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FOOD TRACEABILITY ON INTENTION TO USE AGRICULTURAL E-COMMERCE PLATFORMS

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Abstract

Utilizing the Internet to aid a company's operations and marketing has become an inevitable trend. In addition to brick-and-mortar storefront sales and traditional marketing methods, a majority of organizations and firms have begun to value and utilize Internet marketing. Therefore, the innovation, development, and application of Internet information technology may provide solutions to problems in agricultural product marketing and distribution channels. This study uses the Technology Acceptance Model (TAM) as a basis for exploring the degree of consumer acceptance of agricultural produce e-tailing and treats food traceability as an external factor of TAM to ascertain whether consumer desire for e-tailed agricultural produce will increase because of the introduction and intensification of e-commerce platforms and food traceability. The results suggest that perceived ease-of-use and food traceability do not have a significant direct relationship with intention to use but that both have a positive effect on intention to use through perceived usefulness; moreover, perceived ease-of-use is related to food traceability significantly. Therefore, should e-tailers wish to increase the acceptance of online shopping of produce, they must first strengthen perceived usefulness. Perceived ease-of-use also has a positive and significant effect on food traceability, helping strengthen the intention to buy agricultural products online by providing consumers with convenient and easy access to information related to the safety of the products. This research study ascertains consumer demand for the design and planning of e-tailing platforms from TAM and strengthens the effectiveness of embedding food traceability into system functions to boost consumer intention to buy produce online. In fact, there is scant research on consumer demand and e-commerce platform design focusing solely on agricultural products. Thus, to a certain

extent, the results of this study have further bolstered the research discussion and theoretical basis for providing solutions to the marketing and distribution of agricultural produce.

Key words: Technology Acceptance Model (TAM); Food Traceability; Online Shopping; Agricultural Produce

Introduction

In the process of the acceptance and use of new technology after it is introduced to the market, there will be differences in consumers' time of use because of the level of their technology acceptance (Ha and Stoel, 2009). According to Chang (2019), the popularization of the Internet in Taiwan has led to an increasing number of consumers using the Internet for shopping, with food and health products accounting for 15.6 percent (including agricultural products). Particularly with the advent of the E-generation, people are using mobile phones and mobile communication networks with increasing frequency, and traditional marketing and brick-and-mortal retail outlets can no longer keep pace with consumer demand. Thus, it stands to reason that the innovation, development, and application of Internet information technology could provide solutions for the marketing and distribution of agricultural produce.

Bitner et al. (2000) pointed out that technology could increase the amount of customer contact with companies and help facilitate service delivery. Mulligan and Gordon (2002) and Zhu et al. (2002) also hold the view that the use of information technology could feasibly enable the relationship between customers and service providers to overcome geographical restrictions as well as boosting service standards and optimizing customer acquisition costs, all of which have a significant effect on service quality and customer satisfaction. It has become an inevitable trend for businesses to use the Internet to aid their operations and marketing (Chen and Lin, 2012). In addition to brick-and-mortar store sales and traditional marketing methods, most organizations and firms have begun valuing and utilizing online marketing.

Although Taiwan's county and city governments and township and municipal farmers' associations usually have their own official websites, local specialty crop promotion and marketing websites generally are not well-integrated into their business operations, lack creativity, and are content-poor owing to the questions of manpower and funding. Moreover, the produce is perishable and needs to be operated with cold chain technology, thereby increasing management and sales costs. Therefore, few items can be sold online, and they are seasonal and vulnerable to external factors. Factors that affect product quality and other issues may also limit the scale or inventory of the produce items that can be sold online (Abad, 2003; Bakker et al., 2012; Freiboth et al., 2013). In addition to the aforementioned problems, food safety issues in Taiwan have become quite frequent in the past few years. For example, the presence of

Fipronil detected in eggs, expired ingredients or raw materials, the mixing of food and recycled waste oil, and other food safety incidents, were prevalent, the severity of which the public has been made aware. To dispel consumer misgivings about food safety (Fecke et al., 2018), the government has begun mandating the labeling of food ingredient information, production and sales history records, the Implementation of hygienic packaging, and food labeling, in addition to reforming policies and regulations and bolstering inspections. It is hoped that through the openness, transparency, and traceability of product information, consumers can buy with confidence, thereby increasing consumer purchase intention.

It is apparent from the foregoing that the promotion and marketing of local special crops on the websites of local governments and peasant associations in Taiwan generally lacks creativity and content and that different consumers have had different experiences in using technology, thus confronting them with new technology, which causes discrepancies in the degree of acceptance of new applications. In addition, the singularity of farm produce (such as its perishability, seasonality, and lack of uniformity), along with the impact of reoccurring food safety incidents that are likely to affect consumer willingness to use online shopping platforms to purchase farm produce.

This study uses the Technology Acceptance Model (TAM) as the research framework to explore consumer acceptance of online shopping for agricultural produce. In addition to ascertaining whether consumers are willing to purchase produce on e-tailing platforms, inquiries were made into the effect of the ease-of-use and usefulness on consumer willingness to purchase produce via such platforms. Moreover, traceability information was taken as an antecedent of the TAM model and used to ascertain consumer willingness to shop for online farm produce because of the platform's bolstering its traceability and security information.

Literature Review

Agricultural Produce E-tailing Business Opportunities

Consumers want to feel more confident about products and services by obtaining pertinent information in terms of both quality as well as quantity (Sheldon, 1997). The breakthrough and popularization of Internet technology have made interactions between consumers and businesses more immediate and transactions more convenient, thus solving many problems (Buhalis and Licata, 2002). Survey results show that the online population in the country is estimated to have reached 18.66 million (TWNIC, 2019), with the overall Internet penetration rate reaching 79.2 percent. Therefore, in a refined Internet infrastructure and advanced network environment, the promotion of digital economic development is highly beneficial. Judging from the survey results of the development of the e-commerce market (Institute of Information Industry, 2018), 4.5 out of every 10 transactions were completed online, with overall online shopping frequency reaching a level as high as 45 percent. China Insights Consultancy (CIC) estimates that the scale of

Taiwan's e-commerce market alone would reach 1.330 billion in 2018 (TechNews, 2018), yet in terms of agricultural produce e-tailing performance, agricultural products accounted for less than 4 percent of the top 10 e-commerce companies' overall online sales performance in 2018 (China News Network, 2019). In addition, a scale of only 40 million indicates a lukewarm reception for agricultural products in Taiwan's online shopping market and suggests that agricultural product e-tailing is an underdeveloped business model in the country.

With economic development and lifestyle changes, specialty crops have evolved from a primary industry (planting and harvesting) and secondary industry (processing and manufacturing) to a tertiary industry (i.e., service industry, including marketing and distribution). Therefore, the development of the production and marketing system has gradually changed from a producer-oriented to a consumer-oriented epoch. How to sell farm produce and how to serve customers well is what farmers and firms alike care about the most. The Internet has played an increasingly important role in the development of the tourism industry, coupled with the fact that the use of the Internet to bolster firms' operations and marketing has become an ineluctable trend for businesses. The Internet has become an integral and indispensable marketing tool for the travel industry. Granted, the Internet cannot completely supplant actual contact with and service from real professionals, but at the very least, it has been gradually playing an important role in product marketing and promotion and can compensate for the shortcomings of advertising media, time, and place constraints and insufficient physical channels. In the final analysis, the Internet is a suitable sales and marketing channel for farm produce.

Food Safety vs. Food Traceability

Regardless of the industry or consumers, the online agricultural product market is still in its nascent stages of learning and exploration. A great many studies have pointed out consumer misgivings regarding online shopping. In addition to the fact that consumers are used to buying from physical channels (such as markets or supermarkets), their skepticism also includes uncertainties about e-commerce system processes and products, inconsistent quality, and difficulties in obtaining returns, all of which reduce online purchasing intention (Chang et al., 2005; Hernández et al., 2010; Sahoo et al., 2018). This is particularly with respect to the characteristics of the agricultural products themselves, including their perishability, seasonality, and pricing fluctuations in the peak and off seasons (Marucheck et al., 2011), which make consumers wary of the business model of online shopping for agricultural products. Even the ubiquity of food safety issues both large and small has set the bar higher for the quality and safety of foods that consumers ingest, all of which are a real test for farm produce e-tailing as a business model. The scale of the agricultural product e-commerce market is still difficult to develop, and the proportion of online shopping purchases remains low.

Safe food should be treated as a given for any country's citizens. However, agricultural producers, and the food industry as a whole, use large amounts of pesticides, fertilizers, or genetically modified crops and add illegal additives, dyes, or preservatives to mass-produced food to save money. Food safety incidents have occurred frequently in Taiwan recently (Peng et al., 2017; Timothy, 2015) and have seriously affected the public's health, which has gradually led to a general awareness of the importance of food safety. Therefore, to ensure that food is not corrupted in the supply chain, greater attention is being placed on food sources (Kim and Woo, 2016; Wang and Tsai, 2019) and on the chemicals that are used in the raw materials. When food incidents occur, the public initiates a boycott, even calling on more people to participate in the boycott via the Internet.

Moreover, food safety issues cannot be identified for many products with the naked eye or sense of smell. Even as the food supply network becomes more complex, the health damage caused by food-related diseases has made the purchasing decisions of agricultural products an increasingly arduous task. For example, Mad Cow Disease in the United States and Canada (Pouliot and Daniel, 2008) caused the government to assume the mantle of food safety gatekeeper (Kang et al., 2014). It conducts regular and spot inspections and checks of the manufacturing and production processes of product suppliers through pertinent government units or professional inspection agencies (Ko, 2015; Al-Kandari) et al., 2019). Just in case there are concerns with product ingredients and contents, they can be published immediately on government external websites and publications in real time, ensuring transparent communicated to consumers to safeguard them from food safety risks.

Therefore, the government has put forward policies and systems pertaining to the safety and quality of agricultural products to boost the confidence of the people in farm produce. Practices in this regard include mandatory labeling of nutrition and ingredient information, provision of traceability records, strengthening of hygienic packaging processes, and promotion of credible food safety labels (Ndraha et al., 2017; Shen, 2016). From additive content management, product source traceability, food production, and processing sanitation requirements to promoting safety and sanitation standards for producers through certificate authority and for manufacturers through systematized production processes and workflows and systems that confirm the presence of certain product quality guarantee labels after authentication.

Agricultural E-Commerce Platform Acceptance

The TAM, put forth by Davis (1986), is based on the Theory of Reasoned Action (TRA) but abandons the TRAs subjective norms, beliefs, and compliance motivations. It combines Expectancy Theory (i.e., perceived usefulness) with Self-Efficacy Theory (i.e., perceived ease-of-use) to develop a research framework that is used to predict user acceptance of new technologies (Taherdoost, 2018) and is often used in

the field of information systems and management. The TAM was initially used to explore student acceptance of e-mail and writing software (Davis et al., 1989) and was gradually expanded by scholars to explore different people, different software and hardware, different workplaces, and different temporal backgrounds.

Lu et al. (2019) analyzed and ascertained the reasons for which users are obsessed with the Internet from the perspective of psychological and emotional needs, including interpersonal relationships, personal autonomy, IT capability, and social class. When compared with other models, the TAM is equally endowed with theoretical foundation and simplicity. It has been adopted by many studies, is generally supported by positive empirical results (Min et al., 2019), is a behavioral survey aimed at apprehending whether users would accept new information application designs, explains user acceptance of the new information system, and analyzes the factors that affect user acceptance. Of them, perceived usefulness and perceived ease-of-use are related to external variables. Therefore, this study holds that the TAM should be applied to research on the acceptance and intention to use agricultural e-commerce platforms.

Van Wezemael et al. (2007) assert that consumers will discern the quality of food by considering its various characteristics (such as coloration, labeling, traceability information, and ingredient lists) in the decision-making process. Moreover, Van Rijswijk and Frewer (2012) hold that farm produce is a characteristically low-involvement item. When purchasing agricultural products, consumers are unlikely to spend much effort searching for information. Therefore, businesses and producers can proactively and transparently present agricultural products and the content of the raw ingredients used, by way of food label and background information use, in an effort to improve the transparency of production and marketing information (Overbosch and Blanchard, 2014). This will effectively reduce the time consumers spend researching food information and allow them to clearly evaluate the quality of the product and source information, providing them with a reference for purchasing decisions.

Research Design

The conceptual model of this study added food traceability elements onto the TAM, which provides the basis for the model. Other dimensions include perceived ease-of-use, perceived usefulness, and intention to use (as shown in Figure 1). E-commerce is widely used in many different industries. Agriculture is limited to playing a minor role in the world of e-commerce (Hansen, 2008) by the perishability of produce and its inherent characteristic of a production process that is difficult to standardize (Geng et al., 2007). As it stands now, the farm produce online shopping market is still developing. Consumers are still waiting to see the e-tailing of agricultural products, such as online shopping of fresh produce, bear fruit. With the advancement of technology, both fresh produce and processed products are becoming increasingly diversified, and therefore, this research study has not limited itself to a single agricultural

product item but seeks to confirm consumer intention to use online shopping platforms to purchase agricultural products.

In the TAM architecture, perceived usefulness refers to the user's subjective belief that in a specific situation, the use of the system can improve their work performance. People tend to use systems that they think can help them do better. Therefore, the higher the user's perceived usefulness the more positive the attitude and willingness to use this technology. However, perceived usefulness is affected by both perceived ease-of-use and external variables. Perceived ease-of-use refers to how simple the system is to use. When the user recognizes that the system is easier to use, self-efficacy and self-control increase, and the user will have a more positive attitude toward adopting the system. Perceived ease-of-use is affected by external variables. Behavioral intention is the magnitude of the user's willingness to use the system, which is affected by both perceived usefulness and perceived ease-of-use. In this study, the external variable is food traceability.

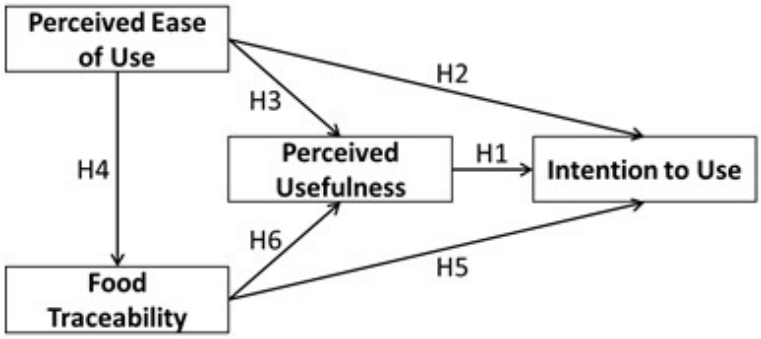

Figure 1. Conceptual Model

Hypothesis Testing

Technology Acceptance Model

Online shopping websites are essentially a form of information technology, which is the reason why part of the concept of buying farm produce online can be explained through an IT model. Previous research (Bounagui and Nel, 2009; Rose and Straub, 1998) has indicated the reliability of the TAM model in various information technology acceptance studies, with the model being applicable in a host of nations globally. Thus, many scholars have applied it to the e-commerce industry (Lee et al., 2001) to explore consumer attitude or intention to use information technology through its simplicity and utility. Of these dimensions, perceived usefulness refers to the question of whether users recognize a new technology's ability to improve or boost their work efficiency. Therefore, when used in an online shopping context, it means that consumers believe that online shopping can improve their shopping efficiency

(Cho and Sagynov, 2015). Ease-of-use refers to how straightforward it is for users to learn to use a new technology. In light of the preceding, the basic logic of the TAM holds that users likely choose to use information technology rationally and that the more practical and user-friendly the site, i.e., if the site allows users to complete the tasks they want, the more frequently the site is used. Online shopping platforms can provide consumers with "one-stop shopping" services, and an abundance of shopping needs can be met—all on one site. When an online shopping platform can improve consumer shopping efficiency (Faqih, 2013), it can effectively boost consumer repurchase rate. Thus, this study proposes the following hypotheses:

Hypothesis 1: Perceived usefulness has a positive effect on the intention to purchase agricultural products online.

Hypothesis 2: Perceived ease-of-use has a positive effect on the intention to purchase agricultural products online.

Hypothesis 3: Perceived ease-of-use has a positive effect on the perceived usefulness of purchasing agricultural products online.

The Technology Acceptance Model and Food Traceability

Online shopping websites are commercial entities that consumers use to transact with when they consume online. When there are risk factors for both buyers and sellers in online transactions, trust becomes the most important issue (Reichheld and Schefter, 2000). When laws applying to online exchanges are not robust enough, the establishment of a transaction depends entirely on the trust of consumers in online shopping websites. Therefore, when the approach of online shopping websites conforms to social moral standards and behaviors, they are considered trustworthy, and most consumers are conceivably willing to pay higher fees to trade with them. Therefore, an online shopping platform should address the four points of information mentioned in the foregoing. If the platform brings together labeling nutrition and ingredient information, providing traceability records, strengthening hygienic packaging procedures, and promoting credible food safety labels, these four factors can ensure product quality (i.e., food traceability) and can be integrated into the consumer purchasing interface to promote consumer trust in online shopping websites (Gefen, 2000). This, in turn, feasibly increases their willingness to spend more generously because the online shopping websites not only create a sound relationship between traditional buyers and sellers but also reduce the risks associated with online shopping.

If a consumer's perceived ease-of-use is higher and the online shopping platform is more user-friendly, confidence in self-efficacy and self-control on the part of the users increases, and their attitude toward the system becomes more positive. Therefore, using intuitive and effective functional mechanisms that provide product information for consumer reference

purposes can reduce the time required to collect and seek out information that guarantees the safety of agricultural products. Moreover, food safety incidents have compromised consumer trust in food companies in the wake of issues that include unmarketable products, products removed from shelves, and even indemnification, causing tremendous losses to companies. An online shopping platform could proactively provide information on the quality of farm produce so that consumers can decide whether to purchase on the basis of this information. This will also increase their satisfaction in service received and confidence in the product quality of the online shopping platform (Ortega Egea and Román González, 2011), bringing about a positive attitude toward agricultural e-tailing. Therefore, this research proposes the following hypotheses:

Hypothesis 4: Perceived ease-of-use has a positive effect on consumer perception of food traceability.

Hypothesis 5: Food traceability has a positive effect on the intention to purchase agricultural products online.

Hypothesis 6: Food traceability has a positive effect on the perceived usefulness of online agricultural products.

Research Methodology

The research structure of this paper is shown in Figure 1. It is hoped that consumer acceptance of online shopping for agricultural produce can be understood through the TAM foundation and by further adding the antecedent—food traceability. If information related to agricultural product quality is integrated into the e-commerce platform, consumers can be provided with an evaluative reference. That could conceivably strengthen consumer willingness and positive attitudes toward purchasing agricultural products online. The variables in the research framework include the intention to use, perceived usefulness, perceived ease-of-use, and food traceability.

The design of the questionnaire items (as listed in Table I) is mainly based on previous TAM-related research and modified on the basis of the research context and expert opinions. According to the definition suggested by Davis (1989), "perceived ease-of-use" refers to "the degree to which a person believes a specific information system is easy to use." It is thus defined in this research as follows: "The degree to which consumers believe an online shopping platform for farm produce to be easy to use." In terms of operationalization, the scales suggested by Davis (1989) and Davis et al. (1992) were referred to and modified according to the research context and include five items. According to the definition suggested by Davis (1989), "perceived usefulness" refers to "the degree to which an individual believes that the use of a specific information system will be helpful to his or her job performance." This study thus defines it as "The degree to which consumers believe that an online shopping platform for agricultural products is helpful to their consumption process." In terms of operationalization,

the scales proposed by Davis (1989) and Davis et al. (1989) were referred to and modified according to the research context and include four items.

According to the definition of Davis et al. (1992), "behavioral intention" refers to the "intensity of an individual's desire to perform a specific action." This study thus defines "intention to use" as "the intensity of consumers' willingness to use an online shopping platform for agricultural products." In terms of operationalization, it is based on the scale proposed by Taylor and Todd (1995), has been modified according to the research context and expert opinion, and includes five items. Finally, "food traceability" refers to the "transparency of information on the production and sales process of agricultural products as well as the content of raw materials added or used and the improvement of transparency of production and sales information through tracking methods such as food labeling and background information." After subject matter experts' discussion and revision, there are four items, and this part of the content is mainly based on research on how to control food safety-related discussions and recommended practices (Al-Kandari et al., 2019; Ko, 2015; Ndraha et al., 2017).

With regard to research subjects, according to Hansen (2008), research subjects with online shopping experience should be included. Therefore, to ascertain whether online shopping consumers will purchase produce through e-commerce platforms, this study distributed online questionnaires, 185 of which were recovered. After factoring out invalid samples (including those with no online shopping experience and incomplete answers), 172 questionnaires remained for subsequent data analysis. The basic statistics of the respondents are shown in Table II. The questionnaire is designed as a 7-point Likert scale, with strongly disagree being 1 and strongly agree being 7. There are four constructs. Each construct, with four to five questions, was modified after referring to the pertinent literature to create suitable content. Therefore, before the questionnaire was formally distributed, a pre-test was conducted, with the first draft of the questionnaire distributed among three senior university students, who were asked to sample it, and the second stage of discussion and revision of the content of the questions considered vague or unclear was subsequently pursued.

Considering the sample size, Partial Least Squares (PLS) was employed in this research study as an analysis tool for the research model (Ringle et al., 2005). PLS is a component-based structural equation modeling analytical technique that examines the relationships among latent variables and considers the relationship between latent variables and observation items (Chin et al., 2003). PLS-SEM is more suitable for this research study than other SEM data analysis methods because of its looser requirements on data distributional assumptions, its applicability to small sample sizes, and its suitability for exploratory research.

Table I. Construct Measures

Construct	Questionnaire Items	Sources
Intention to use (IU)	IU1 I tend to buy agricultural products online. IU2 I am optimistic about the development of the e-tailing of agricultural products in the future. IU3 I will try to purchase agricultural products online. IU4 I am interested in purchasing agricultural products online. IU5 I will recommend relatives and friends to purchase agricultural products online.	Davis (1989); Dodds et al. (1991); Taherdoost (2018)
Perceived usefulness (PU)	PU1 I can buy the agricultural products I need online. PU2 Buying agricultural products online can increase the speed of purchasing. PU4 Buying agricultural products online is helpful for daily purchasing decisions.	Davis (1989); Cho and Sagynov (2015)
Perceived ease-of-use (PEOU)	PEOU1 Learning how to shop online for agricultural products is easy. PEOU2 I am proficient in operating the functions of a general online shopping website to purchase agricultural products. PEOU3 It is clear and easy to understand the product pages for general online purchase of agricultural products. PEOU4 It is easy to familiarize myself with how to buy agricultural products online. PEOU5 Purchasing agricultural products online is easy.	Davis (1989); Bounagui and Nel (2009)
Food Traceability (FT)	FT1 Nutrition information is indicated on online shopping platforms. FT2 Production and sales history records are provided on agricultural e-commerce platforms. FT3 Agricultural products sold online are strictly processed with hygienic packaging. FT4 Agricultural products on the Internet are guaranteed by credible food safety labels.	Ko (2015); Ndraha et al. (2017); Al-Kandari et al.(2019)

In the measurement model, Fornell and Larcker (1981) suggested that the reliability and validity of the questionnaire can be verified through

Composite Reliability (CR) and Average Variance Extracted (AVE). CR must exceed 0.7 and AVE must exceed 0.5. In modeling the nodes, because the statistical significance of each path coefficient is estimated using the Bootstrapping Re-sampling method, it is necessary to set the number of samples for repeated sampling. Tenenhaus et al. (2005) recommend that it be set to at least 100. If researchers want to obtain a more reasonable estimate of the standard error parameter, they can set a value greater than 100. In this study, a value of 1000 is set.

Table II. Sampling Profiler

Variable	Item	Number of times	Percentage (%)
Gender	Male	82	47.7
	Female	90	52.3
Age	16-25	29	16.9
	26-35	62	36.0
	36-45	45	26.2
	46 or over	36	21.0
Education	Secondary Education or Lower	37	21.3
	University	119	69.2
	Graduate School and Higher	16	9.5
Occupation	Service Industry	35	20.5
	Manufacturing Industry	36	20.9
	Student	69	40.1
	Army, civil service and education	12	7.0
	Housewife	19	11.0
	Other	1	0.5

Data Analysis

Measurement Model

According to Table III, the CR values of the constructs in this study range from 0.878 to 0.948, which is in line with the value recommended by Hair et al. (2010), indicating that the various questionnaire items within the construct are highly correlated and can measure the same construct; in other words, the underlying construct is measurable. The AVE value is between 0.644 and 0.820, which is in line with the recommended value of Fornell, and Larcker (1981), indicating that the reliability of the questionnaire items used in each study meets the requisite statistical threshold value and has good

convergence validity. In addition, Hair et al. (2010) suggested the need to confirm the discriminant validity of the latent variables during the measurement model stage. It is necessary to observe whether the results after the root sign of the AVE value are greater than the correlation coefficients of other survey variables with different constructs. The results after the root sign of the AVE value in Table IV (between 0.8025 and 0.9055) are larger than all the correlation coefficient values, indicating that the latent variables of this study are not the same and that they have good discriminant validity.

Table III. CFA Results

Construct	CR	AVE	Factor Loading		Std. Estimate	t-value
IU	0.948	0.785	IU1	0.871	0.032	26.945
			IU2	0.913	0.023	40.532
			IU3	0.927	0.017	54.276
			IU4	0.855	0.068	12.508
			IU5	0.862	0.033	26.102
PU	0.948	0.820	PU1	0.903	0.029	30.816
			PU2	0.925	0.027	33.937
			PU3	0.885	0.033	26.874
			PU4	0.910	0.020	45.576
PEOU	0.946	0.777	PEOU1	0.851	0.034	25.246
			PEOU2	0.856	0.031	27.780
			PEOU3	0.901	0.019	47.150
			PEOU4	0.912	0.030	29.983
			PEOU5	0.886	0.047	18.800
FT	0.878	0.644	FT1	0.822	0.057	14.301
			FT2	0.848	0.042	20.063
			FT3	0.783	0.063	12.369
			FT4	0.754	0.104	7.224

Table IV Means, Standard Deviations, and Correlations

	Mean	SD	1	2	3	4
1. IU	4.351923	1.506951	0.8860			
2. PU	5.004808	1.395337	0.532	0.9055		
3. PEOU	5.151923	1.363577	0.684	0.590	0.8815	
4. FT	5.019231	1.317030	0.469	0.501	0.511	0.8025

Note: Values in bold italics are the AVE values after the root sign.

Structural Model

In terms of the results of the Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis and verification of the research framework proposed for the structural model stages in this study, the path analysis diagram is shown in Figure 2. Two of the six hypotheses showed no significant results, and the results are listed in Table V. Perceived ease-of-use and food traceability have a direct and significant effect on the perceived usefulness ($\beta = 0.446$, $p < 0.001$; $\beta = 0.288$, $p < 0.01$); thus, H3 and H5 are supported. Moreover, both perceived ease-of-use and food traceability must have a significant effect on intention to use through perceived usefulness ($\beta = 0.530$, $p < 0.001$); thus, H1 is supported, and perceived ease-of-use has a significant effect on food traceability ($\beta = 0.501$, $p < 0.001$); thus, H6 is supported.

Results

According to TRA (Davis et al., 1992), users' attitudes and behavioral intentions toward new technologies or new applications are affected by two factors: perceived usefulness and perceived ease-of-use. From Figure 2, perceived usefulness has a positive and significant effect on behavioral intention, indicating that consumer recognition of the usefulness of the online shopping environment should reinforce consumer motivation to purchase agricultural products through online shopping platforms. Perceived ease-of-use is a pre-factor of perceived usefulness. Perceived ease-of-use has a positive and significant effect on food traceability but does not affect behavioral intention, meaning that within the context of online shopping for produce, simply strengthening the online platform's purchasing functions, mechanisms, or user interface does not in and of itself increase consumer intention to shop online for agricultural products. Rather, the pertinent functions, mechanisms, and user interface design have to be acknowledged before consumers' perceived usefulness could truly be strengthened.

Table V. Results of Hypotheses Testing

Hypotheses	Path Direction	St. Estimate	T Statistics	P	Result
H1	PU→IU	0.099	5.400	0.000***	Supported
H2	PEOU→IU	0.104	1.534	0.125	Not supported
H3	PEOU→PU	0.097	4.656	0.000***	Supported
H4	FT→IU	0.110	1.087	0.288	Not supported
H5	FT→PU	0.123	2.291	0.021**	Supported
H6	PEOU→FT	0.073	6.994	0.000***	Supported

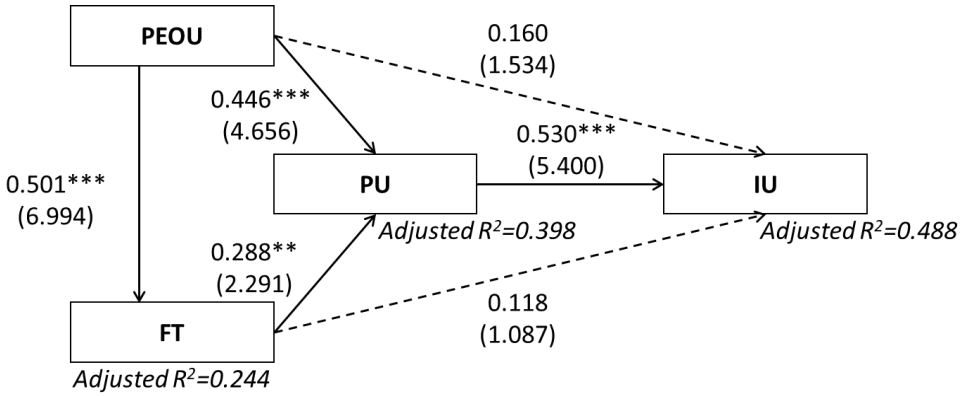

Figure 2. PLS-SEM Proposed Model Test

Note: Regular numbers represent path coefficients. Numbers inside the brackets represent T statistics. ** and *** denote significance levels of 0.01 and 0.001, respectively

According to Table I, the implications of "perceived usefulness" include the ability of online shopping platforms to help consumers purchase the necessary agricultural products, accelerate their purchase, experience increased convenience, and sense that the use of purchasing special crops online is beneficial to their lives. The end goal is to allow consumers to enjoy the convenience, time-savings, transparent online price comparisons, dynamically updated product discounts, new product information, and consumer reviews. Then, there is the convenience of purchasing products online whenever they so desire (Hajli et al., 2014; Lambrecht and Tucker, 2013; Lewis, 2011; Zhang et al., 2010). Thereby, consumer willingness to buy agricultural products on online shopping platforms is strengthened and so is their willingness to recommend relatives and friends to purchase produce online as well.

Similarly, food traceability can enhance consumers' confidence and convenience in that they can purchase on the online platform safely, comfortably, and with guaranteed quality through the enhancement of perceived ease-of-use. Furthermore, this effect indirectly strengthens consumer perception of the usefulness of online shopping platforms. For producers and online shoppers, thought has to go into designing a simple, clear, and quick integration of information, including nutrition information, food traceability records, and food safety labels, to ensure that the produce can meet the relevant national health and safety regulations and standards.

Conclusion

Food traceability has become a term (A buzz word) related to food, food safety, and food safety accidents, which is getting widespread attention and application. Since January 2005, the EU has implemented mandatory traceability management (Mandatory traceability) for all food and feed products. In modern society, the establishment of a sound food traceability system has been a

common requirement of food companies, consumers and governments, and has become the development trend of global food safety management. In recent years, food safety cases have occurred repeatedly, and it is urgent to adopt a safe, credible and transparent food safety traceability system to strengthen the supervision efficiency of the food industry chain, improve the level of food safety, and protect the health of the people. The establishment of a food traceability system is one of the important measures for food safety assurance. Therefore, establishment of a food traceability system is conducive to consumers to grasp relevant food information in real time, is conducive to the supervision of food quality indicators and safety by the regulatory authorities, and is conducive to the food safety management of food companies Strengthening of consciousness.

The purpose of this research study was to explore consumer acceptance of online shopping for agricultural products and to ascertain whether it is possible to strengthen consumers' willingness to buy agricultural products online through the factors of perceived ease-of-use and perceived usefulness. In addition, food traceability is treated as an external variable of the TAM model to determine the degree of importance to consumers with respect to whether they can purchase safe food on the online shopping platform with confidence, thereby increasing their willingness to use the online platform. From the previous discussion, it is apparent that perceived usefulness does have a significant effect on consumers' behavioral intentions and that perceived ease-of-use strengthens consumers' perceived usefulness of agricultural e-commerce and increases consumers' peace of mind with respect to food traceability. However, perceived ease-of-use does not have a significant direct effect on behavioral intention. The introduction of food traceability into online shopping platforms strengthens consumers' perceived usefulness of online shopping agricultural products. However, food traceability does not have a significant effect on behavioral intention.

It is apparent that simply enhancing the ease-of-use of the online shopping platform or providing information about product quality and safety likely does not have a significant effect on consumers' behavioral intentions of shopping online for agricultural products. As mentioned in the previous section, the purchasing functions, mechanisms, user interface, or process designs provided by the platform have to effectively address and respond to consumers' ease-of-use demands and concerns through effective and convenient operation. Providing additional traceability information on the agricultural products can reduce consumers' misgivings about food safety and help increase consumer confidence and willingness to purchase agricultural products online.

Simplifying the purchasing process and allowing consumers to enjoy convenience and time-savings can certainly reduce consumers' resistance toward e-commerce. Minimizing the complexity of the purchasing process brings consumers a sense of ease on the

online shopping platform. Although this cannot directly or effectively increase consumers' willingness to purchase produce online, it can effectively improve consumer perception of the usefulness of online shopping platforms. As far as agricultural products are concerned, buyers traditionally comparison-shop to find the lowest price and have seasonal buying and hygiene management habits. Online shopping platforms can use transparent price comparisons, product discounts, timely promotion of new product information, and consumer reviews or discussion areas to address the consumers' "need to know." In addition, the importance of food safety and quality is also a factor influencing consumers' purchase of agricultural products. It has a direct and significant effect on the perception consumers have of whether online agricultural products are useful to them. Moreover, integrating the food traceability elements into the design and considerations of the website's functionality and usability can effectively improve their evaluation of the usefulness of online shopping platforms.

In Figure 2, perceived usefulness of shopping for agricultural produce online has the highest path coefficient to the behavioral intention factor, showing that consumers are most concerned about the usefulness of the online shopping platform. Therefore, future research can add other external factors that might affect perceived usefulness, including the technological readiness level of the consumers themselves (such as (Parasuraman, 2000)) and the quality and safety demands for agricultural products (such as (Rehber, 2012)). More in-depth analysis and discussion could be performed, and the research capacity and theoretical basis of potential factors affecting the development of the online shopping market for agricultural products could be continually expanded, thus helping online shoppers and growers alike to improve and develop the online agricultural product market's operational efficiency and consumer acceptance.

Research Limitations

Because this research study is not limited to a single produce item, the increasing diversification of fresh produce or processed products is a situation that has to be addressed. Therefore, future studies could conduct further research into specific categories or items of agricultural products (such as apples, meat, and vegetables) and explore the online shopping environment or consumer demand for different produce items. For example, in Taiwan, it has to be indicated clearly as to whether products contain Ractopamine, in order to continue to expand the online shopping categories of agricultural products and increase consumer satisfaction. In addition, the sample used in this study only considered Taiwanese consumers as the subject of the survey. Moreover, the author has expanded the sample size as much as possible within a limited time and strived to balance the proportions of all age groups. However, the results of this study can only represent the status of the respondents. In the future, interested researchers can continue to expand the sample size to facilitate Analyze the food traceability

mechanism provided by online sales of agricultural products or its impact on consumers' purchase intentions. Therefore, the question of whether there might be similar analysis results for the different aspects of the TAM model in agricultural e-tailing in different countries is certainly worthy of interest and continued exploration for researchers.

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