ease of use	0.45		0.45

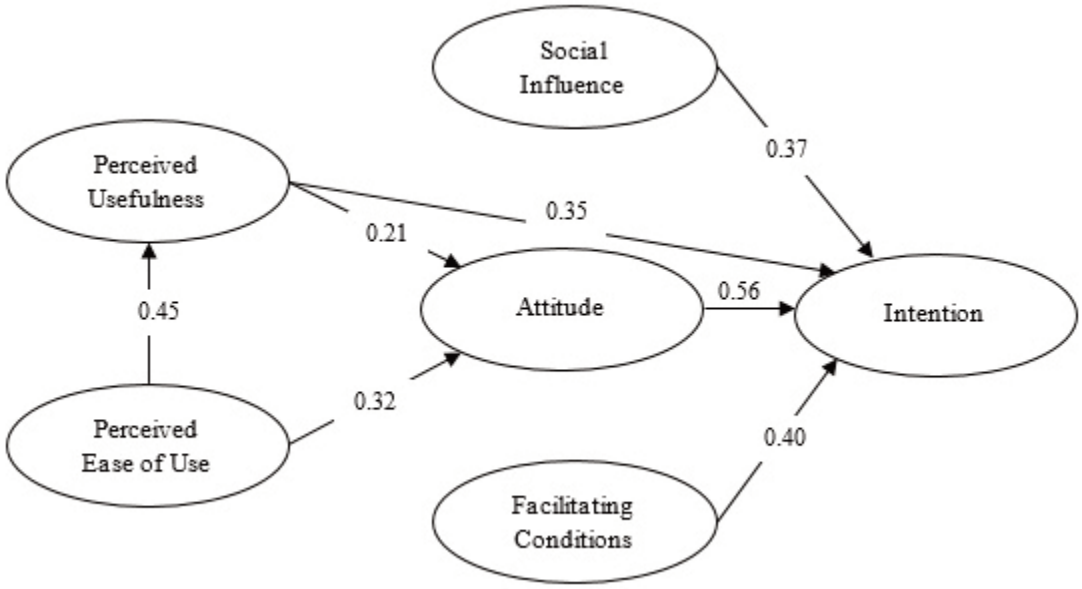

Figure 3. Farmers' Behavioral Intention Model towards Using Agricultural E-commerce

questionnaire instrument. The proposed research model identified seven hypotheses. All hypotheses were supported and the coefficients of the paths linking all model constructs (perceived ease of use, perceived usefulness, attitude, facilitating conditions, social influence, and intention) were significant. In general, the results showed that the extended form of TAM constructs was significant in explaining farmers' behavioral intention and it provided a useful framework to explain farmers' behavior intention to use agricultural e-commerce. This means that attitude, perceived usefulness, facilitating conditions, social influence, and perceived ease of use accounted for 50.3 percent of the variance in behavioral intention. Therefore, agricultural e-commerce planners should focus on these five elements (attitude, perceived usefulness, facilitating conditions, social influence, and perceived ease of use) to increase farmers' intention to use agricultural e-commerce. Attitude had a large effect on behavioral intention (β= 0.56). Therefore, it is recommended to improve farmers' attitudes towards using agricultural e-commerce through extensional and educational programs.

From the direct effects on behavioral inten-

tion, we can infer that when citrus growers have positive attitudes, they believe that technology would improve their work performance and make them more efficient, believe the organizational and technical infrastructure are existing to support use of agricultural e-commerce, and perceive that others believe they should use e-commerce in agricultural activities, they are likely to use this new technology (agricultural e-commerce). Based on the results, behavioral intention to use technology was indirectly predicted by perceived ease of use and mediated by attitude toward usage. Our findings are consistent with the previous literature in this area (Venkatesh & Davis, 1996; Agarwal & Karahanna, 2000; Chau, 2001; Roca et al., 2006; Mutahar et al., 2018; Nguyen et al., 2019; Thongsri et al., 2019).

In addition, the hypotheses of the extended TAM constructs showed that social influence and facilitating conditions have a positive and significant effect on intention towards using agricultural e-commerce. This finding is in line with the UTAUT. This theory proposes that social influence and facilitating conditions have a direct effect on the intention to use technology. In other related studies, Sombultawee (2017) also finds that social influence and facilitating conditions have a positive and significant effect on consumer intention to switch from other retail channels to mobile commerce. Therefore, the family, friends, peers, etc. who are surrounding the citrus growers will influence him or her positively or negatively to use agricultural e-commerce. In this context, the government and agricultural e-commerce planners should prepare awareness campaigns on all media, especially using social media, and target all groups of social influence (the family, friends, peers, etc.). The campaign should clarify the benefits of using e-commerce to them (Alraja, 2016). In addition, this result suggests that the government and e-commerce planners have to provide the necessary technical and educational facilities such as communication and network infrastructure in rural areas, secure and reliable Internet space, suitable agricultural e-commerce platforms, clear procedures and guidelines for agricultural e-commerce, and educational and training programs in agricultural e-commerce. These facilities can encourage and induce farmers to conduct agricultural e-commerce activities. Therefore, providing and developing appropriate agricultural e-commerce technical infrastructure along with conducting agricultural e-commerce educational and extensional programs for farmers will help them use agricultural e-commerce. Actually, long-term planning and a strong commitment are needed in this regard.

Although almost 50 percent of the variance in the dependent variable, behavioral intention to use, was explained by the five variables, over 49 percent of the variance was left unexplained. The study might have excluded other variables that might be associated with citrus growers' intention to use agricultural e-commerce. Other studies could be conducted to examine other variables and how these variables may be employed to extend the TAM to obtain a greater understanding of its predictive ability in explaining the behavioral intention to use agricultural e-commerce among farmers. In addition, consumers' behavior towards agricultural e-commerce is an important factor in agricultural e-commerce development. However, this study focused only on farmers. It is, therefore, recommended to study the consumers' intention towards agricultural e-commerce in future studies.

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How to cite this article:
Zarei, R., Zamani, G., Karimi, H. & Micheels, E. (2022). An extension of the technology acceptance model: Understanding farmers' behavioral intention towards using agricultural e-commerce. *International Journal of Agricultural Management and Development, 12*(1), 27-42. **DOR:** 20.1001.1.21595852.2022.12.1.3.2