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E-Commerce Adoption in Distribution Channel: Evidence from Retail Enterprises in Vietnam

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Abstract

Purpose: In the context of substantial digital transformation, e-commerce plays a crucial role in enhancing the competitiveness of retail enterprises. This study aims to strengthen the theoretical basis of intention to adopt e-commerce in Vietnamese enterprises focusing on retail enterprises and the decision to implement it in practice, currently there is very little research on this topic. **Research design, data and methodology:** This study uses the TOE model to identify the factors influencing the intention and behavior of retail enterprises in Vietnam to apply e-commerce. Survey data from 230 enterprises analyzed using the SEM model. **Results:** The results show that five factors have a positive impact on the intention to adopt e-commerce, including perceived relative advantage, perceived compatibility, organizational readiness, knowledge and experience, and organizational innovativeness. Other factors such as external pressure, and external support do not influence the intention to adopt e-commerce for various reasons. **Conclusion:** The results also affirm the important role of adopted intentions in practical implementation decisions. In practice, the research results are useful references for Vietnamese e-commerce policy makers in strategic issues such as the need to specify policies to enhance e-commerce capacity for state management officials, retail enterprises owners and business households; develop e-commerce technologies in which e-commerce transactions between the government and businesses are the focus; perfect the legal framework on cyber security. On that basis, the study proposes recommendations for managers and enterprises to promote e-commerce in the retail industry, contributing to sustainable growth in the digital era.

Keywords : E-Commerce Adoption, Distribution Channel, Retail Enterprises, TOE Framework, Vietnam

JEL Classification Code: L66, L81, M30, L86, O32

1. Introduction

Retail enterprises are a vital bridge between production and consumption. E-commerce adoption in retail operations is crucial in today's intensely competitive global business market, and it has been demonstrated to help retail companies enhance their distribution channel management and business performance (Bach et al., 2025). This research assesses the overall benefits of e-commerce as well as delves into the complex factors influencing the decision to adopt e-commerce at retail enterprises in Vietnam, a rapidly growing market with unique characteristics in terms of digital infrastructure, distribution, and consumer behavior.

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Specifically, e-commerce adoption helps enterprises change the game in the retail industry with benefits such as expanding the market, optimizing business operations, and improving customer experience (Hussain, Shahzad & Hassan, 2020; Awa & Ojiabo, 2016). The COVID-19 pandemic has fundamentally changed the traditional distribution system, shifting from the physical store model to e-commerce, causing consumers' thinking to change from visiting stores to shopping directly to online shopping without having to visit stores, while promoting strong growth of the online distribution market (Gao et al., 2023; Shin et al., 2023). The explosion of the Internet and other forms of connectivity (wifi, Bluetooth, NFC, etc.), the diversity of terminals (smartphones, tablets, smart wearables, etc.), and the trend of consulting the community on various social networks have changed the shopping habits, customer expectations, and product evaluations of retail enterprises (Hakim et al., 2024; Nguyen, Hadian & Govinnage, 2022).

E-commerce, powered by distribution innovation integrated with advanced technology and online consumption trends, has emerged as a disruptive force in the traditional retail business model (Boateng et al., 2016; Chandra & Kumar, 2018; Hussain, Kareen & Alqahtani, 2020; Nguyen et al., 2022). E-commerce sales and installations have skyrocketed in Vietnam due to the country's large Internet user population, digital transformation-promoting legislation, convenience distribution, and technologically savvy citizens. According to a report by Government News (2025), Vietnam's e-commerce market in 2024 reached 25 billion USD, accounting for 9% of the country's total retail revenue. Platforms such as Shopee, Lazada, and TikTok Shop in Vietnam have recorded strong growth with a total transaction value of nearly 319 trillion VND in 2024. Additionally, laws related to e-commerce create a solid legal corridor for e-commerce development. However, e-commerce adoption requires superior technological capabilities, large resources, and an in-depth understanding of the market.

Currently, although there are many studies on e-commerce in the world, the studies on e-commerce adoption are not up-to-date, especially in Vietnam, where the studies on e-commerce adoption and distribution are few, fragmented, and unsystematic. Vietnamese enterprises mainly focus on building websites and mobile applications to increase interaction and sales, but do not have a comprehensive view of the factors affecting the decision to adopt E-commerce (IDEA, 2023; Hoang et al., 2021; Nguyen, Hadian & Govinnage, 2022). This research makes a difference by delving into the complex factors affecting e-commerce adoption in Vietnam, a country with strong potential for digital economic development and rapidly changing online consumer behavior, thereby building a suitable retail distribution chain for enterprises.

The objective of this study is to specifically focus on clarifying how e-commerce is changing traditional business models and reshaping supply and distribution chains in the Vietnamese retail industry, clarifying the impact of legal and technological infrastructure, and emphasizing the role of distribution science in optimizing supply chains and online sales channels in Vietnam. After that, propose recommendations to state administration organizations, enterprises, and individuals on how to utilize, operate efficient e-commerce linked with suitable distribution strategies.

2. Theoretical Background and Hypothesis

2.1. E-commerce

E-commerce is the purchase and sale of products and services on electronic systems such as the Internet and computer networks (Schneider & Perry, 2000). Moreover, Laudon & Traver (2021) defines e-commerce as the process of using digital platforms, especially the Internet, to trade goods or exchange information. On the other hand, Kedah (2023) believes that e-commerce is an online form of business that uses an information technology platform with the support of the Internet to carry out online purchases, sales, exchanges, and payments. E-commerce includes various models such as B2B, B2C, C2C, and C2B (Orzol, 2023).

In today's digital economy, E-commerce has a significant impact on developing enterprises, such as contributing to penetrating new markets without geographical barriers, increasing opportunities to reach customers on a large scale, personalizing the customer experience, and providing smart recommendations tailored to customer needs. The use of big data and AI helps enterprises understand customer consumption behavior, thereby continuously improving products, distribution chains, and operational regulations to better meet buyer needs. Enterprises can optimize their distribution chains to reduce operating costs and increase revenue by reaching more customers. Additionally, customers also benefit from e-commerce because they can purchase anytime, anywhere, access quality products, and easily choose their favorite products through computers and smartphones.

2.2. Conceptual Framework

Many scholars are interested in the adoption of e-commerce in the field of digital retail, and several theoretical frameworks have previously been applied in their

studies. Some prominent theories that are commonly used are the Technology-Organization-Environment (TOE) Model, Technology Acceptance Model (TAM), Diffusion of Innovation (DOI), Unified Theory of Acceptance and Use of Technology (UTAUT); Dual Factor Theory (DFT); Theory of Planned Behaviour - TPB; the DeLone and McLean Model of Information Success.

Notably, the TOE model (Tornatzky & Fleischer, 1990) is widely used in studies on the application of digital technology and e-commerce in enterprises. The research model in this study is built on the TOE framework. According to this model's approach, an organization's technological decisions are influenced by the technological context, the organizational context, and the environmental context. This method is used based on previous studies (Aljowaidi, 2015; Awa et al., 2015; Mohtaramzadeh et al., 2017).

The TOE's three main contextual groups include (1) The technology landscape is all the technologies available inside and outside the enterprise, including the perception of the benefits of the technology, compatibility, testability, and complexity; (2) The organizational context outlines the internal characteristics of the enterprise, including the size of the enterprise, culture, management capacity, leadership commitment, and available resources; (3) The environmental context indicates external factors affecting the business such as pressure from competitors, the legal environment, customer demand, and government policies.

2.3. Research Hypothesis

2.3.1 Technological Context

**Perceived Relative Advantage (PRA)*

The perceived relative advantage is about the superiority of an innovation over existing methods for doing the same work (Yeap et al., 2016). Several studies show that perceived relative advantage has a positive effect on the adoption of innovations in enterprises (Hussain, Kareen & Alqahtani, 2020). Enterprises recognize the importance of e-commerce with its many benefits and are more likely to integrate it into their operational processes (Verbivska et al., 2023). Given the perceived relative advantages that e-commerce offers, companies that are better aware are more likely to pursue e-commerce adoption (Rahayu & Day, 2015). Perceived relative advantage is also a strong predictor of the adoption of innovations in enterprises, especially e-commerce (Nguyen, Hadian & Govinnage, 2022; Alenezi & Isa, 2024). From there, the authors proposed a research hypothesis:

H1: Enterprises with greater perceived relative advantage from the intention to adopt e-commerce are more likely to pursue its adoption.

**Perceived Compatibility (PC)*

Perceived compatibility is the ability of different components in a system to work effectively together, which is crucial in technological innovation, especially e-commerce (Mohdhar & Shaalan, 2021; Rane et al., 2024). In a digital environment, compatibility is important to ensure system stability and efficiency. An innovative technology that aligns with organizational culture, operating systems, and job responsibilities will be more likely to be accepted (Naveed et al., 2022). If the existing business process is compatible with the e-commerce system, the business will tend to adopt it higher (Verbivska et al., 2023; Nguyen, Hadian & Govinnage, 2022). Previous research has also determined that even for small enterprises with sufficient financial resources, perceived compatibility has a great influence on e-commerce adoption (Awiagah et al., 2016; Alenezi & Isa, 2024). Awareness of compatibility is an important factor that positively impacts e-commerce adoption. When enterprises find that e-commerce is in line with the existing process, the likelihood of e-commerce adoption will increase significantly (Zain et al., 2020). Proposed research hypothesis:

H2: Perceived Compatibility has a positive impact on Intention to adopt E-commerce

2.3.2. Organizational Context

**Organizational Readiness (ORR)*

Organizational readiness is increasingly critical to the success of the adoption of new technologies, including e-commerce (Chandra & Kumar, 2018). The readiness of the organization reflects the technological level, innovation capacity, and financial viability of the enterprise (Khayyam et al., 2024; Gumilang & Prihartono, 2025). The readiness of an organization to adapt and utilize technology is significantly influenced by the skills and expertise of its employees, particularly in the field of information technology (Nguyen et al., 2020). Enterprises frequently have difficulty in adopting innovation owing to high initial expenditures and a lack of sufficient technical infrastructure, if there is a low degree of readiness. (Haug et al., 2011). Companies with robust financial resources can invest in e-commerce systems, while organizations with a high level of computerization are more likely to be receptive to technology (Kabanda & Brown, 2017; Rane et al., 2024). From there, the authors proposed a research hypothesis:

H3: Enterprises at a higher state of organizational readiness are more likely to intend to adopt E-commerce.

**Knowledge and experience*

The knowledge and experience of managers play a vital role in deciding e-commerce adoption by enterprises (Hakim et al., 2024). According to Neumeyer et al. (2020),

enterprises may be slow to access new technologies due to knowledge barriers that can slow down technology adoption, while digital knowledge helps reduce risks and accelerate technology adoption. Small business managers often lack management experience and understanding of e-commerce, so they have difficulty integrating it into their operations (Kabanda & Brown, 2017; Shemi & Procte, 2018). Sutanonpaiboon and Pearson (2006) found that managers' technology literacy and attitudes toward technological innovation had a significant influence on e-commerce adoption decisions. Managers who understand the benefits of e-commerce frequently urge their organizations to utilize technology in order to accomplish numerous breakthroughs (Awa et al., 2015). The research hypothesis is formulated:

H4: Enterprises with managers who have more experience and knowledge are more likely to intend to adopt e-commerce.

**Organizational Innovativeness (IN)*

Enterprise innovation is a key factor driving e-commerce adoption in enterprises (Alenezi & Isa, 2024). Enterprises that tend to innovate will help the organization be more successful when incorporating new technology, notably e-commerce (Mohtaramzadeh et al., 2017; Bourne et al., 2013). Boateng et al. (2016) determined that innovation had a beneficial influence on e-commerce adoption in enterprises. In addition, innovation can appear in many forms when applying e-commerce to products, processes, and distribution strategies (Mohtaramzadeh, 2017). Enterprises with a passion for innovation constantly assume risks and are willing to seek differences to adapt their business models according to market changes (Alenezi and Isa, 2024). The research hypothesis is proposed:

H5: The greater the organizational innovativeness, the more likely the intention to adopt e-commerce will be.

2.3.3. Environmental Context

**External pressure*

According to Rogers (1995), the adoption of technology is social, influenced by organizational and social pressures. Many studies have identified external pressure as an important factor driving the adoption of digital technology (Shahadat et al., 2023; Scupola, 2009; Saffu et al., 2012). Aljowaidi (2015) also further demonstrates that external pressure is one of the top three predictors of the adoption of technological innovation. As competitors adopt e-commerce, other enterprises are under similar pressure. Governments also play an important role in this process (Koe & Sakir, 2020; Awa & Ojiabo, 2016). Therefore, it is possible to make the research hypothesis:

H6: External Pressure has a positive impact on Intention to adopt E-commerce

Both the government and industry play a key role in promoting e-commerce adoption. Given the speed at which technology is evolving, the government must implement a more intelligent assistance policy. The government has intervened to make it easier for small enterprises and remote areas to access e-commerce (Hussain, Shahzad & Hassan, 2020). Many previous studies have also shown that support from the government has a significant relationship with e-commerce adoption (Awiagah et al., 2016; Scupola, 2009). Government support can be measured by access to technology and policies that encourage small and medium-sized enterprises. Technology companies' support in adopting e-commerce is also significant, becoming a driving force for companies to deploy e-commerce (Ramdansyah & Taufik, 2017). The support of external technology companies will speed up the process of applying e-commerce in enterprises, improving efficiency when transferring technology (Hoang & Nguyen, 2022). At the same time, restrictive support can slow down this process (Zhu & Kraemer, 2005). Proposed research hypothesis:

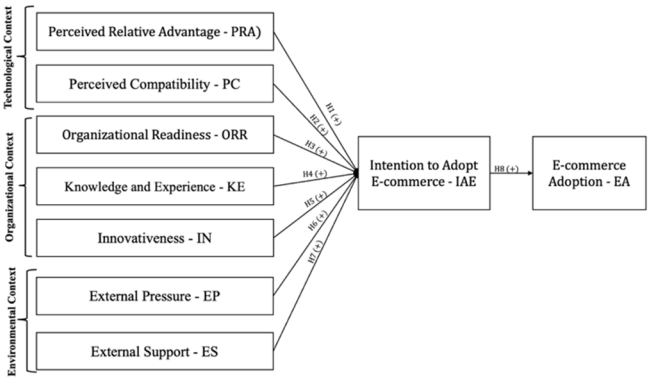
H7: External Support has a positive impact on Intention to adopt E-commerce

2.3.4. Relationship between Intention to Adopt E-commerce and E-commerce Adoption

Platforms, applications, and websites are used in e-commerce to facilitate online purchasing, delivery, and payment processing as well as to improve the distribution chain, enhance customer satisfaction, and customer support (Nguyen et al., 2022). E-commerce adoption is a complex process, influenced by many different factors, in which Intention to Adopt e-commerce can be considered an important factor in promoting actual adoption behavior. Previous research on technology have indicated that when enterprises are aware of the benefits and efficiency of e-commerce, they prefer to cultivate their desire to utilize this technology before implementing it (Ahmad et al., 2015). In particular, when enterprises have formed their intention to apply the existing technology platform and the support of managers, the likelihood that they will actually implement and use e-commerce will be higher (Sila, 2013; Sutanonpaiboon & Pearson, 2006). Finally, in the context of the environment, pressure from competitors, requests from customers, and supportive policies from the government can further strengthen the intention of enterprises to adopt e-commerce and promote the actual implementation process (Neumeyer et al., 2020; Shahadat et al., 2023). When enterprises intend to adopt e-commerce, they will tend to look for the right solution and invest resources to implement it. Therefore, the following research hypothesis can be proposed:

H8: Intention to adopt E-commerce has a positive impact on E-commerce Adoption

2.4. Proposed Research Model



Note: The authors proposed

Figure 1: Proposed Research Model

3. Research Methods

This research was conducted on retail enterprises in Vietnam by combining both qualitative and quantitative research. The authors collected and synthesized secondary data from relevant domestic and international books, articles, and journals. From previous studies, the questionnaire was constructed using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) to express their agreement or disagreement. The latent variables include (1) Perceived Relative Advantage (PRA), (2) Perceived Compatibility (PC), (3) Organizational Readiness (ORR), (3) Knowledge and Experience (KE), (4) Organizational Innovativeness (IN); (5) External Pressure (EP); (6) External Support (ES); (7) Intention to Adopt E-commerce (IAE); (8) E-commerce Adoption (EA). The authors used previous studies to construct 34 observational variables, and the wording was adjusted according to the research content. After that, 20 preliminary quantitative questionnaires were collected to revise the questionnaire until all measurement items were acceptable. Preliminary quantitative research and qualitative research focus on assessing the feasibility of the research method, detecting questionnaire design errors (e.g., ambiguous questions, logical errors), and making preliminary estimates of parameters (variance, standard deviation) to calculate the final sample size. Official quantitative survey questionnaires are sent through Google Forms and sent directly to retail enterprises in Vietnam, and primary data on opinions or evaluations of business representatives are obtained. Survey participants must ensure the following factors: (1) retail enterprises understand the definition of e-commerce; (2) the enterprise has at least 5 employees; (3) it has been operating for one year or more.

Green (1991) proposed the sample size formula n=50+8m, where m is the number of predictor variables in the regression model or SEM, so the required sample size is n = 50 + 8 x 6 = 114. Bentler and Chou (1987) recommended 150 samples as the minimum for SEM analysis. Depending on the complexity of the model, Hair et al. (2019) proposed the formula: n=max(50,5X) or max(50,10X), with X being the number of observed variables, accordingly, with this study having 34 observed variables, the sample size will range from 170 to 340 samples which are appropriate, the research model is also not complicated. The sample size range can also range from 200 to 500 for CB-SEM, depending on the complexity of the model and data quality (Çelik & Yılmaz, 2013). The research team interviewed three experts related to the field of e-commerce to calibrate the content of the observed variables to suit reality. The ratio of observed variables (all potential variable items) to the number of questionnaires in the model is typically 1:4 or 1:5 (Hair et al., 2013; Zhang, 2022). The total number of survey responses collected was 300, of which 230 responses were accepted. Other responses were eliminated due to selecting the same answer for all questions or incomplete answers.

SPSS 26 and AMOS software are used for data entry and research model analysis. The steps of analyzing the research model include (1) Testing the reliability of the scale by Cronbach's Alpha coefficient, (2) Exploratory Factor Analysis (EFA) to evaluate the convergence value and differential value of the scales, (3) Confirm Factor Analysis (CFA), (4) SEM model analysis to test the relationship and influence of the factors affecting the decision to e-commerce adoption of Vietnamese retail enterprises.

Table 1 shows the demographic and descriptive statistical characteristics of the research sample, including enterprise size, types of business entities, years in business operation, and main retail categories. These data provide an overview of the characteristics of the research sample that helps to orient a deeper analysis of the factors affecting e-commerce adoption in retail enterprises in Vietnam.

Table 1: Demographic Profile and Descriptive Statistics

	Frequency	Percentage
Enterprise size*		
Micro-enterprise	57	24.8%
Small enterprise	112	48.7%
Medium-sized enterprise	52	22.6%
Large enterprise	9	3.9%
Types of business entities		
Limited Liability Company (LLC)	102	44.3%
Joint Stock Company (JSC)	86	37.4%
Private Company	34	14.8%
Others	8	3.5%

	Frequency	Percentage
Years in business operation		
1 year to less than 3 years	65	28.3%
3 years to less than 5 years	96	41.7%
5 years to less than 10 years	54	23.5%
10 years or above	15	6.5%
Main retail categories		
Cosmetics and Beauty Care	23	10.0%
Fashion	41	17.8%
Household Goods	32	13.9%
Food	45	19.6%
Traditional Family Products	22	9.6%
Technology Devices	26	11.3%
Others	41	17.8%

Note: The authors analyzed

**Enterprise size:*
Micro-enterprise: Total annual revenue not exceeding 10 billion VND or total annual capital not exceeding 3 billion VND.
Small enterprise: Total annual revenue not exceeding 100 billion VND or total annual capital not exceeding 50 billion VND, but not classified as micro-enterprises as described above.
Medium-sized enterprise: Total annual revenue not exceeding 300 billion VND or total annual capital not exceeding 100 billion VND.
Large enterprise: Total annual revenue exceeding 300 billion VND or total annual capital exceeding 100 billion VND.

4. Research Results

4.1. Results of Quantitative Research

4.1.1. Reliability Testing by Cronbach's Alpha Coefficient

Table 2: Cronbach's Alpha Reliability Test Results

Latent variable	Number of variables	Cronbach's Alpha
Perceived Relative Advantage (PRA)	3	0.784
Perceived Compatibility (PC)	5	0.843
Organizational Readiness (ORR)	3	0.799
Knowledge and Experience (KE)	5	0.837
Innovativeness (IN)	4	0.829
External Pressure (EP)	4	0.837
External Support (ES)	2	0.719
AIntention to Adopt E-commerce (IAE)	5	0.778
E-commerce Adoption (EA)	3	0.761

Note: The authors analyzed

Based on Table 2, the Cronbach's Alpha coefficient of the factors (PRA, PC, KE, IN, EP, ES, IAE, EA) is greater than 0.7. Additionally, the Corrected Item-Total Correlation of all factors (PRA, PC, KE, IN, EP, ES, IAE, EA) is greater than 0.3. Therefore, no observed variables are discarded due to insufficient reliability (Nunnally, 1978; Hair et al., 2009).

4.1.2. Exploratory Factor Analysis (EFA)

When performing the initial Exploratory Factor Analysis (EFA), the KE3 variable simultaneously uploads two factors. The variable KE3 reflects two distinct aspects in one question, including (1) Support for technology adaptation is related to management training and internal communication capabilities, and (2) Risk management is related to risk management and decision-making skills. This ambiguity makes KE3 not unidimensional. This is consistent with Hair et al. (2019) on the importance of designing clear measurement variables that focus on a single concept. To ensure the accuracy of the research, the authors removed the KE3 variable and proceeded to perform a second EFA analysis. The results are presented below.

Table 3: Results of Exploratory Factor Analysis (EFA)

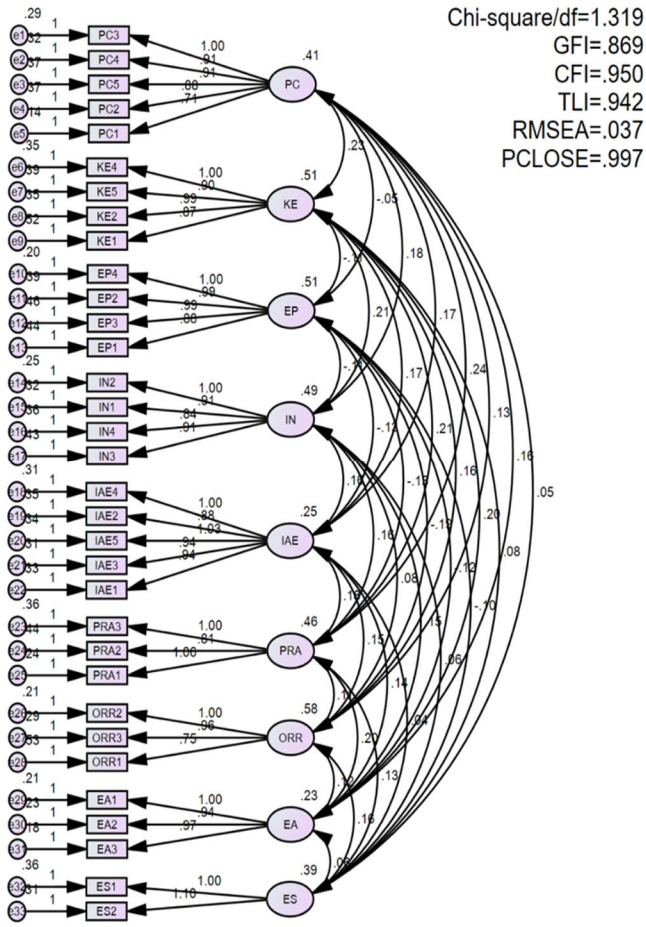
Factor	KMO	p-value	Eigenvalues	Total Variance Explained	The Smallest Factor Loading
KE	0.857	0.000	8.636	67.585%	0.582
PC			2.987		0.525
EP			2.194		0.747
IN			1.994		0.754
IAE			1.775		0.572
ORR			1.679		0.773
PRA			1.430		0.721
EA			1.201		0.624
ES			1.082		0.847

Note: The authors analyzed

The exploratory factor analysis (EFA) illustrated consistent results. First, the Kaiser-Meyer-Olkin coefficient (KMO) (0.857) exceeded the threshold of 0.5, confirming the compatibility of EFA with the data set. Moreover, the factor loadings consistently exceed 0.5, underscoring the significance of the observed variables in the research factors and the actual relevance of the variables. Observational variables all play an important role in research factors and have practical significance. Moreover, sig. (Bartlett's Test) = 0.000 < 0.05 indicates that the observed variables are correlated with each other. The factors PRA, PC, KE, IN, EP, ES, IAE, and EA all have Eigenvalues greater than 1, so these factors are retained in the analysis model. The total

variance explained is 67,585% > 50% satisfactory. The research model is well-qualified.

4.1.3. Confirmatory Factor Analysis (CFA)



Note: The authors analyzed

Figure 2: Results of CFA Exploratory Factor Analysis

Based on the evaluation criteria of Hu and Bentler (1999), Mishra (2016), and Gallagher and Brown (2013), the results of the CFA analysis show the conformity of the measurement model with the Chi-square = 605,209; df = 459; Chi-square/df = 1.319 (< 3) we can see a good pattern; P= 0.000 (< 0.05) meaningful pattern. Besides, RMSEA=0.037 (<0.06) is good; PCLOSE=0.997>0.05 makes good sense. In the results, other indicators such as TLI = 0.942 (> 0.9) are good; CFI = 0.950 is very good; GFI = 0.869 (>0.8) is acceptable according to research by Baumgartner and Homburg (1996) and Doll, Xia, and Torkzadeh (1994). Thus, the authors concluded that the model was consistent with the data.

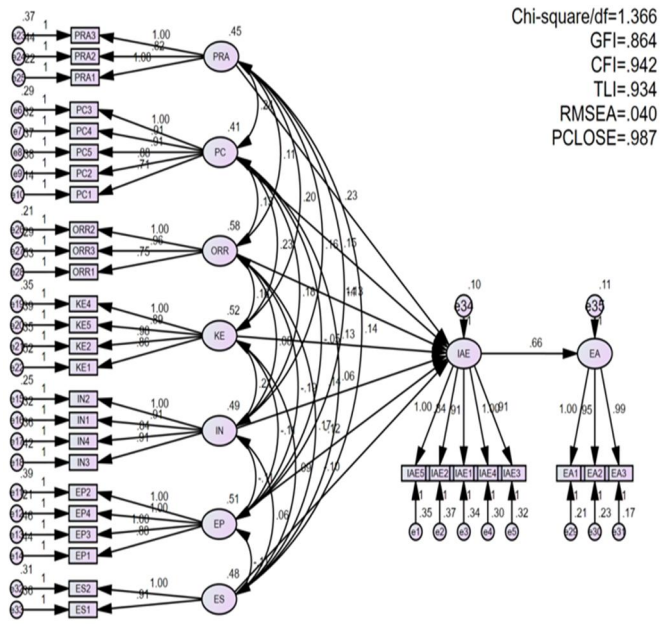
Table 4: Standardized Regression Weights

			Estimate
PC3	<---	PC	0.764
PC4	<---	PC	0.716
PC5	<---	PC	0.692
PC2	<---	PC	0.675
PC1	<---	PC	0.769
KE4	<---	KE	0.770
KE5	<---	KE	0.720
KE2	<---	KE	0.769
KE1	<---	KE	0.655
EP4	<---	EP	0.846
EP2	<---	EP	0.753
EP3	<---	EP	0.725
EP1	<---	EP	0.691
IN2	<---	IN	0.813
IN1	<---	IN	0.748
IN4	<---	IN	0.703
IN3	<---	IN	0.698
IAE4	<---	IAE	0.671
IAE2	<---	IAE	0.596
IAE5	<---	IAE	0.666
IAE3	<---	IAE	0.644
IAE1	<---	IAE	0.632
PRA3	<---	PRA	0.751
PRA2	<---	PRA	0.642
PRA1	<---	PRA	0.828
ORR2	<---	ORR	0.859
ORR3	<---	ORR	0.805
ORR1	<---	ORR	0.618
EA1	<---	EA	0.727
EA2	<---	EA	0.685
EA3	<---	EA	0.740
ES1	<---	ES	0.722
ES2	<---	ES	0.778

Note: The authors analyzed

According to the results of the CFA analysis, the observed variables have a normalized impact coefficient in the Estimate column greater than or equal to 0.5, so the observed variables have good implications for the parent factor (Hair et al., 2009).

4.1.4. SEM Model Analysis



Note: The authors analyzed

Figure 3: SEM Model Analysis Results

The results of the CFA analysis show that the conformity of the measurement model with the Chi-square index = 636,768; df = 466; Chi-square/df = 1.366 (< 3), we can see a good pattern; P= 0.000 (< 0.05) meaningful pattern. Besides, RMSEA=0.040 (<0.06) is good; PCLOSE = 0.987>0.05 makes good sense. In the results, other indicators such as TLI = 0.934 (> 0.9) are good; CFI = 0.942 (> 0.9) is good; GFI = 0.864 (>0.8) is acceptable according to research by Baumgartner and Homburg (1996) and Doll, Xia, and Torkzadeh (1994).

Table 5: Regression Weights (Default Model)

			Estimate	S.E.	C.R.	P
IAE	<---	PRA	0.233	0.071	3.279	0.001
IAE	<---	PC	0.154	0.072	2.133	0.033
IAE	<---	ORR	0.135	0.050	2.705	0.007
IAE	<---	KE	0.133	0.058	2.309	0.021
IAE	<---	IN	0.141	0.054	2.611	0.009
IAE	<---	EP	-0.119	0.051	-2.347	0.019
IAE	<---	ES	-0.100	0.057	-1.762	0.078
EA	<---	IAE	0.661	0.094	7.035	***

Note: The authors analyzed

Using the 95% reliability standard, the ES->IAE relationship has a sig. = 0.078 (>0.05), which is not meaningful (the H7 hypothesis is not supported). The rest of the relationships all have a sig. <0.05 (*** is a sig equal to 0.000), so these relationships are all meaningful. Thus, there are 5 variables (PRA, PC, ORR, KE, IN, EP) that have a positive impact on IAE; there is 1 variable (IAE) that has a positive impact on the EA; there is 1 variable (EP) that has an inverse effect on IAE (contrary to the H6 hypothesis).

Overall, the results of the research show that both the H6 and H7 hypotheses are not supported. The research hypotheses H1, H2, H3, H4, H5, H8 are all supported.

Table 6: Standardized Regression Weights

			Estimate
IAE	<---	PRA	0.306
IAE	<---	PC	0.192
IAE	<---	ORR	0.201
IAE	<---	KE	0.187
IAE	<---	IN	0.193
EA	<---	IAE	0.711

Note: The authors analyzed

According to the results in Table 6, there are 5 variables that have a positive impact on IAE, the order of decreasing impact variables is PRA (0.306), ORR (0.201), IN (0.193), PC (0.192), KE (0.187); there is 1 variable (IAE) (0.711) that has a positive impact on EA.

Table 7: Squared Multiple Correlations

	Estimate
IAE	0.628
EA	0.506

Note: The authors analyzed

The R-squared value of IAE is 0.628 = 62.8%, so the independent variables affect 62.8% of the variation of IAE.

The R-squared value of EA is 0.506 = 50.6%, so the independent variables affect 50.6% of the variation of EA.

4.2. Results of Testing the Research Hypothesis

Table 8: Research Hypothesis Testing Results

Hypothesis	Result
H1: Enterprises with greater perceived relative advantages from the intention to adopt e-commerce are more likely to pursue its adoption.	Supported
H2: Perceived Compatibility has a positive impact on Intention to adopt E-commerce	Supported
H3: Enterprises at a higher state of organizational readiness are more likely to intend to adopt E-commerce	Supported
H4: Enterprises with managers who have more experience and knowledge are more likely to intend to adopt e-commerce	Supported

Hypothesis	Result
H5: The greater the organizational innovativeness, the more likely the intention to adopt e-commerce will be adopted	Supported
H6: External Pressure has a positive impact on Intention to adopt E-commerce	Not Supported
H7: External Support has a positive impact on Intention to adopt E-commerce	Not Supported
H8: Intention to adopt E-commerce has a positive impact on E-commerce Adoption	Supported

Note: The author concluded

5. Recommendation and Conclusion

5.1. Discussion

Regarding the technology context

The Perceived Relative Advantage factor has a regression coefficient β = 0.306 (standardized), which means that when this factor increases by 1 unit, the average intention to apply e-commerce increases by 0.306 units (provided that other factors remain the same). This is the factor that has the greatest influence on the application of e-commerce in enterprises. This result is in line with research by Rahayu and Day (2015), which shows that enterprises that are well aware of the benefits of e-commerce (expanding the market, reducing costs) will tend to apply more strongly.

With a regression coefficient of 0.192, Perceived Compatibility positively impacts e-commerce adoption intentions, which is consistent with Scupola's (2009) conclusion that e-commerce is only acceptable when it fits the existing process. For example, enterprises that have adopted warehouse management technology (ERP) have an easier time integrating e-commerce due to system compatibility (Alenezi & Isa, 2024).

Regarding organizational context

The Organizational Readiness factor has a regression coefficient β = 0.201, indicating that financial and technical resources play a vital role. This result is consistent with Kabanda & Brown (2017) and Nguyen et al. (2022), enterprises with technological capacity and investment capital achieve two to three times higher e-commerce adoption rates than the rest of the group.

The coefficient β = 0.187 of the knowledge and experience factor of leaders confirms the importance of the management capacity of retail e-commerce enterprises. Hakim et al. (2024) shows that e-commerce-savvy leaders are more likely to make accurate decisions, especially in choosing the right platform.

The organizational innovativeness factor positively impacted e-commerce adoption intention with β=0.193, which is consistent with the findings of Mohtaramzadeh et al. (2017) and Bourne et al. (2013). Technology changes rapidly, so the fact that enterprises always tend to innovate will be important for the success of adopting e-commerce.

Regarding the environmental context

Regarding the External Pressure factor, the H6 hypothesis is refuted in contrast to the result by Aljowaidi (2015). This is explained by the following reasons (1) Customers still maintain traditional shopping habits to be able to directly check the quality of goods and limit risks in payment when encountering counterfeit and low-quality goods. This reduces the pressure on enterprises to switch to applying e-commerce to satisfy customer needs; (2) The dominance of foreign e-commerce floors in the retail sector, the lack of domestic e-commerce floors, causing domestic enterprises to gradually lose market share and not determining the application of e-commerce as the number one priority to survive in the fiercely competitive market; (3) Competition in the distribution chain or requirements from suppliers requiring retail enterprises to connect and share the e-commerce system is not particularly strong; (4) Some enterprises consider pressure as a risk rather than a motivator for growth, particularly when there are insufficient financial and human resources to successfully adopt e-commerce. External pressures are sometimes not strong enough to prioritize overcoming barriers within the enterprise.

The External Support factor has no statistical significance in the model (p = 0.078), and the H7 hypothesis is refuted, which contradicts the results of Ramdansyah and Taufik (2017) and Hoang and Nguyen (2022). This reflects limitations in the Government's e-commerce support policy, such as a lack of advisory activities, policies, and incentives for retail enterprises to access and apply e-commerce. High costs, lack of expertise, and complexity in integrating technology are major barriers that prevent enterprises from making effective use of external resources. While Awiagah et al. (2016) point out that the government's support has the most direct and greatest impact on e-commerce intentions, the results of this study do not support the same claim in Vietnam. The reason for this is that the efficiency of the government's e-commerce development policies varies depending on the market's growth stage, particularly given the rapid e-commerce in Vietnam. While domestic retail enterprises have yet to utilize government support policies and technological solutions to establish a professional digital distribution system, international e-commerce enterprises now dominate and have a very substantial market share in Vietnam.

The regression coefficient β=0.711 (standardized) confirms that the intention to adopt e-commerce is an important premise for e-commerce adoption behavior in practice. This is consistent with Planned Behavior Theory (Ajzen, 1991), which is similar to the research of Shahadat et al. (2023), enterprises that intend to adopt e-commerce often have a faster level of implementation than the hesitant group.

R^2 = 62.8% for e-commerce adoption intention and 50.6% for e-commerce adoption decision reflect the good interpretability of the TOE model, which is consistent with previous research (Neumeyer et al., 2020).

5.2. Recommendations

For Policy Managers

The results of the study indicate that the perceived relative advantage (PRA) is the factor that has the greatest influence (0.306) on e-commerce adoption in enterprises. Along with the results of enterprise leaders' knowledge and experience (0.187), it has a positive impact on e-commerce adoption, but currently, only a few Vietnamese enterprises have started digital transformation (Bach et al., 2025).

Measures to support factors in the context of the organization that the government can apply include (1) Developing comprehensive support policies, creating a favorable environment for enterprises to improve the level of readiness to apply e-commerce, focusing on building a comprehensive and sustainable set of criteria to assess the level of e-commerce application of enterprises; (2) Develop e-commerce infrastructure, create a driving force for digital transformation, and create new development space for enterprises. To reduce the digital gap between localities, the government needs to based on the e-commerce rankings of provinces and cities to identify from 10 to 15 provinces with the lowest ratings to deploy a package to support free 5G Internet connection, and at the same time invest in digital training centers located in provinces, cities across the country; (3) Implement financial support policies through preferential loans, tax exemption or reduction for enterprises investing in innovation in e-commerce, build a fund to support SMEs connecting with global distribution platforms such as Amazon Global Selling. It is necessary to improve the law on intellectual property and control of intellectual property infringement to encourage enterprises to invest in research and development in the field of e-commerce; (4) The government needs to strengthen the e-commerce capacity of retail enterprise leaders through measures to support e-commerce knowledge training for entrepreneurs, focusing on optimizing multi-channel distribution channels, smart inventory management, and digital marketing. At universities, the volume of specialized credits on digital distribution chain management and e-commerce platform operations needs to be increased; (5) The government needs to develop e-commerce technologies in government-to-business transactions and vice versa (G2B or B2G) to increase perceived compatibility in the technology context, and facilitate enterprises to participate in these transactions. This will be the initial technological resource for enterprises to easily apply e-commerce in other types of e-commerce transactions (B2C, C2B).

For Vietnamese retail enterprises

The results of the research show that Perceived Compatibility affects 0.192 on e-commerce adoption intention ($p < 0.05$), indicating that enterprises should look for system design solutions that flexibly integrate e-commerce modules with existing enterprise resource management (ERP) systems to reduce time and financial costs for deploying e-commerce. Strengthening the application of AI to automate the process of ordering, payment, order fulfillment, and transportation... is also a suitable way for retail enterprises with limited resources. Retail enterprises also need to increase innovation through the application of AI to analyze customer behavior and develop a multi-industry live-streaming interface warehouse according to TikTok's "shoppertainment" model. To ensure resource efficiency for e-commerce, retail enterprises need to implement the "Pareto principle", spending 80% of the budget to upgrade 20% of the core technology for e-commerce. Besides, outsourcing SaaS services also allows enterprises to reduce operating costs.

Vietnamese retail enterprises should focus on developing a multi-channel distribution strategy that combines social media and e-commerce platforms with traditional storefronts to increase consumer access and boost the efficiency of e-commerce apps in the distribution channel. Especially in rural regions, investing in digital logistics infrastructure enhances customer satisfaction, lowers expenses, and streamlines transportation procedures. Enterprises must use data analytics technology to predict demand, customize services, and maximize inventory. A crucial component is also building distribution management teams' digital capability through comprehensive training courses on data analysis, marketplace operations, and digital distribution channel management. Investing in technology, developing digital human resources, and implementing a multi-channel strategy would help Vietnamese retail companies become more competitive and grow sustainably in the current distribution landscape.

5.3. Conclusion

The authors analyzed the factors influencing the decision to adopt e-commerce in retail enterprises in Vietnam, using the TOE model as a basic theoretical framework. Through a

quantitative survey with 230 retail enterprises and data analysis using the SEM linear structure model, this research has achieved the following important results. Five factors have been identified that positively affect the intention to apply e-commerce of Vietnamese retail enterprises, including perceived relative advantage, perceived compatibility, organizational readiness, knowledge and experience, and organizational innovativeness. In which, the perception of relative advantage has the strongest influence with β=0.306. The research model explained 62.8% of the variation of e-commerce application intention and 50.6% of the variation of e-commerce application behavior in practice. The results of the research also affirm the important role of forming the intention to apply e-commerce before implementation.

Based on these findings, the authors propose recommendations to e-commerce policymakers on some strategic issues such as it is necessary to concretize policies to strengthen e-commerce capacity for state management officials in e-commerce, retail business owners, and business households; developing e-commerce technologies, focusing on e-commerce transactions between the government and enterprises; completing the legal framework on cybersecurity; develop a comprehensive set of criteria to assess the level of e-commerce application of enterprises; Developing e-commerce infrastructure, creating a driving force for digital transformation. In addition, the research team also proposed solutions for Vietnamese retail enterprises related to finding solutions to design flexible integrated e-commerce systems, solutions to ensure resource efficiency for e-commerce, developing infrastructure for digital distribution, building digital human resources, and making technological investments.

Despite the efforts, this study still has some limitations, the authors also propose some future research directions to clarify this topic. This study was conducted on a small sample with limited time and resources, leading to results that are not representative of the entire industry or region. Moreover, the retail businesses participating in the survey operate in many different fields, making it difficult to find common influencing factors. Due to the limited research resources, this study only focuses on the stage before applying e-commerce without going into the challenges after application. The authors suggest that further studies can analyze the characteristics of e-commerce channels, including sales on the business's website, sales on e-commerce platforms, and sales through social networks. The initial assessment is that there are differences in the level of acceptance of websites, webshops, and social media. Additionally, future studies could also focus more on the influence of the business environment and culture on e-commerce adoption. In particular, the research model could be updated with some new research variables suitable for the current digital economic context.

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