Print ISSN: 1738-3110 / Online ISSN 2093-7717
JDS website: http://www.jds.or.kr/
http://dx.doi.org/10.15722/jds.20.02.202202.65

E-commerce Adoption in Distribution: An Empirical Study on Household Businesses in Food and Beverage Industry

Xuan Truong NGUYEN[1], Thai Ha NGUYEN[2], Huynh Phuong DANG[3], Thi Lan Phuong PHAM[4], Thi Thanh BUI[5], Nhat Minh TRAN[6], Tri An HUYNH[7], Nam Phong NGUYEN[8]

Received: January 2, 2022. Revised: Janaury 28, 2022. Accepted: February 05, 2022.

Abstract

Purpose: This study aims to identify factors affecting the adoption of e-commerce by household businesses in Vietnam's food and beverage industry. **Research design, data and methodology:** The integrated TAM and TOE frameworks and ten hypotheses were developed to test the relationship between relevant factors. A cross-sectional survey was conducted to collect valid data from 992 respondents who run F&B household businesses in Vietnam. **Results:** The empirical research results confirm all proposed hypotheses that e-commerce adoption is affected by the perceived usefulness, the perceived ease of use, vendor support partners, social expectancy, competitive pressure, subjective norm, and household resources. Meanwhile, technical readiness, environment readiness, and organization readiness are intermediate variables that influence the implementation of e-commerce in food and beverage distribution. **Conclusions:** The findings suggest effective orientations to foster the food and beverage e-trading practice for household businesses in developing countries. Accordingly, to encourage private household businesses to adopt e-commerce, it is necessary to focus on improving business resources, technology readiness, environment readiness, and organization readiness through raising awareness of usefulness, benefits, perceived ease of use, and increased support of vendor partners. Future research can focus on improving the efficiency of e-commerce applications in F&B distribution for both household businesses and larger-scale enterprises.

Keywords: E-commerce adoption; Distribution, Household businesses; Food and beverage industry, TAM and TOE frameworks; F&B distribution.

JEL Classification Code: L81, M15, M30.

1. Introduction

The Internet and electronic commerce have changed the business environment and created opportunities for firms and consumers worldwide. It has helped reduce trade barriers, increase employment, and promote economic growth (Das, 2018), while enabling firms to improve competitiveness, generate high profits, and promote growth (Susanty, Handoko, & Puspitasari, 2020). Biagi and Falk (2017) stated that e-commerce could generate benefits in both developed and developing countries. Since the 2000s,

1 First and Corresponding Author, PhD, Dean of Marketing faculty, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: ts.truong@ufm.edu.vn.
2 Second Author, MBA, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: nguyenthaiha@ufm.edu.vn
3 Third Author, Master of Art in Strategic marketing, Marketing faculty, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: Dhphuong@ufm.edu.vn.
4 Fourth Author, Master of Business in Integrated marketing communication, Marketing faculty, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: ptlphuong@ufm.edu.vn.
5 Fifth Author, MBA, Marketing faculty, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: buithithanh@ufm.edu.vn.
6 Six Author, MBA, Marketing faculty, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: minhtn@ufm.edu.vn.
7 Seventh Author, MBA, Marketing faculty, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: huynhan@ufm.edu.vn.
8 Eighth Author, MBA, Marketing faculty, University of Finance - Marketing, Ho Chi Minh City, Vietnam; Email: namphong@ufm.edu.vn.

e-commerce has been used by large enterprises in developed countries and has continued to be a phenomenon in developing countries for recent years, especially with household businesses. E-commerce was mostly adopted in large enterprises, while the application in small and medium enterprises still experienced some barriers. In the food and beverage industry, this technology allowed consumers to experience and shop online quickly, pay securely, and help businesses reduce costs, increase efficiency, and improve customer service (Moisescu, 2018).

For the last several decades, researchers have developed various theoretical methods to explore the adoption of technology and e-commerce. The two leading models advocated by influential experts in information technology and e-commerce adoption are the Technology Acceptance Model (TAM) and Technology Organizational Environment (TOE). The TAM, proposed by Davis (1985), stated that users' motivation could be driven directly by three external factors called Perceived Usefulness; Perceived Ease of Use; and Attitude towards using the system. TAM has been widely used, but it does contain limitations. The most outstanding shortcomings are that TAM looks at future behavior, not actual behavior (Schillewaert, 2005; Wu, 2011), and it fails to concern the effects of external environmental factors. Furthermore, in practice, TAM examines the application of electronic commerce at the individual level, not the organizational level.

On the other hand, the TOE model, originally proposed by Tornatzky and Fleischer (1990), interprets business owners' intention to employ e-commerce in the technological, organizational, and environmental context. The TOE model is especially suitable for internet-based innovations to explain organizational behavior under the application of information technology (Paris, Bahari, Iahad, & Ismail, 2016; Abualrob & Kang, 2016). Compared to TAM, the TOE model is more suitable for studies of organizations rather than individuals. Due to its positive impact on business performance, e-commerce remains an interesting research area. However, to date, there has been a lack of research on the affective factors or barriers to both the acceptance and application of e-trading in private enterprises in Vietnam. This study can fulfill the research gap by examining factors influencing the practice of electronic commerce by household businesses in the food and beverage industry in Vietnam. The novelty of this study is the exploration and empirical evaluation of these factors based on the integration of the TAM and TOE models. Understanding the factors affecting e-commerce application by household businesses is very important to set out an improvement scheme for e-business effectiveness not only in Vietnam but also in other developing countries with similar economic situations.

In 2019, Vietnam is recognized as one of the most attractive F&B markets worldwide (ranked at the 10th position in Asia). Total revenue from selling food and drinks reached VND 975,867 billion (rising by 3.8% year-on-year) in 2020. And the contribution of the food and beverage industry to GDP was approximately 15.8%. Food and beverage spending currently make up the largest proportion of the monthly expenditure structure of consumers (about 35% of spending). It is estimated that there will be about 17 million middle-class households in Vietnam by 2030. In the next decade, Vietnam is expected to become the third-largest urban market in consumer numbers and the fifth largest in total spending in Southeast Asia. Importantly, in recent years, the development of e-commerce practice is one of the fastest-growing trends in Vietnam's F&B distribution. Especially in 2021, the COVID-19 pandemic has put an end to many F&B brands. Plenty of traditional business activities was hampered. However, this also brings new opportunities for those businesses that operate e-commerce activities and omnichannel distribution.

This study sought to identify the key elements influencing online trading employment in the F&B industry. Specifically, the study focuses on the following factors: perceived usefulness, perceived ease of use, vendor partner support, competitive pressure, social expectancy, subject norms, resource, and technology readiness, environment readiness, and organization readiness. These factors are important for various reasons. Firstly, recent research has shown that perceived usefulness, perceived ease of use, and vendor partner support are key drivers of technology readiness impact on adopting e-commerce (Susanty et al., 2020; Rana, Barnard, Baabdullah, Rees, & Roderick, 2019; Nguyen & Luu, 2020; Lee & Shim 2007; Ahmad, Abu Bakar, Faziharudean, & Mohamad Zaki, 2015). Secondly, the F&B industry depends on the environment, such as competitive pressure and social expectation for successful operations. Thus, F&B household businesses frequently have to speedily ensure environment readiness. Thirdly, the F&B industry in Vietnam is dominated by family-led, small-sized businesses. As such, the owner household business' attitudes and characteristics are strongly reflected in subject norms and their resources (Peters, Kallmuenzer, & Buhalis, 2019; Rowe, Truex, & Huynh, 2012). However, to date, research on the relative importance of these factors for adopting online trading platforms in the household business sector of the F&B industry is scarce. Therefore, this study aimed to answer the following.

Unlike larger enterprises, household businesses in the F&B industry are operated at small scales with individual characteristics. Most management decisions are influenced by the owner's opinion and related management system factors. It is necessary to identify factors that affect the application of e-commerce by F&B business households in

Vietnam. The answer to this question helps scholars and policymakers have solutions to promote e-commerce applications for household businesses in Vietnam and other countries with similar contexts.

The study develops an integrated conceptual framework including environmental and technological factors from the TOE and affective perceived ease of use, usefulness, and subjective norm from the TAM model, and social expectations from the unified theory of acceptance and use of technology (UTAUT) model. The vendor partner support, competitive pressure, social expectancy, resource, technology readiness, environment readiness, and organization readiness are from the TOE model. The factors described above formed the independent and mediating variables for this research, with the application of e-commerce being the dependent variable.

2. Literature review and hypotheses development

2.1. Perceived usefulness (PU)

The perceived usefulness of technology was an important element in the TAM model that led to changes in technology adoption behavior (David, 1989). According to Davis (1989), the term perceived usefulness refers to how a person believed that using a particular system would enhance their job performance. The perceived usefulness of e-commerce is also considered as one of the important factors for household businesses to apply this platform in their business activities (Nguyen, 2019). The perceived usefulness of e-trading included saving time, costs, and human resources in the business process (Susanty et al., 2020). According to Rahayu and Day (2015), perceived usefulness, compatibility, and cost of e-business influenced the implementation of e-commerce technology. In addition, the perceived usefulness of online commerce refers to the degree to which an organization accepts the possible advantages that electronic commerce technology can bring to an organization. Thus, the perceived usefulness of e-commerce was suggested to positively trigger an organization's technological readiness (Kabango & Asa, 2015; Rana et al., 2019). Therefore, this study proposes the following hypothesis:

H1: Perceived usefulness positively impacts technology readiness.

2.2. Perceived ease of use (PE)

Davis (1989) proposed perceived ease-of-use as “the degree to which a person believes that using a particular system would be free from effort." Perceived ease is then related to how easy it is to access a technology system and its display. According to Jones and Kauppi (2018), ease of use influenced technology adoption. Teo, Ursavas, and Bahcekapili (2011) suggested a relationship between perceived ease of use and intention to use technology. New technology had to be easily applicable to perform a job or task (Aryani, Herwanti, & Basuki, 2018; Nguyen & Luu, 2020). Saffu, Walker, and Mazurek (2012) argued that perceived ease of use and usefulness influenced online commerce's readiness and application. So the hypothesis proposed is:

H2: Perceived ease of use positively impacts technology readiness.

2.3. Vendor Partners Support (VP)

The support of information technology vendor partners was concluded to be very important to firms, especially when adopting a new technology (Lee & Shim 2007; Sucahyo, Utari, Budi, Hidayanto, & Chahyati, 2016). For family businesses in the F&B industry, having a close working relationship with IT vendor partners would make the practice of e-commerce implementation easier (Xin & Levina, 2008). Smartphones, tablets, and computers are considered important technological devices for the employment of online trading by household businesses in the F&B industry in Ho Chi Minh City. These devices are used to access electronic commerce platforms, social networks, or sales websites. Moreover, the willingness of vendor partners to support hardware and software can make the e-commerce adoption intention higher. Therefore, the following hypothesis is proposed:

H3: Vendor partners positively affect technology readiness.

2.4. Competitive Pressure (CP)

The term competitive pressure refers to the competitive industrial environment in which a company operates (Lertwongsatien & Wongpinunwatana, 2003). Organizations are likely to adopt innovation because of competitive pressure in a competitive environment. Organizations will often respond by distributing resources to offer innovative products or services to vie with competitors in a competitive environment. Competitive pressure threatens the business performance of firms, and the severity of that competition would be a serious problem for businesses (Purnama & Subroto, 2016). Previous research has shown that competitive pressure changes business performance (Yu, Ramanathan, & Nath, 2017). External pressures imposed by trading partners and competitors (Al-Bakri & Katsioloudes, 2015) pushed SMEs

to utilize e-commerce. To win the competition, businesses must innovate to adapt to the complexities of the environment (Anning-Dorson, 2016). Thus, it can be argued that the change, readiness to adapt to the business environment is due to the impact of competitive pressure. Therefore, the following hypothesis is developed:

H4: Competitive pressure positively impacts environmental readiness.

2.5. Social Expectancy (SE)

Social expectation refers to changing one's behavior after interacting with others, the organization, and society. According to Friedkin (1998), an individual's opinions and behavior could be changed due to the expectations of other individuals. Guzzo, Ferri, and Grifoni (2014) argued that social expectations were characterized by the following key characteristics: (i) suitability to meet the expectations of others; (ii) the power to compel someone to behave in a particular way through outcomes; (iii) power was legitimized by those subjected to it. In other words, social expectations are the external environmental factors that drive organizations to be willing to change internal environmental factors to serve them. For the F&B industry, customers are gradually getting used to e-commerce, which puts pressure on household businesses to change and improve their internal environment readiness to apply this innovation. Thus, this study argues that social expectancy affects environment readiness:

H5: Social expectancy has a positive effect on environmental readiness.

2.6. Subjective Norms (SN)

The term subjective norm refers to an individual's perception of social pressures to perform a behavior (Ajzen, 1991). The intentions and behaviors are highly influenced by individual factors, such as attitudes and perceived behavioral control. The relationship between the subjective norm and behavioral intention implies predictability about actual activities and behaviors that others are performing (Rivis & Sheeran, 2003). Like subjective norms, social norms refer to perceptions of others' opinions of how individuals should behave. Others also influence one's attitudes and behavior. Therefore, in the context of household businesses, we consider both subjective and social norms as subjective normative factors. Poorangi et al. (2013) suggested a significant positive relationship between awareness, the trustworthiness of management, and the application of e-commerce in small and medium enterprises. Owner enthusiasm drove micro, small, and medium enterprises (SMMEs) to adopt e-commerce (Ndayizigamiye & McArthur, 2014). Thus, the study proposed the hypothesis:

H6: Subjective norms positively impact organization readiness.

2.7. Resources (RE)

According to Kuan and Chau (2001), larger firms were more likely to employ electronic commerce than small-sized businesses thanks to their available financial resources, IT knowledge, machinery infrastructure, and highly qualified human resources. Good human and financial resources were important criteria for firms to be ready for e-commerce practice (Teo & Tan, 1998). Organization readiness depended on the availability of financial and technological resources (Rana et al., 2019). In this line, the resulting research of Lim and Trakulmaykee (2018) showed that for small and medium enterprises, resources become more important to get ready for operating on this online trading platform. Household businesses are smaller in size compared to small and medium enterprises, so resources are an important factor in the application of e-commerce. To create a competitive advantage, businesses need to implement resource-based organizational management (Anderson, 2010). Rowe, Truex, and Huynh (2012) argued that the knowledge, available resources of the business, and the positive attitude of the management towards technology were the most important factors driving the adoption of e-commerce technology in Vietnam. Therefore, this study proposes the hypothesis:

H7: Resources positively impact organization readiness.

2.8. Technology Readiness (TR)

Technology readiness is an important factor in the TOE model. This concept referred to the readiness of firms to apply e-commerce from the characteristics of the technology used (Yang, Sun, Zhang, & Wang, 2015). The compatibility of e-business with both firm working methods significantly influenced e-commerce implementation (Ahmad et al., 2015; Ndayizigamiye & McArthur, 2014). Good information technology infrastructure, lower internet costs promoted enterprises to adopt electronic commerce (Solaymani, Sohaili, & Yazdinejad, 2012). The findings of Ndayizigamiye and McArthur (2014) showed that access to information impacted the application of e-commerce of micro, small and medium enterprises (SMEs). In the context of F&B household businesses, based on the above explanation, this study uses technology readiness as an intermediate variable to assess the readiness to apply e-commerce. Therefore, the hypothesis proposed is:

H8: Technology readiness positively impacts e-commerce adoption.

2.9. Environment Readiness (ER)

The competitive environment influences the innovation capacity of enterprises. Environment readiness would enhance the competitiveness of enterprises and drive companies to become more innovative (Anning-Dorson, 2016). When companies were ready to compete, they would be motivated to improve and try to combine innovations to differentiate themselves from competitors. However, it was not the case with Thong's study (1999), which stated that the competitive environment has little influence on the application of online commerce in household businesses. Several previous studies, on the contrary, have proved that innovation ability is related to environment readiness and has a positive impact on business performance (Hamelink & Opdenakker, 2019). Furthermore, many other types of research have shown that the competitive environment affects the adoption of e-commerce in enterprises (Zhu & Kraemer, 2005). Competitive pressure, thus, could make changes to the readiness of the environment. At the same time, the environment's readiness has a relationship with the employment of e-commerce. From this argument, the study hypothesizes:

H9: Environment readiness positively impacts e-commerce adoption.

2.10. Organization Readiness (OR)

Organization readiness has been defined as the extent to which a firm prepares the necessary resources to implement e-commerce (Yang et al., 2015). Accordingly, human resources, equipment, and household heads are important factors that show an organization's readiness. Employee qualifications, especially in information technology, are critical to a company's ability to adapt and use technology. The empirical results reveal that the organizational factor affecting the willingness to use e-commerce is employee knowledge (Jeon, Han, & Lee, 2006). Many organizations tried to delay or refuse to apply new technology due to the lack of qualified staff (Thong, 1999; Teo & Tan, 1998). Other studies by Al-Qirim (2007), and Molla and Licker (2005) demonstrated that resource availability was also an important organizational factor influencing whether or not to practice e-commerce. Besides, the company's size is a factor leading to the readiness of the organization as well (Thong, 1999; Zhu & Kraemer, 2005). There is a lack of professional human resources and information technology capabilities in the context of small-scaled F&B household businesses in Vietnam. Based on the relationship between organization readiness and e-commerce adoption, the following hypothesis is proposed:

H10: Organization readiness positively impacts e-commerce adoption.

2.11. E-commerce Adoption

Electronic commerce includes a technology application platform towards automating business transactions, exchanging information, buying, and selling products, making payments, solving wishes of businesses, consumers, and management to reduce costs while improving product quality, service quality, and speed of service delivery (Kalakota, Stallaert, & Whinston, 1997). The main drivers contributing to the deployment of e-commerce are the potential benefits such as improved customer leads, time and cost savings, increased efficiency, improved satisfaction, and greater customer loyalty compared to the traditional business model. In this study, e-commerce adoption is understood within household businesses in the F&B industry as implementing platforms, applications, and websites to enable online ordering, delivery, payment, and improving customer experience and customer service.

3. Methodology

3.1. Data collection

To test the proposed conceptual model with associated hypotheses, a cross-sectional survey was used for collecting data from individual household businesses. F&B industry is dominated, while the questionnaire involved a dual translation protocol (Harkness, 2004). Firstly, a questionnaire was developed in English then translated into Vietnamese by a bilingual expert. Secondly, the Vietnamese version of the questionnaire was then translated back into English by another bilingual expert. Finally, a third bilingual expert examined the two English versions and found no significant difference. The survey questions applied the Likert scale of five points, ranging from 1=strongly disagree to 5=strongly agree. The questionnaire consisted of three sections. The first section included two screening questions. The second section pertained to the Likert scale questionnaire. The third section provided information on the household businesses' age range, the number of employees, and turnover. The questionnaires were distributed both online and face-to-face.

This research applied Davis's (1989) five measurement items of perceived usefulness and five measurement items of perceived ease of use. The five measurement items of Jyoti and Arora (2013) were employed to measure vendor

partner support. The five measurement items from Sigalas, Economou, and Georgopoulos (2013) were used to evaluate competitive pressure, while the five measurement items from Chauhan, Jaiswal, and Kar (2018) were applied to measure social expectancy. Five measurement items adopted from Kolvereid (1996), measured subjective norms. The five measurement items to measure technology readiness were adopted from Parasuraman (2000), while the five measurement items of environment readiness reflected Holt, Armenakis, Harris, and Field (2007). Finally, five measurement items of organizational readiness and the five measurement items of e-commerce adoption were those originally used by Teo and Tan (1998).

3.2. Data analysis

This study employed SPSS 26.0 and SmartPLS 3.2.3 software for analyzing data. To evaluate internal consistency reliability, convergent validity, and discriminant validity, the collinearity, fit of the model, R^2 value, f^2 value, Q^2 value were applied according to the standards of Hair, Hult, Ringle, and Sarstedt (2021). Structural equation modeling (SEM) was chosen because it provides the tools necessary to test the hypotheses. To assess the significance of path coefficients, this study used bootstrapping with 5,000 samples. A multi-group analysis was performed to explore the similarities and differences in the influence of factors on groups according to the characteristics of household heads.

4. Result

4.1. Descriptive Findings

From the total 992 valid responses of surveyed household businesses, 294 household businesses (29.64%) had under five years of operation, 493 household businesses (49.69%) were between five and ten years old, and the remaining 205 (20.67%) had been established for more than ten years. Regarding labor resources, there were 499 household businesses (45.26%) operating with less than five employees, 333 (33.57%) with between five and ten employees, and 160 household businesses (16.13%) with more than ten employees. As for annual revenue, there were 391 household businesses (39.42%) with a turnover of below 31,750 USD, 398 household businesses (40.12%) earned 31,750 USD to 63,500 USD annually, and 203 (20.46%) generated 63,500 USD every year. In terms of gender, there were 495 female-owned household businesses, equivalent to 49.90%, 440 male-owned household businesses making up 44.35%, and 57 LGTB-owned household businesses, accounting for a mere 5.75%. By business type, there were up to 461 household businesses offering both food and beverages (accounting for 46.47%), while the number of food-only businesses was 415 (making up 41.84% of the total 992 survey business participants). In comparison, beverage-only businesses accounted for 116 of those surveyed (11.69%). This result indicates that household businesses in the F&B industry are relatively small in revenue and size. Unlike developed countries, in Vietnam, there are a dominant number of small businesses rather than large enterprises; therefore, the market is highly fragmented. The competition in the F&B industry is thus very dynamic.

4.2. Evaluation of the Measurement Model

Internal Consistency Reliability: According to Hair et al. (2021), composite reliability is the upper bound, and Cronbach's alpha is the lower bound of internal consistency reliability. Cronbach's alpha should be higher than 0.70, and composite reliability should be higher than 0.70. The results show that Cronbach's alpha ranged from 0.784 (RE) to 0.867 (CP), and composite reliability values ranged from 0.862 (VP) to 0.890 (SN) (*Table 1*); thus, all 11 constructs had high levels of internal consistency reliability.

Convergent Validity: According to Hair et al. (2021), the construct was convergent validity if the Average variance extracted (AVE) was higher than 0.50, outer loading higher than 0.7, and indicator reliability higher than 0.5. These research results show that the AVE values of all constructs ranging from 0.507 (RE) to 0.652 (CP) are well above the required minimum level of 0.50. In addition, all outer loadings of all measurement items of the 11 constructs were larger than the threshold value of 0.70. The indicator RE4 has the highest indicator reliability with a value of 0.853, while the indicator of SE2 (0.702) has the smallest indicator reliability. Therefore, the measurement items of all 11 constructs have high levels of convergent validity (*Table 1*).

Discriminant Validity: The confidence interval of the Heterotrait-Monotrait Ratio (HTMT) should be lower than 0.85, and the relevant threshold level statistic should not include the value 1 for all combinations of constructs (Hair et al., 2021). The results showed that all HTMT values ranged from 0.048 to 0.085 lower than the more conservative threshold value of 0.85. However, when examining the HTMT ratios, the HTMT values were significantly different from 1. Hence, all 11 constructs were already discriminant validity.

Table 1: Construct Reliability and Validity

Construct	Internal Consistency		Convergent Valibility
	Cronbach's Alpha	Composite Reliability	Average Variance Extractedb(AVE)
Competitive Pressure	0.867	0.903	0.652
E-Commerce Adoption	0.862	0.901	0.645
Environment Readiness	0.863	0.901	0.647
Organization Readiness	0.845	0.890	0.618
Perceived Ease of Use	0.853	0.893	0.625
Perceived Usefulness	0.862	0.899	0.640
Resource	0.784	0.835	0.507
Social Expectancy	0.838	0.884	0.603
Subject Norms	0.865	0.902	0.647
Technology Readiness	0.867	0.903	0.652
Vendor Partner Support	0.855	0.895	0.632

4.3. Structural Model Evaluation

To assess collinearity, we apply VIF values lower than five (Hair et al., 2021) in the predictor constructs as critical levels of collinearity. The findings show that the VIF of measurement items ranged from 1.450 (RE3) to 2.145 (TR3). Therefore, all measurement items were accepted. To assess the significance of path coefficients, this study used bootstrapping with 5,000 samples. First, when examining the p-value, which should be lower than 0.05 (significance level = 5%). The results show that all p-values ranged from 0.000 to 0.018, lower than 0.05 so the ten hypotheses were supported (Table 2 and Figure 1). For example hypothesis H1: perceived usefulness ($\beta = 0.079$; $p < 0.001$), hypothesis H2: perceived ease of use ($\beta = 0.096$; $p < 0.001$) and H3: vendor partner support ($\beta = 0.128$; $p < 0.05$) have significant impact on technology readiness. The path coefficients ranged from the lowest of 0.088 (H4) to the highest of 0.463 (H9) (*Table 2*).

The R^2 values of the E-Commerce Adoption constructs of 0.257 could be described as respectively moderate. The f^2 values indicated an exogenous construct ranging from 0.005 (H10) to 0.288 (H9) respectively on an endogenous construct from small to medium.

Predictive relevance: The resulting Q^2 values of EA (0.164); TR (0.022); ER (0.008); and OR (0.013), which are larger than 0, indicate that the exogenous constructs had predictive relevance for the endogenous construct under consideration.

Model fit: For theory testing, we use the Standardized Root Mean Squared Residual (SRMR) as a test of exact fit.

The result shows that the SRMR value was 0.038 less than 0.08, indicating a good fit.

Table 2: Hypothesis testing

Relationship	Hypothesis	Path coefficients	t-Value	p-Values	f^2	Hypothesis testing
PU → TR	H1	0.079	2.686	0.007	0.006	Supported
PE → TR	H2	0.096	3.356	0.001	0.009	Supported
VP → TR	H3	0.128	4.134	0.000	0.017	Supported
CP → ER	H4	0.088	2.978	0.003	0.008	Supported
SE → ER	H5	0.076	2.735	0.006	0.006	Supported
SN → OR	H6	0.096	3.533	0.000	0.009	Supported
RE → OR	H7	0.111	3.803	0.000	0.012	Supported
TR → EA	H8	0.165	5.269	0.000	0.036	Supported
ER → EA	H9	0.463	15.741	0.000	0.288	Supported
OR → EA	H10	0.064	2.376	0.018	0.005	Supported

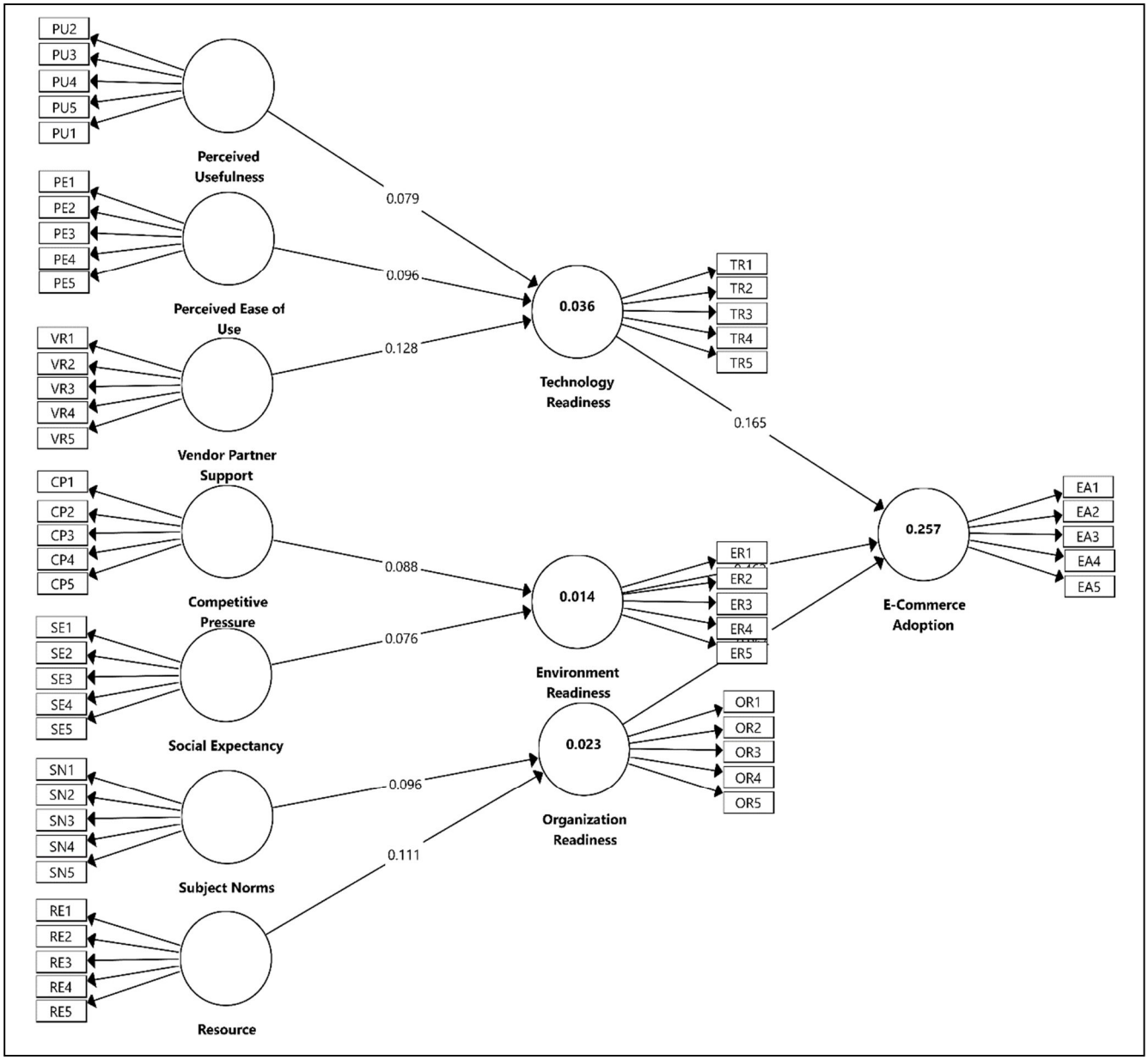

Figure 1: Structural Equation Model

4.4. Indirect Effects

The mediating effects of TR, ER, and OR were analyzed. As shown in Table 3, the effect of co-created value on EA is mediated by TR, ER, and OR. The results show that all indirect effects are significant since neither 95% confidence intervals include zero but p-values for RE of (0.086) and SN (0.092). Hence, the RE and SN have no indirect effects on EA. The empirical t value of the indirect effect (0.041) for the CP → ER → EA relationship is 2.837, yielding a p-value of 0.005. The indirect effect (0.035) for the SE → ER → EA relationship is 2.508, yielding a p-value of 0.012.

Similarly, the indirect effect (0.016) for the PE → TR → EA relationship is 2.820, yielding a p-value of 0.005. The indirect effect (0.013) for the PU → TR → EA relationship is 2.238, yielding a p-value of 0.025 and (0.021) for the VP → TR → EA with a p-value of 0.01. Specifically, PE, PU, and VP significantly impacted EA through TR; CP and SE significantly influenced EA through ER. TR and ER have mediated the effect of PE, PU, VP, CP, and SE on EA, while SN and RE affected EA partially through OR.

Table 3: Specific Indirect Effects

Relationship	Path	t value	P Values	97.5% Confidence interval of indirect effects
CP → ER → EA	0.041	2.837	0.005	[0.015, 067]
SE → ER → EA	0.035	2.508	0.012	[-0.029, 057]
RE → OR → EA	0.007	1.716	0.086	[-0.001, 0.015]
SN → OR → EA	0.006	1.683	0.092	[0.001, 0.015]
PE → TR → EA	0.016	2.820	0.005	[0.006, 0.027]
PU → TR → EA	0.013	2.238	0.025	[0.004, 0.024]
VP → TR → EA	0.021	3.178	0.001	[0.010, 0.035]

4.5. Importance-Performance Map

The Importance-Performance Matrix Analysis (IPMA) data enables an importance-performance map, as shown in Figure 2. The results show that the average total effects of all constructs were 0.088, and the average performance of the construct was 67.35. As can be seen, the SN, PU, VP, SE, CP, and OR constructs in the higher left area of the importance-performance map have high performance for the target construct EA but show low importance. Therefore, there is a particularly high potential for improving the performance of the constructs positioned in this area. On the other hand, the ER and TR constructs in the higher right area of the importance-performance map have high importance for the target construct EA and show high performance. Hence, there is a need to keep up the good work. Meanwhile, the RE construct is in the lower-left area of the importance-performance map, showing low performance and low importance for the target construct EA. Hence, there is a lower priority for performance and important improvements.

4.6. Multiple Group Comparisons

This study collected data from groups categorized by year of establishment, the number of employees, turnover amount, and gender of the sole individual in some household businesses. The results indicate that the differences between the length of the establishment are quite significant. Therefore, only hypotheses H3 and H9 are accepted in all groups. For households with less than five years of operation, results supported six hypotheses (H1, H2, H3, H6, H8, and H9) and rejected four hypotheses (H4, H5, H7, and H10). Those businesses from five to ten years supported seven hypotheses (H3, H4, H5, H6, H7, H8, and H9) and three hypotheses (H1, H2, and H10). For household businesses over ten years old, only three hypotheses were accepted (H3, H9, and H10), the remaining seven hypotheses were rejected (H1, H2, H4, H5, H6, H7, and H8).

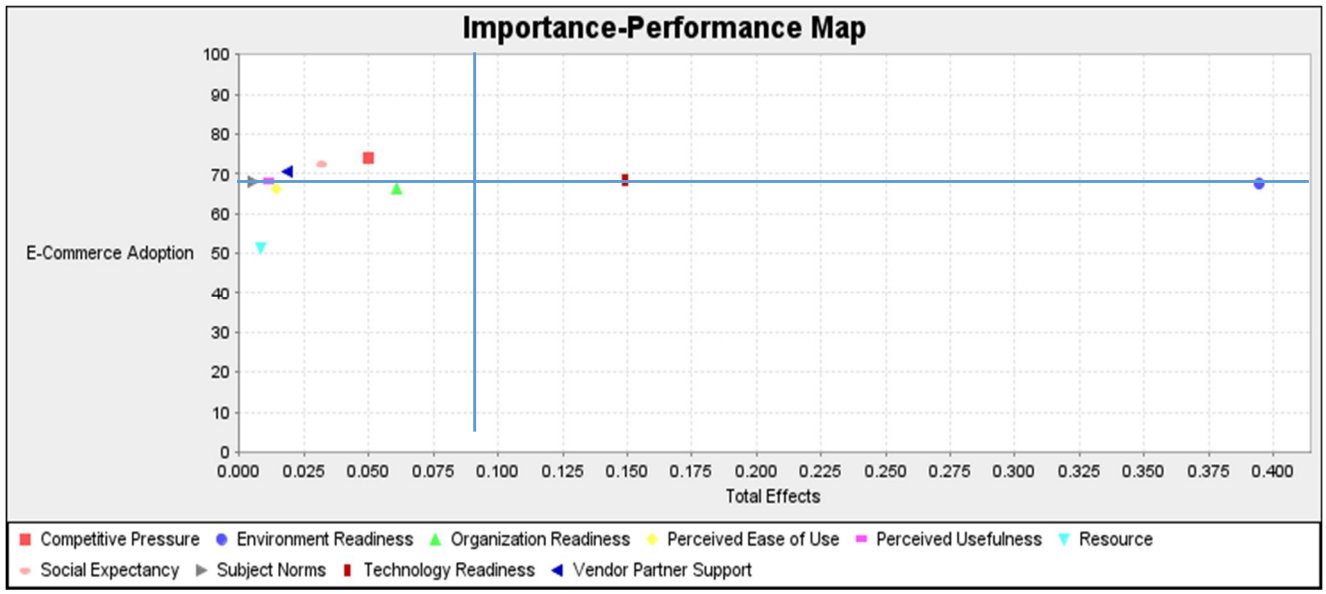

Figure 2: Importance-Performance Map

These results imply that in terms of e-commerce acceptance, longer-established household businesses are affected by fewer factors. In comparison, newer household businesses are influenced by more factors. These results are similar to the findings of Chang and Dasgupta (2015). They revealed that long-established firms could adopt e-commerce more quickly than younger companies. The results obtained for the human resources of household businesses show that only hypotheses H8 and H9 are supported in all groups.

Smaller companies with less than five employees rejected three hypotheses (H1, H5, and H6). The businesses with five to ten staff members rejected six hypotheses (H1, H2, H4, H5, H7, and H6). H10), and the larger-scale businesses with more than ten employees rejected seven hypotheses (H1, H2, H3, H4, H5, H6, and H10). The results also indicate that, in the F&B sector, household businesses with more employees see fewer factors impacting their implementation of e-commerce and become more favorable in adopting this technology than household businesses at a smaller scale.

5. Discussion

The results of empirical research based on the integration of TAM and TOE model show that all independent variables, including perceived usefulness, perceived ease of use, vendor partners support, social expectancy, competitive pressure, subjective norm, and resources of the household, were found to affect e-commerce adoption. This result confirms what was claimed in TAM (Davis, 1989) and TOE model (Paris et al., 2016). Meanwhile, technical readiness, environment readiness, and organization readiness are intermediate constructs simulating the employment of this technology.

These findings are also supported by Rahayu and Day (2015), who found that perceived usefulness, compatibility, and cost of e-business affect the implementation of electronic commerce. More specifically, the perceived usefulness of e-commerce positively impacted an organization's technological readiness (Kabango & Asa, 2015; Rana et al., 2019), while good technological readiness promoted enterprises to apply the innovation (Solaymani et al., 2012). Besides, this research agrees with Jones and Kauppi (2018) that ease of use affects technology adoption while technology readiness influences e-commerce implementation (Ahmad et al., 2015; Ndayizigamiye & McArthur, 2014).

Regarding the relationship between vendor partners and e-commerce adoption, this research result backs up the statement that the support of information technology vendor partners is very important for firms when adopting a new technology (Lee & Shim, 2007; Sucahyo et al., 2016). Similarly, Xin and Levina (2008) agreed that for household businesses in the F&B industry, being well cooperated with IT vendor partners would make the practice of e-commerce application easier. Meanwhile, external pressures imposed by trading partners and competitors (Al-Bakri & Katsioloudes, 2015; Lim et al., 2018) pushed SMEs to adopt this technology. This view was also supported by Anning-Dorson (2016), who argued that to beat the competition, firms must innovate to adapt to the complexities of the environment.

Apart from that, Friedkin (1998) confirms this study's positive relationship between social expectancy and environment readiness by stating that an individual's opinions and behavior can be changed by the expectations of other individuals while the readiness of the organization also leads to the employment of electronic commerce (Thong, 1999; Zhu & Kraemer, 2005). At the same time, the findings are relevant to Rivis and Sheeran's (2003) argument that individuals were influenced not only by perceptions and attitudes but also by the opinions and behaviors of those around them. Meanwhile, many studies have found that the competitive environment is a factor affecting the adoption of online trading (Zhu & Kraemer, 2005). Organization readiness was also dependent on the availability of financial and technological resources (Rana et al., 2019). Rowe, Truex, and Huynh (2012) argued that the knowledge, available resources of the business, and the positive attitude of the management towards technology were the key factors driving organization readiness and the adoption of technology e-commerce in Vietnam.

However, the contribution degrees of these factors are different. Specifically, partners' support and enterprise resources are those independent variables with the strongest impact. In contrast, environment and technology readiness have stronger impacts on F&B e-commerce applications than organization readiness with an intermediate variable. Based on the results of the ten accepted hypotheses, it has been proved that the integrated model between TAM and TOE is suitable for studying the e-commerce application of F&B household businesses. Household businesses have the characteristics of an organization, but the owner's individual biases play an important role.

6. Conclusions and implications

6.1. Conclusions

Household businesses in the F&B industry play a very important role in developing economies, especially in transition economies like Vietnam. This study demonstrates that context and technology readiness, context and

environment readiness, and organization readiness influence e-commerce adoption. The factors and the level of impact they cause depend on the characteristics of the household business. Therefore, the integrated model between TAM and TOE, including 11 variables (7 independent variables, three intermediate variables, and one dependent variable), is suitable for research with small-sized businesses in the application of e-commerce and new technology platforms.

6.2. Implications

Over the years, the application of electronic commerce and new technology has emerged as a burgeoning topic and has an important place within academic literature. Even so, there seems to be considerable ambiguity regarding the application of research to small household businesses that perform both organizational and individual roles. Through this study, the research team has proposed an integrated framework of the TAM - TOE model that can be used for future empirical research to develop different theories and measure the decision-making process in the adoption of online commerce and other new technology for household businesses and similar enterprises.

It can be observed that household businesses are increasingly implementing e-commerce for food and drink distribution through food delivery platforms, apps, and websites to meet consumer demands. This decision is influenced by factors relating to technology, the business environment, and the organization's influence. Therefore, promoting e-commerce adoption should be an important recommendation for government policymaking. This can be achieved by (1) increasing the technology readiness of household businesses by investing in information technology infrastructure, expanding transmission lines; (2) supporting training on adoption and use of information technology and e-commerce for household businesses; and (3) loan support for the digital transformation of household businesses. Furthermore, government and private industry can work together to improve digital infrastructure and provide tailored online training for business owners and aspiring entrepreneurs on e-commerce, as digital skills today underpin businesses and end-users.

To enhance the effectiveness of e-commerce, household businesses in F&B distribution can (i) improve their ability to market to customers, (ii) improve logistics capabilities, and (iii) increase the use of digital payments. The government has an important role in improving the logistics infrastructure and the digital transformation of the banking and digital payment industry. This imperative is highlighted by the need to improve the general legal environment for businesses to use digital payments and cryptocurrencies. In addition, the ease of switching to e-commerce systems for consumer purchases (Wagner, 2015; Heuer, Brettel, & Kemper, 2015) presents a challenge in maintaining customer loyalty. Therefore, in addition to product innovation, businesses need to improve the customer experience and improve e-commerce systems to meet the increasing demands of consumers while maintaining customer loyalty, and ensuring sustainable development.

7. Limitation and future research

This study is based on an empirical model to explore the factors influencing the decision to adopt e-commerce. However, this research has not studied in-depth the process of implementing e-commerce. Future research can focus on the post-launch phase to help improve the efficiency of e-commerce applications for both household businesses and large-scale enterprises. In addition, the study of how users interact with e-business is also a future research direction that would help household businesses and other enterprises capture consumer trends to serve them better and achieve greater efficiency in their business.

Reference

Abualrob, A. A., & Kang, J. (2016). The barriers that hinder the adoption of e-commerce by small businesses: Unique hindrance in Palestine. *Information Development*, *32*(5), 1528-1544.

Ajzen, I. (1991). The theory of planned behavior. *Organizational behavior and human decision processes*, *50*(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Ahmad, S. Z., Abu Bakar, A. R., Faziharudean, T. M., & Mohamad Zaki, K. A. (2015). An empirical study of factors affecting e-commerce adoption among small- and medium-sized enterprises in a developing country. Evidence from Malaysia. *Information Technology for Development*, *21*(4): 555-72. https://doi.org/10.1080/02681102.2014.899961

Al-Alawi, A. I., & Al-Ali, F. M. (2015). Factors affecting e-commerce adoption in SMEs in the GCC, An empirical study of Kuwait. *Research Journal of Information Technology*, *7*(1): 1–21. https://doi.org/10.3923/rjit.2015.1.21

Al-Bakri, A. A., & Katsioloudes, M. I. (2015). The factors affecting e-commerce adoption by Jordanian SMEs. *Management Research Review*, *38*(7): 726-49. https://doi.org/10.1108/MRR-12-2013-0291

Al-Qirim, N. (2007). The adoption of eCommerce communications and applications technologies in small businesses in New Zealand. *Electronic Commerce Research and Applications*, *6*(4), 462-473. https://doi.org/10.1016/j.elerap.2007.02.012

Anderson, G. L. (2010). Research on democracy. *International Journal on World Peace*, *27*(4), 3-5.

Anning-Dorson, T. (2016). Interactivity innovations, competitive intensity, customer demand, and performance. *International Journal of Quality and Service Sciences*, *8*(4), 536-554. https://doi.org/10.1108/IJQSS-11-2015-0075

Aryani, R. A. I., Herwanti, R. T., & Basuki, P. (2018). The Effect of Perception of Use, Ease, Security and Confidentiality to Use E-Filing (Study in the Tax Office Pratama Raba Bima*). International Journal of Scientific Research and Management*, *6*(4), 294-304. https://doi.org/10.18535/ijsrm/v6i4.em08

Biagi, F., & Falk, M. (2017). The impact of ICT and e-commerce on employment in Europe. *Journal of Policy Modeling*, *39*(1), 1-18. http://dx.doi.org/10.1016/j.jpolmod.2016.12.004

Chang, J., & Dasgupta, B. (2015). An Investigation of the Barriers to E-business Implementation in Small and Medium-Sized Enterprises. *International Journal of Industrial and Systems Engineering*, *9*(1), 26-36.

Chauhan, S., Jaiswal, M., & Kar, A. K. (2018). The acceptance of electronic voting machines in India: A UTAUT approach. *Electronic Government, an International Journal*, *14*(3), 255-275.

Chen, L. D., & Tan, J. (2004). Technology adaptation in e-commerce: Key determinants of virtual stores acceptance. *European Management Journal*, *22*(1), 74-86. https://doi.org/10.1016/j.emj.2003.11.014

Das, K. (2018). *The digital archipelago: How online commerce is driving Indonesia's economic development*. McKinsey.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, *13*(3), 319-340. https://doi.org/10.2307/249008

Fan, J., Tang, L., Zhu, W., & Zou, B. (2018). The Alibaba effect: Spatial consumption inequality and the welfare gains from e-commerce. *Journal of International Economics*, *114*(C), 203-220.

Friedkin, N. E. (2006). *A structural theory of social influence* (Vol. 13). Cambridge University Press.

Guzzo, T., Ferri, F., & Grifoni, P. (2016). A model of e-commerce adoption (MOCA): Consumer's perceptions and behaviours. *Behaviour & Information Technology*, *35*(3), 196-209. https://doi.org/10.1080/0144929X.2015.1132770

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.

Hamelink, M., & Opdenakker, R. (2019). How business model innovation affects firm performance in the energy storage market. *Renewable Energy*, *131*, 120-127. https://doi.org/10.1016/j.renene.2018.07.051

Harkness, J., Pennell, B. E., & Schoua-Glusberg, A. (2004). Questionnaire translation and assessment, in Presser, S., Couper, M. P., Lessler, J. T., Martin, E., Martin, J., Rothgeb, J. M., & Singer, E, *Methods for testing and evaluating survey questionnaires*, pp. 453-473, Hoboken, NJ: John Wiley & Sons.

Heuer, D., Brettel, M., & Kemper, J. (2015). Brand competition in fashion e-commerce. *Electronic Commerce Research and Applications*, *14*(6), 514-522.

Holt, D. T., Armenakis, A. A., Harris, S. G., & Feild, H. S. (2007). Toward a Comprehensive Definition of Readiness for Change: A Review of Research and Instrumentation. *Research in Organizational Change and Development*, *16*, 189-336. https://doi.org/10.1016/S0897-3016(06)16009-7

Jones, A. B., & Kauppi, K. (2018). Examining the antecedents of the technology acceptance model within e-procurement. *International Journal of Operations and Production Management*, *38*(1), 22-42. https://doi.org/10.1108/IJOPM-06-2015-0346

Jeon, B. N., Han, K. S., & Lee, M. J. (2006). Determining factors for the adoption of e-business: The case of SMEs in Korea. *Applied Economics*, *38*(16), 1905-1916. https://doi.org/10.1080/00036840500427262

Jyoti, J., & Arora, H. (2013). Impact of client-vendor relationship on firm's financial performance: A study of outsourcing firms. *Global business review*, *14*(4), 691-709.

Kabango, C. M., & Asa, A. R. (2015). Factors influencing e-commerce development: Implications for the developing countries. *International Journal of Innovation and Economic Development*, *1*(1), 64-72.

Kalakota, R., Stallaert, J., & Whinston, A. (1996). Worldwide real-time decision support systems for electronic commerce applications. *Journal of organizational computing and electronic commerce*, *6*(1), 11-32. https://doi.org/10.1080/10919399609540265

Kolvereid, L. (1996). Prediction of employment status choice intentions. *Entrepreneurship Theory and Practice*, *21*(1), 47-58.

Kuan, K. K., & Chau, P. Y. (2001). A perception-based model for EDI adoption in small businesses using a technology–organization–environment framework. *Information & management*, *38*(8), 507-521. https://doi.org/10.1016/S0378-7206(01)00073-8

Lee, C. P., & Shim, J. P. (2007). An exploratory study of radio frequency identification (RFID) adoption in the healthcare industry. *European Journal of Information Systems*, *16*(6), 712-724. https://doi.org/10.1057/palgrave.ejis.3000716

Lim, S., & Trakulmaykee, N. (2018). An empirical study on factors affecting e-commerce adoption among SMEs in west Malaysia. *Management Science Letters*, *8*(5), 381-392. DOI:10.5267/j.msl.2018.4.008

Moisescu, O. I. (2018). From perceptual corporate sustainability to customer loyalty: A multi-sectorial investigation in a developing country. *Economic research-Ekonomska istraživanja*, *31*(1), 55-72.

Molla, A., & Licker, P. S. (2005). eCommerce adoption in developing countries: A model and instrument. *Information & management*, *42*(6), 877-899. https://doi.org/10.1016/j.im.2004.09.002

Ndayizigamiye, P., & McArthur, B. (2014). Determinants of e-commerce adoption amongst SMMEs in Durban, South Africa. *Mediterranean Journal of Social Sciences*, *5*(25), 250-250.

Nguyen, X. T., & Luu, Q. K. (2020). Factors Affecting Adoption of Industry 4.0 by Small- and Medium-Sized Enterprises: A Case in Ho Chi Minh City, Vietnam. *Journal of Asian Finance, Economics and Business*, *7*(6), 255-264. https://doi.org/10.13106/jafeb.2020.vol7.no6.255

Nguyen, X. T. (2019). Factors Impacting on Korean Consumer Goods Purchase Decision of Vietnam's Generation Z. *Journal of distribution Science*, *17*(10), 61-71. https://doi.org/10.15722/jds.17.10.201910.61

Oliveira, J. A. S. d., Basso, L. F. C., Kimura, H., & Sobreiro, V. A. (2018). Innovation and financial performance of companies doing business in Brazil. *International Journal of Innovation Studies, 2*, 153-164. https://doi.org/10.1016/j.ijis.2019.03.001

Parasuraman, A. (2000). Technology Readiness Index (TRI) a

multiple-item scale to measure readiness to embrace new technologies. *Journal of service research*, *2*(4), 307-320. https://doi.org/10.1177/109467050024001

Paris, D. L., Bahari, M., Iahad, N. A., & Ismail, W. (2016). Systematic literature review of e-commerce implementation studies. *Journal of Theoretical and Applied Information Technology, 89*(2) 422-438.

Peters, M., Kallmuenzer, A., & Buhalis, D. (2019). Hospitality entrepreneurs managing quality of life and business growth. *Current Issues in Tourism*, *22*(16), 2014-2033. https://doi.org/10.1080/13683500.2018.1437122

PoorangI, M. M., Khin, E. W., nikoonejad, S., & kardevani, A. (2013). E-commerce adoption in Malaysian Small and Medium Enterprises Practitioner Firms: A revisit on Rogers' model. *An Acad Bras Cienc*, *85*(4).

Purnama, C., & Subroto, W. T. (2016). Competition intensity, uncertainty environmental on the use of information technology and its impact on business performance small and medium enterprises. *International Review of Management and Marketing*, *6*(4), 984-992.

Rana, N. P., Barnard, D. J., Baabdullah, A. M., Rees, D., & Roderick, S. (2019). Exploring barriers of m-commerce adoption in SMEs in the UK: Developing a framework using ISM. *International Journal of Information Management*, *44*, 141-153. https://doi.org/10.1016/j.ijinfomgt.2018.10.009

Rahayu, R., & Day, J. (2015). Determinant factors of e-commerce adoption by SMEs in developing country: evidence from Indonesia. *Procedia-social and behavioral sciences*, *195*(3) 142-150. https://doi.org/10.1016/j.sbspro.2015.06.423

Rivis, A., & Sheeran, P. (2003). Descriptive norms as an additional predictor in the theory of planned behaviour: A meta-analysis. *Current psychology*, *22*(3), 218-233. https://doi.org/10.1007/s12144-003-1018-2

Rowe, F., Truex, D., & Huynh, M. Q. (2012). An empirical study of determinants of e-commerce adoption in SMEs in Vietnam: An economy in transition. *Journal of Global Information Management (JGIM)*, *20*(3), 23-54.

Ruiz-Ortega, M. J., Parra-Requena, G., & Garcia-Villaverde, P. M. (2016). Do Territorial Agglomerations Still Provide Competitive Advantages? A Study of Social Capital, Innovation, and Knowledge. *International Regional Science Review*, *39*(3), 259-290. https://doi.org/10.1177/0160017613512652

Saffu, K., Walker, J. H., & Mazurek, M. (2012). Perceived strategic value and e-commerce adoption among SMEs in Slovakia. *Journal of Internet Commerce*, *11*(1), 1-23. https://doi.org/10.1080/15332861.2012.650986

Schillewaert, N., Ahearne, M. J., Frambach, R. T., & Moenaert, R. K. (2005). The adoption of information technology in the sales force. *Industrial marketing management*, *34*(4), 323-336.

Sigalas, C., Economou, V. P., & Georgopoulos, N. B. (2013). Developing a measure of competitive advantage. *Journal of Strategy and Management*.

Solaymani, S., Sohaili, K., & Yazdinejad, E. A. (2012). Adoption and use of e-commerce in SMEs, A case study. *Electronic Commerce Research*, *12*(3): 249-63. https://doi.org/10.1007/s10660-012-9096-6

Sucahyo, Y. G., Utari, D., Budi, N. F. A., Hidayanto, A. N., & Chahyati, D. (2016). Knowledge management adoption and its impact on organizational learning and non-financial performance. *Knowledge Management & E-Learning: An International Journal*, *8*(2), 387-413. https://doi.org/10.34105/j.kmel.2016.08.025

Susanty, A., Handoko, A., & Puspitasari, N. B. (2020). Push-pull-mooring framework for e-commerce adoption in small and medium enterprises. *Journal of Enterprise Information Management*, *33*(2), 381-406. https://doi.org/10.1108/JEIM-08-2019-0227

Teo, T. S., & Tan, M. (1998). An empirical study of adoptors and non-adopters of the Internet in Singapore. *Information & management*, *34*(6), 339-345. https://doi.org/10.1016/S0378-7206(98)00068-8

Teo, T., Ursavas, O. F., & Bahcekapili, E. (2011). Efficiency of the technology acceptance model to explain pre-service teachers' intention to use technology: A Turkish study. *Campus-Wide Information Systems*, *28*(2), 93-101. https://doi.org/10.1108/10650741111117798

Thong, J. Y. (1999). An integrated model of information systems adoption in small businesses. *Journal of management information systems*, *15*(4), 187-214. https://doi.org/10.1080/07421222.1999.11518227

Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *Processes of technological innovation*. Lexington books.

Wagner, M. (2015). The link of environmental and economic performance: Drivers and limitations of sustainability integration. *Journal of Business Research*, *68*(6), 1306-1317.

Wu, W. W. (2011). Developing an explorative model for SaaS adoption. *Expert systems with applications*, *38*(12), 15057-15064.

Xin, M., & Levina, N. (2008, December). Software-as-a-service model: Elaborating client-side adoption factors. In *Proceedings of the 29th International Conference on Information Systems, R. Boland, M. Limayem, B. Pentland, (eds), Paris, France*. 14-17 December

Yang, Z., Sun, J., Zhang, Y., & Wang, Y. (2015). Understanding SaaS adoption from the perspective of organizational users: A tripod readiness model. *Computers in Human Behavior*, *45*, 254-264. https://doi.org/10.1016/j.chb.2014.12.022

Younge, K. A., & Tong, T. W. (2018). Competitive pressure on the rate and scope of innovation. *Journal of Economic Behavior and Organization*, *150*, 162-181. https://doi.org/10.1016/j.jebo.2018.03.026

Yu, W., Ramanathan, R., & Nath, P. (2017). Environmental pressures and performance: An analysis of the roles of environmental innovation strategy and marketing capability. *Technological Forecasting & Social Change*, *117*, 160-169. https://doi.org/10.1016/j.techfore.2016.12.005

Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: cross-country evidence from the retail industry. *Information systems research*, *16*(1), 61-84. https://doi.org/10.1287/isre.1050.0045