

## Explore the drivers of e-commerce adoption by SMEs

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### Abstract

*This study investigates the impact of e-commerce on the performance of SMEs in Taiwan, focusing on key factors that drive successful adoption. The analysis considers management support, IT infrastructure, organizational readiness, and external environment factors. Multiple regression analysis was conducted to test the hypotheses. Findings indicate that management support is the primary driver of e-commerce adoption, followed by IT infrastructure and organizational readiness, while the external environment has a smaller effect. Positive managerial attitudes, technological improvements, and organizational resource readiness are essential for e-commerce adoption. Government policies, socio-cultural alignment, and an effective legal framework also play significant roles. These findings provide insights for business managers and recommendations for policymakers to support SME growth in the digital economy.*

### Keywords

*List the keywords covered, in your paper. E-commerce, small and medium-sized enterprises (SMEs), business environment, facilitating adoption.*

## 1. Introduction

In the global economy, particularly following the COVID-19 pandemic, e-commerce has emerged as a crucial component of corporate strategy and a significant catalyst for economic growth. Information technology has now advanced to foster a comprehensive environment for knowledge exchange, connecting individuals, and disseminating information, notably through Industry 4.0 networks. Amid the digital transformation of the global economy, small and medium-sized enterprises (SMEs) increasingly recognize the potential of e-commerce to enhance market competitiveness, operational efficiency, and market reach. Nevertheless, SMEs encounter multiple challenges in e-commerce adoption, such as insufficient development of new ICTs due to their limited scale and horizontal structure. SMEs in emerging economies lack the latest ICT infrastructure to effectively support e-commerce initiatives compared to their counterparts in developed countries [1].

SMEs are key contributors to national and regional development, acting as stabilizers at both

microeconomic and macroeconomic levels. They balance monopolies, mitigate corporate dominance, and drive economic efficiency, particularly in developing nations [2]. This study focuses on the corporate environment of SMEs, exploring environmental factors affecting e-commerce adoption, including management support, IT infrastructure, organizational readiness, and external environment influences. Management support, strong IT infrastructure, and internal resources such as financial and human capital are critical for successful e-commerce adoption. External factors like market competition, customer demand, government policies, and a supportive legal environment also play essential roles. This study will use questionnaires and data analysis to determine which drivers most effectively promote e-commerce adoption among SMEs. The findings will offer practical guidance for business managers in developing e-commerce strategies and provide policy recommendations to support SME growth in the digital economy.

## **2. Literature Review and Hypotheses**

### **2.1. Administrative Support**

The adoption of e-commerce is a significant driver of business sustainability. Research has shown that innovation, information management, and e-commerce adoption play crucial roles in enhancing the performance and sustainability of MSMEs [3]. Furthermore, government encouragement and support are recognized as critical factors for e-commerce adoption among small businesses [4]. For instance, in the case of electronic data interchange (EDI), companies that receive financial assistance and technical guidance from government initiatives can more rapidly integrate these technologies into their operations, thereby boosting efficiency and market competitiveness. Similarly, the role of government policies in promoting IT adoption in India has been emphasized, highlighting their importance in technological advancement [5]. Establishing a comprehensive IT infrastructure is also identified as the most effective strategy for promoting the adoption of IT technologies, particularly in Taiwan [6]. In the APEC region, many SMEs have responded favorably to government initiatives aimed at promoting e-commerce adoption, showing support for policies such as fair taxation, infrastructure development, telecommunications enhancements, and e-commerce training. Business owners and managers are key decision-makers in the adoption of e-commerce, as their risk tolerance and innovative mindset significantly impact the adoption process. Moreover, organizational knowledge—especially the technical expertise of management—is crucial for the effective implementation of new technologies. For SMEs, minimizing operating costs is a major focus of management efforts, and adopting e-commerce is an effective strategy for achieving cost savings, which is particularly vital for business management [7].

H1: The adoption of e-commerce by businesses is positively influenced by the level of administrative support from the government.

### **2.2. IT infrastructure and socio-cultural compatibility**

As science and technology continue to advance, the adoption of new technologies by companies is influenced by factors such as potential benefits, compatibility with existing systems, and associated costs. The primary drivers of e-commerce adoption have been the

benefits it brings to firms, such as the optimization of resource management [4]. Additionally, socio-cultural infrastructure plays a vital role in technology adoption, particularly in the diffusion of e-commerce. Cultural compatibility significantly affects the effectiveness of technology adoption. Research indicates that cultural values within different countries greatly influence the behavior and intentions related to technology acceptance; the greater the socio-cultural alignment, the higher the likelihood of successful technology adoption [8]. For instance, cultural traits like risk acceptance, openness to new technologies, and levels of individualism impact the acceptance and utilization of e-commerce by businesses and consumers. Consequently, e-commerce penetration is generally higher in cultures that are conducive to technology adoption, aligning with innovation diffusion theory, which suggests that cultural context and social influence are key factors in the diffusion of technology [9]. Therefore, this study proposes the following hypotheses:

H2: The adoption of e-commerce by businesses is positively influenced by the degree of sociocultural infrastructure compatibility

### **2.3. Effectiveness of the external environment**

Understanding the impact of the external environment is crucial for e-commerce adoption among SMEs. Research shows that a sound legal framework, supportive policies, and infrastructure development significantly influence SMEs' decisions to adopt e-commerce [10]. Government stabilization policies and infrastructure investments reduce uncertainty and risks, boosting confidence in adopting new technologies. Competitive pressures and macroeconomic changes, particularly the quality of supporting infrastructure and the legal environment, also directly affect e-commerce adoption [11]. Environmental readiness, including market forces, supporting industries, and government policies, is essential for successful e-commerce adoption in developing countries [12]. Cultural compatibility and stable government policies further enhance technology adoption [8]. Legal and policy support are confirmed as key drivers of e-commerce adoption in emerging markets [13][14]. In countries with robust legal systems, businesses benefit from a secure environment for electronic transactions, increasing e-commerce adoption rates. Thus, an effective external environment significantly promotes the adoption of e-commerce, with improvements in the environment directly correlating to increased adoption. Based on these findings, this study proposes hypothesis 3.

H3: The adoption of e-commerce by businesses is positively influenced by the effectiveness of the legal environment in the country.

### **2.4. The degree of readiness of the organization for technological change**

Organizational readiness, including the availability of financial and human resources, is essential for successful e-commerce adoption by SMEs [12]. The Technology-Organization-Environment (TOE) framework also highlights the significance of the external environment, where factors like competitive pressures, regulations, and technical support influence technology adoption decisions [15]. Organizational attributes, such as management awareness, company size, owners' knowledge, and operating costs, impact e-commerce adoption. Adequate resources and adaptability to technological changes reduce adoption risks, improve employee acceptance, and enhance implementation efficiency, making the organization more likely to succeed in e-commerce adoption [12]. Moreover,

e-commerce enhances overall business value beyond direct sales impact, and appropriate revenue categorization can mitigate data loss risks [16]. A review of SME challenges in Malaysia during technology adoption underscores their vital role in economic development, suggesting that addressing these challenges can foster innovation, boost competitiveness, and promote effective technology adoption [17]. These insights lead to the formulation of hypothesis 4.

H4: The more organizationally prepared a business is, especially in adapting to technological change, the more likely it is to adopt e-commerce.

### **3. Research Methods and Procedures**

#### **3.1. Data Collection**

Linear regression analysis is used to predict changes in a dependent variable in response to variations in independent variables. In this study, multiple linear regression is employed to assess the influence of various factors — such as Management, IT infrastructure, Organizational readiness, Environmental conditions, Year of establishment, Time of e-commerce adoption initiation, Duration of respondents' employment, Number of employees, and Type of business—on e-commerce adoption. This approach allows for a comprehensive evaluation of how multiple independent variables concurrently impact e-commerce adoption.

Currently, e-commerce has been widely adopted by many SMEs. In the initial phase, the researchers designed a questionnaire to investigate the adoption of e-commerce by SMEs. A total of 100 questionnaires were distributed, with 71 completed responses deemed valid for analysis. The sample was collected through an online survey conducted via Google Forms, targeting respondents from SMEs. The data collection spanned three months, from October to December 2023. The survey was shared with individuals who had work experience in small and medium-sized enterprises.

#### **3.2. Measurements**

This study devised several dimensions to explore the factors influencing e-commerce adoption. The questionnaire utilized a six-point Likert scale ranging from 1 to 6, with the following criteria: 1 for "strongly disagree," 2 for "disagree," 3 for "slightly disagree," 4 for "agree," 5 for "strongly agree," and 6 for "very strongly agree."

Regarding the management dimension, and based on the work of Cloete, Courtney, and Fintz [18], the questions aimed to evaluate managerial support and attitudes toward e-commerce adoption. Specifically, the study focused on whether firms were compelled to adopt e-commerce (MV1) as a means to reduce production costs and assessed their attitudes toward risk-taking in business operations (MV2). Additionally, the positive attitudes of managers toward innovation (MV3), as well as their knowledge of e-commerce and information technology (MV4), were considered influential factors that could positively impact the effective adoption of e-commerce.

In terms of IT infrastructure, the dimension was based on the research of Tiago and Maria [19], which primarily evaluated the IT readiness of enterprises. This involved assessing whether companies had established IT infrastructure (IT1), possessed websites and technical

tools to support e-commerce operations (IT2), and whether human resources had the necessary technical capabilities to support e-commerce implementation (IT3). These aspects were identified as critical for the successful adoption of e-commerce technology.

In terms of the external environment dimension, the study references the work of Duan, Deng, and Corbitt [10], focusing on the external pressures and support faced by enterprises. The study specifically examines whether competitive pressures (EV1) and customer demands (EV2) drive businesses to actively adopt e-commerce. Additionally, government support policies (EV3) that promote e-commerce development, such as financial, technical, and infrastructure assistance, are considered crucial factors influencing e-commerce adoption. Furthermore, the government's regulatory requirements regarding transactions and the use of e-commerce (EV4) significantly impact the decision of companies to adopt e-commerce.

For the organizational structure dimension, the study refers to the research conducted by Zhu and Kraemer [11], which explores the readiness of internal resources (OV1), including the adequacy of financial and human resources to support e-commerce implementation. The study also investigates whether firms can leverage e-commerce according to their economies of scale and whether they have sufficient funding to invest in e-commerce (OV2). The role of the board of directors in guiding e-commerce adoption and providing strategic direction (OV3) also plays a critical role in the successful implementation of e-commerce. Moreover, the export orientation and market expansion strategies of firms (OV4) are motivational factors that drive the more active use of e-commerce to enhance their competitive advantage.

In terms of demographic attributes, this study examines factors such as the type of firm, the number of years respondents have worked in the firm, the number of employees, the number of years since the firm's establishment, and the timeline for initiating e-commerce. These attributes provide a more comprehensive understanding of the firm's background and facilitate the analysis of how different firm characteristics influence the adoption of e-commerce.

## 4. Analysis and Results

### 4.1. Factor analysis

Factor analysis is also employed to filter out non-conforming variables. The correlations between observed variables and latent variables are presented in Table 1. Each latent variable in the questionnaire is linked to the corresponding observed variables, and the values in the table illustrate the extent to which each observed variable represents the latent construct. Observed variables with a value below 0.700 in the Component Matrix<sup>a</sup> are excluded from subsequent analysis. Consequently, variables with scores below 0.700—specifically OV1 (0.671), OV2 (0.620), and MV3 (0.698)—were removed from further consideration.

**Table 1:** Factor analysis

		<b>Component Matrix<sup>a</sup></b>
Management (MV)	MV4	0.851
	MV1	0.849
	MV2	0.837
IT infrastructure (IT)	IT1	0.864

	IT2	0.857
	IT3	0.808
Environment (EV)	EV2	0.784
	EV1	0.782
	EV3	0.772
	EV4	0.751
Organization (OV)	OV2	0.854
	OV3	0.729

#### 4.2. Reliability analysis

To identify the underlying structure of six variables related to the quality of community pharmacy services, this study used exploratory factor analysis (EFA). At the same time, to verify the suitability of the sample set, we used the tests of Kaiser-Meyer-Olkin (KMO) and Bartlett. This study aims to summarize the data more clearly by selecting smaller component sets.

**Table 2:** Reliability analysis

	Variable	Cronbach's Alpha	No. of Items
MV	Management	0.907	3
IT	IT infrastructure	0.939	3
OV	Organization	0.662	4
EV	Environment	0.875	2
HIS	E-commerce adoption	0.860	4

The total variable correlation of all observed variables was greater than 0.4, so the degree to which SMEs were affected by e-commerce met the requirements for exploratory factor analysis. The KMO assessment was shown to be 0.877 ( $> 0.6$ ), indicating that the data obtained in this study are suitable for exploratory factor analysis. The Bartlett test showed "no correlation between variables", supporting the hypothesis ( $H_0$ ) with a significance value of 0.00 and less than 0.05.

#### 4.3. Return Analysis

The regression analysis results indicate that the adjusted R-squared value is 0.63 and the R-squared value is 0.66, implying that 63.3% of the variation in SME e-commerce adoption can be explained by the relationship between the independent variables. Analysis of variance (ANOVA) results show an F-score of 340.497 with a significance level of  $\text{Sig.} = 0.000 < 0.05$ , which confirms a significant association between the independent and dependent variables and supports the reliability of the model used in the study. Multiple regression analysis was conducted to evaluate the relationship between the independent and dependent variables, with specific results presented in Table 3.

The results indicate convergence and divergence in e-commerce adoption among SMEs. All hypotheses were supported, suggesting that management support, IT infrastructure, organizational readiness, and external environmental factors significantly influence

e-commerce adoption. Notably, management factors have a particularly strong influence on e-commerce adoption among SMEs, indicating that management's attitude toward innovation and risk-taking is a key driver.

Moreover, the study results reveal that the significance values for all variables are below 0.05, confirming the acceptance of all hypotheses. Table 3 demonstrates that management factors have the strongest influence on e-commerce adoption among SMEs (standardized beta coefficient = 0.103, p-value = 0.001). In comparison, IT infrastructure and organizational factors exert a smaller impact, with standardized beta coefficients of 0.061 and 0.229, and p-values of 0.001 and 0.000, respectively. Environmental factors have the least influence on SME e-commerce adoption (standardized beta coefficient = -0.092, p-value = 0.000). Among the technological factors, the study identifies four key variables that affect e-commerce adoption by SMEs, including business readiness, website compatibility, and IT human resource preparedness for e-commerce implementation.

**Table 3:** Analysis Results

Model		Coefficients				
		Unstandardized Coefficients		Standardized Coefficients	t	sig.
		B	Std. Error	Beta		
1	(Constant)	0.480	0.612	-	3.342	0.000
	Establishment year	0.019	0.164	-0.030	0.491	0.626
	E-commerce start year	0.202	0.076	0.061	-0.885	0.581
	Duration	-0.303	0.142	-0.092	-0.334	0.574
	Employee count	0.057	0.268	0.103	-0.707	0.683
	Firm type	0.049	0.153	-0.071	0.016	0.671
2	(Constant)	0,231	0.097	-	2.395	0.018
	OV	0.193	0.020	0.229	8.491	0.000
	IT	0.202	0.076	0.061	6.331	0.001
	EV	-0.303	0.142	-0.092	-0.334	0.000
	MV	0.057	0.268	0.103	-0.707	0.001
Dependent Variable: SA (e-commerce adoption by SMEs)						
Independent Variable: (MA (Management), IT (IT infrastructure), OV (Organizational), EV (Environmental))						

Investigate the relationship between variables against four hypotheses. The test results are summarized in the table below.

**Table 4:** Summarizes the hypotheses

Hypothesis	Description	Result
H1	The adoption of e-commerce by businesses is positively influenced by the level of administrative support from the government.	Supported
H2	The adoption of e-commerce by businesses is positively influenced by the degree of sociocultural infrastructure compatibility.	Supported

H3	The adoption of e-commerce by businesses is positively influenced by the effectiveness of the legal environment in the country.	Supported
H4	The adoption of e-commerce by SMEs is positively influenced by the organization's readiness to adapt to technological changes.	Supported

## 5. Conclusion

This study explores the impact of e-commerce on SMEs and analyzes the key factors that contribute to the successful adoption of e-commerce. The results show that factors such as management support, IT infrastructure, organizational readiness, and the external environment have a significant impact on e-commerce adoption among SMEs. However, management support has been shown to have the greatest impact on e-commerce adoption, highlighting the positive attitude of corporate management in innovation and risk-taking as an important driver of e-commerce adoption.

In addition, the study also points out that good IT infrastructure and organizational resource preparation can effectively promote the application of e-commerce, while the influence of external environmental factors is relatively small. This shows that with the support of policies, infrastructure and cultural compatibility, companies can apply e-commerce technologies more effectively and thus enhance their competitiveness.

Overall, this study contributes to the understanding of the promotion and application of e-commerce in SMEs, providing valuable advice for policymakers to create the necessary conditions to support SMEs to thrive in the digital economy. Business managers can also use the recommendations of this study to better apply e-commerce technologies to achieve growth, efficiency and sustainability through improved management support and technology readiness.

## References

- [1] M. A. Nazir & M. A. Roomi: Barriers to Adopting Electronic Commerce for Small and Medium-Sized Enterprises in Emerging Economies, *EMAJ Emerging Markets Journal*, vol. 10 (2021), p. 43-55. <https://doi.org/10.5195/emaj.2020.203>.
- [2] H. Keskgñ, C. Şentürk, O. Sungur, & H. M. Kiriş: The Importance of SMEs in Developing Economies, 2nd International Symposium on Sustainable Development, June 8-9, 2010, Sarajevo, p. 183-192.
- [3] D. Damiyana, E. Maulina, A. Muftiadi, L. Auliana, & K. Kurniadi: The Influence of Innovation, Knowledge Management, and E-Commerce Adoption on MSME Performance, and Its Impact on MSMEs Sustainability, *Journal of Infrastructure, Policy and Development*, vol. 8 (2024), p. 7994. <https://doi.org/10.24294/jipd.v8i11.7994>.
- [4] C. L. Iacovou, I. Benbasat, & A. S. Dexter: Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology, *MIS Quarterly*, vol. 19 (1995), p. 465-485.

- [5] S. Dasgupta, D. Agarwal, A. Ioannidis, & S. Gopalakrishnan: Determinants of Information Technology Adoption: An Extension of Existing Models to Firms in a Developing Country, *Journal of Global Information Management*, vol. 7 (1999), p. 30-40.
- [6] E. H. Wang: ICT and Economic Development in Taiwan: Analysis of the Evidence, *Telecommunications Policy*, vol. 23 (1999), p. 235-243.
- [7] A. Sedighi, B. Sirang, & I. Azerbaijan: The Effect of E-Commerce on SME Performance, *International Journal of Applied Research in Management and Economics*, vol. 1 (2018), p. 71-81.
- [8] D. Straub, K. D. Loch, & C. E. Hill: Transfer of Information Technology to the Arab World: A Test of Cultural Influence Modeling, *Journal of Global Information Management*, vol. 9 (2002). <https://doi.org/10.4018/jgim.2001100101>.
- [9] E. M. Rogers: *Diffusion of Innovations* (5th ed.). Simon and Schuster (2003). ISBN 978-0-7432-5823-4.
- [10] X. Duan, H. Deng, & B. Corbitt: Evaluating the Critical Determinants for Adopting E-Market in Australian Small-and-Medium Sized Enterprises, *Management Research Review*, vol. 35 (2012), p. 289-308.
- [11] K. Zhu & K. L. Kraemer: Post-Adoption Variations in Usage and Value of E-Business by Organizations: Cross-Country Evidence from the Retail Industry, *Information Systems Research*, vol. 16 (2005), p. 61-84.
- [12] A. Molla & P. S. Licker: Perceived E-Readiness Factors in E-Commerce Adoption: An Empirical Investigation in a Developing Country, *International Journal of Electronic Commerce*, vol. 10 (2005), p. 83-110.
- [13] M. Khalfan, P. McDermott, & R. Cooper: Integrating the Supply Chain within Construction Industry, *Proceedings of 20th ARCOM Conference*, Heriot Watt University, September 1-3, 2004, vol. 2, p. 897-904.
- [14] E. Kaynak, E. Tatoglu, & V. Kula: An Analysis of the Factors Affecting the Adoption of Electronic Commerce by SMEs: Evidence from an Emerging Market, *International Marketing Review*, vol. 22 (2005), p. 623-640.
- [15] L. G. Tornatzky & M. Fleischer: *The Processes of Technological Innovation*, Lexington Books, Lexington (1990).
- [16] C. Criscuolo, & K. Waldron: *E-commerce and Productivity*, UK Office for National Statistics (ONS), sponsored by the UK Department of Trade and Industry (DTI), (November 2003), <http://www.statistics.gov.uk/cci/article.asp?ID=597>.
- [17] M. K. Loo, S. Ramachandran, & R. N. R. Yusof: Systematic Review of Factors and Barriers Influencing E-Commerce Adoption Among SMEs Over the Last Decade: A TOE Framework Perspective, *Journal of the Knowledge Economy*, (2024). <https://doi.org/10.1007/s13132-024-02257-5>.
- [18] E. Cloete, S. Courtney, & J. Fintz: Small Businesses' Acceptance and Adoption of e-Commerce in the Western-Cape Province of South-Africa, *The Electronic Journal of Information Systems in Developing Countries*, vol. 10 (2002), p. 1-13.
- [19] O. Tiago & F. M. Maria: Understanding E-Business Adoption Across Industries in European Countries, *Industrial Management & Data Systems*, vol. 110 (2010), p. 1337-1354.