FACTORS AFFECTING E-COMMERCE INDUSTRY DEVELOPMENT IN ASIAN COUNTRIES: LESSONS FOR VIETNAM

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Abstract: ***The study examines the influence of economic, social, and technological factors on the development of the e-commerce industry across Asian countries. Employing a quantitative research approach, the study utilizes secondary data obtained from credible international sources and databases to test the relationships between multiple independent variables and a dependent variable representing e-commerce development. The empirical results indicate that technological and economic factors exert significant positive effects, while social factors demonstrate varying levels of influence across countries. Based on these findings, the study proposes policy-relevant implications to support the sustainable development of the e-commerce sector in Vietnam.***

• Keywords: *e-commerce industry, Asian countries, development.*

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Introduction

The e-commerce industry has become a transformative driver of global trade and digital innovation, reshaping consumption patterns, retail structures, and production linkages across economies. According to UNCTAD (2023), Asia is accounted for more than 60% of global online retail sales, with markets such as China, Japan, South Korea and the ASEAN economies that witnessing double-digit growth rates in e-commerce revenue between 2019 and 2023. Given this combination of strong economic fundamentals and dynamic digital transformation, Asia provides an ideal empirical setting for examining about the determinants of e-commerce industry development. The region gives substantial diversity in terms of level of income, technological capacity, education, and institutional readiness, allowing for comparative cross-country analysis while maintaining contextual relevance to Vietnam.

However, numerous studies have explored the e-commerce sector, many are either country-specific or limited to firm-level determinants, often neglecting the multi-dimensional influences of macro-level factors such as technology, education, social structure, and income. Moreover, while cross-country studies within Asia remain scarce, even though the region offers a diverse yet comparable environment in which economies share cultural and institutional similarities but differ in their levels of digital maturity. This research seeks to address this gap by examining how technological, social, and economic factors jointly influence the development of the e-commerce industry in Asian countries and by identifying lessons applicable to Vietnam, an emerging digital economy striving to accelerate its transformation.

Theoretical framework and research model

Overview of previous research related to e-commerce development

The evolution of e-commerce has attracted substantial empirical attention, particularly with regard to the national- and firm-level determinants that drive its adoption and expansion. Gibbs and Kraemer (2004) conducted one of the seminal cross-country investigations, testing an institutional model of e-commerce scope across ten countries; their findings suggest that technological resources, strategic benefits, financial resources, legislation barriers and government promotion significantly influence firms' use of e-commerce. More recently, Li et al. (2020) provided an overview of the digital economy in the Asia region, noting that shifts in

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business processes, digital policy and consumer behaviour are reshaping regional e-commerce dynamics.

Hypotheses and research model

Based on previous studies, this study proposes the following hypotheses:

H1: ICT infrastructure has a positive impact on the development of e-commerce of countries in Asia region

H2: Virtual Social Network has a positive impact on the development of e-commerce of countries in Asia region

H3: Mobile Phone subscription has a positive impact on the development of e-commerce of countries in Asia region.

H4: Urbanization has a positive impact on the development of e-commerce of countries in Asia region.

H5: Expected years of schooling has a positive impact on the development of e-commerce of countries in Asia region.

H6: Population size of a country has a positive impact on the development of e-commerce of countries in Asia region.

H7: GNI per capita has a positive impact on the development of e-commerce of countries in Asia region.

Proposed research model

In this study, the authors use natural log transformation to convert all dependent, independent and control variables to natural log form. In economic studies, natural logarithmic transformations of models in figures are often used to normalize data distributions, especially for variables with right-skewed distributions such as GNI per capita, E-commerce revenue, population. With the data table of the thesis, the countries studied have many differences in terms of product, population as well as income. By narrowing the gap between large and small values, logarithms help reduce the influence of outliers and improve the stability of the error method (limiting the heterogeneity of the current symbol). Second, the work is presented in logarithmic form, allowing the regression model to linearize proportional or nonlinear relationships, thereby better matching the economic nature of the data, such as growth or elasticity relationships. Third, the quantity coefficient in the log model can be directly interpreted as a percentage, that is, it is known if the independent variable increases by 1%, then the dependent variable will change by how much percentage, this is a great advantage in the process of dealing with quantitative results during the research process.

The econometric regression model is the main model used by the authors in the study. The authors propose the following research model:

The influence of three groups of technological, social and economic factors on the development of the e-commerce industry scale.

$$ln(ECG_{i,t)} = \beta_{0} + \beta_1 ICT_{i,t} + \beta_2 VSN_{i,t} + \beta_3 MOS_{i,t} + \beta_4 URB_{i,t} + \beta_5 ln(PPL_{i,t)} + \beta_6 EYS_{i,t} + \beta_7 ln(GNI_{i,t)} + \beta_8 CONTROL_{i,t} + \varepsilon i,t$$

ECG: Growth of e-commerce, in terms of Revenue

ICT: infrastructure of Communication and Technology of country at year t

VSN: virtual social network usage of civilian of country i at year t

MOS: mobile phone subscription of civilian of country i at year t

URB: urbanization rate of country i at year t

ln(PPL): natural logarit of population of country i at year t

EYS: expected years of schooling of civilian of country i at year t

ln(GNI): natural logarit of GNI percapita, calculated as per Atlas method of civilian of country i at year t

CONTROL: control variables used in the model, as per country i at year t

The panel data used by the author in the study is a combination of space (between countries in the sample) and time (2019-2023 period). This combination will bring more valuable results, allowing to observe variables that change through factors that fluctuate over time, while reducing the defect of multicollinearity, providing more degrees of freedom for the data, thereby making the analysis results more reliable.

Research methodology

This research uses quantitative research

method to examine the relationship between economic, social, and technological factors and the development of the e-commerce industry across Asian countries. This quantitative approach will be appropriate, because the author seeks to measure, tests, and quantify the effects of multiple independent variables on the dependent variable representing e-commerce developments. The analysis is conducted using secondary data collected from credible internal sources and database such as the UNCTAD, the International Telecommunication Union (ITU), the World Bank, the International Monetary Fund (IMF), and the GSMA.

Research results

Comparing model and select appropriate model

The study estimates the research model using both Random Effects Model (REM) and Fixed Effects Model (FEM), followed by the Hausman test to determine the more appropriate model. The REM estimation results are presented in Table 1.

Table 1: REM estimation results

REM model of the influence model of technological, economic and social factors on the growth of e-commerce	
R-squared within	0.1994
R-squared between	0.9428
R-squared Overall	0.9289
Chi2	525.41
Prob > chi2	0.0000
Model used	**REM**

Source: authors' calculations

To assess the suitability of the random-effects GLS model, R-squared and hypothesis testing were considered. The estimation results showed that the overall R-squared coefficient reached 0.9289, which implies that the model is capable of explaining up to 92.89% of the variation in the dependent variable (In_ecg) in the data set. When separated, the between-group R-squared coefficient reached 0.9428, reflecting that the model explained 94.28% of the difference in the average level of the dependent variable between countries. Meanwhile, the within-group R-squared coefficient was 0.1994, indicating that the independent variables explained 19.94% of the variation in the dependent variable over time within each country. The significant difference between the Between and Within indices shows that country-specific factors play an important role in explaining the dependent variable.

In addition, the Wald chi2 (χ^2) test results show that the Prob value > chi2 = 0.000, allowing the rejection of the null hypothesis H0 that all regression coefficients of independent variables are simultaneously zero. This confirms that the constructed regression model is statistically significant at the 1% significance level, and at least one independent variable in the model has an impact on the dependent variable.

Table 2: FEM estimation results

FEM mode of the influence model of technological, economic and social factors on the growth of e-commerce	
R-squared within	0.2883
R-squared between	0.6178
R-squared Overall	0.6082
Chi2	10.94
Prob > chi2	0.0000
Model used	**FEM**

Source: authors' calculations

The estimation results from the FEM presented in Table 2 show that the model has a high overall statistical significance. Specifically, the F test with the value Prob > F = 0.0000 proves that the null hypothesis H0 (assuming that all regression coefficients of independent variables are simultaneously equal to 0) is rejected. This confirms that the model is suitable and at least one independent variable in the model has an impact on the dependent variable of e-commerce growth in terms of revenue.

Regarding the explanatory power of the model, the R-squared Within coefficient is 0.2883, indicating that the independent variables explain 28.83% of the variation over time of the dependent variable within each country. Meanwhile, the R-squared Between (0.6178) and Overall (0.6082) coefficients are higher, reflecting that the model also explains a significant part of the difference between countries. The moderately high R-squared Between and Overall (larger than 0.6) is a good sign for the model as this study focuses on factors affecting e-commerce growth across countries across Asia, not just on the internal changes of a country. In particular, the

result of the hypothesis test "F test that all u_ i=0" gives Prob > F = 0.0000, providing strong evidence to reject the hypothesis that there are no separate fixed effects of each country (u_i). This confirms the suitability of the FEM model compared to the pooled OLS regression model, and shows that the specific, time-invariant characteristics of each country have important influences that need to be controlled, giving a signal that FEM may be preferred.

After running both models, to really know which model is more suitable for this study and to systematically and objectively choose between FEM and REM, the Hausman test is used. Theoretically, REM is preferred due to its high estimation efficiency, but only if it satisfies the key assumption that the unobserved individual characteristics of the subject (random fixed effects), as well as the independent variables in the model, are not correlated. If this assumption is violated, the estimates from REM will no longer be robust (biased), and FEM - with the advantage of always giving robust results regardless of the existence of correlation - becomes the more reliable choice. The Hausman test is designed to test this assumption. Basically, it compares the difference between the estimated coefficients from FEM and REM. The null hypothesis (H0) of the test is that REM is the appropriate model (i.e., there is no correlation mentioned above). If the test result has a small p-value (usually less than 0.05), we reject H0 and conclude that FEM is the more appropriate model. Therefore, performing the Hausman test in this study is an important step to ensure the robustness and reliability of the conclusions drawn from the econometric model. Result of Hausman test will be presented in Table 3 below:

Table 3: Hausman test results

Hausman test result	
Chi2	32.66
Prob > chi2	0.0000
Model chosen	FEM

Source: authors' calculations

With the original hypothesis H0 that the REM is appropriate, the results of the Hausman test force us to reject the hypothesis H0. The number 32.66 measures the difference between the estimated coefficients from the FEM model and the REM model. This is a very large number, because compared to the critical value threshold of the Chi-squared distribution with 8 degrees of freedom, at the 1% significance level is only 20.09, the number 32.66 is much larger than this threshold, with the p-value level = 0.0000 < 1%, we have enough solid basis to reject it. This means that the difference between the estimated coefficients from FEM and REM is systematic, not random. Therefore, with this study and data set, FEM is chosen as more appropriate and reliable than the REM.

Autocorrelation and heteroskedasticity test results

To ensure the validity of the estimates in the dynamic panel model, serial autocorrelation test is performed. The author chooses to use the Woolridge test, suitable for FEM model to test for first-order autocorrelation in panel data. The result is in the Table 4 below:

Table 4: Autocorrelation test results

Autocorrelation test result	
Chi2	0.84
Prob > chi2	0.3592

Source: author's calculations

The results show that the p-value = 0.3592. With the p-value greater than the 5% significance level, the H0 hypothesis of no first-order autocorrelation is accepted. This has proven that the model doesn't have the issue of autocorrelation.

In parallel with the autocorrelation test, the issue of heterokedasticity was also evaluated. Applying the modified Wald test to the panel data, the results obtained were statistically significant with p-value = 0.0000 < 1%. This result provides clear evidence to reject the null hypothesis H0 of homoscedasticity (Table 5).

Table 5: Heteroskedasticity test result

Heterokedasticy test result	
Chi2	39683.63
Prob > chi2	0.0000

Source: author's calculations

Based on these findings, heteroskedasticity is addressed using FGLS estimation in the subsequent analysis.

Variance inflation factor test results

To assess the risk of high multicollinearity among independent variables in the model, the study conducted a variance inflation factor (VIF) test. Normally, if the VIF value of a variable exceeds the threshold of 10, or the average VIF value is greater than 1, then multicollinearity is considered to have the potential to seriously affect the accuracy of coefficient estimates. The test results show that the VIF values of all variables are low or within the acceptable threshold. Except for the ln_gni variable which is nearly exceeding 10, the other variables are all less than or equal to 5, indicating that there is almost no risk of multicollinearity in the model.

Table 6: VIF test results

	VIF.
DEI	2.13
EYS	2.03
MOS	1.71
LN_PPL	1.11
IFL	1.08

Source: author's calculations

The test results presented in Table 6 show that the VIF coefficients of all independent variables in the model are in the range from 1.08 to 2.13. Specifically, the variable DEI (Digital Economy Index) has the highest VIF coefficient of 2.13, while the remaining variables such as EYS, MOS, LN_PPL, and IFL all have significantly lower VIF coefficients. With this result, it can be concluded that serious multicollinearity does not exist in the research model. All VIF values are much lower than the usual warning threshold of 10, and even lower than the stricter threshold of 5. This proves that the independent variables do not have a strong enough linear correlation to adversely affect the stability and reliability of the regression coefficient estimates. Therefore, the model is technically guaranteed and is completely suitable for accurately interpreting the estimation results.

Regression results measure the impact of Technological, Economic and Social factors on the growth of e-commerce

After selecting the appropriate model, diagnostic issues are addressed. The FGLS method, implemented using the *xtgls, panels(h)* command, is applied to correct for heteroskedasticity in the residuals.

Table 7: Impact of Technological, Economic and Social factors on the growth of e-commerce

Ln_ECG			
	Coef.	Std. Err.	P-value
Cons	3.1323	0.3453	0.000
DEI	0.5016	0.0153	0.000
MOS	-0.0017	0.0006	0.006
EYS	0.1819	0.0141	0.000
LN_PPL	0.9738	0.0174	0.000
IFL	-0.0003	0.0008	0.679

Source: authors' calculations

With this result, a regression equation was constructed to represent the relationship between the independent variables and the dependent variables in the research model. This equation is established as follows:

$$Ln\ (ECG) = 3.1323 + 0.5016 \times DEI - 0.0017 \times MOS + 0.1819 \times EYS + 0.9738 \times Ln_PPL$$

Based on the results of Table 7, it is clear that the Digital Economy Index group of factors has a significant impact on the growth of e-commerce. When the digital economy index increases by 1 unit, the dependent variable Ln_ECG will increase by an average of 0.5016 units, provided that other factors remain unchanged. With the variable EYS, which represents expected years of schooling, representing the education level of people in each country. The impact coefficient of 0.1819, with a p-value of 0.0141 less than 0.05, shows that the education level also has a certain influence on the development of e-commerce, although this index is not as clear and has a strong impact as other index groups. With the variable reflecting the population level is Ln_PPL, the very high positive regression coefficient of 0.9738 proves that this is a factor that has an important influence on the development of the e-commerce industry in general. For the variable MOS, this is a variable with a result contrary to the initial expectation, when the hypothesis is normal, we expect the level of mobile phone popularity - an indicator of telecommunications and technology infrastructure - to have a positive impact on economic growth. This result indicates that when the mobile phone subscription rate increases by 1 unit, the dependent variable (In_ECG) will decrease by an average of 0.0017 units. With the last variable, IFL, stands for Inflation, the regression coefficient of the variable is close to 0

(-0.0003) and is also not statistically significant with p-value = 0.679.

Conclusion and recommendations

Conclusion

The study highlights Asia's rising role as a global hub for e-commerce growth, driven by demographic advantages, technological adoption, and the expansion of social commerce. Vietnam, in particular, demonstrates strong potential due to its favorable digital ecosystem and supportive government policies. Beyond commercial expansion, e-commerce contributes significantly to economic development by generating employment, fostering SME participation, and modernizing supporting systems. By identifying key determinants, this study provides empirical evidence to support the formulation of sustainable e-commerce development strategies, thereby enhancing economic growth and quality of life in both Asia and Vietnam.

Recommendations

Recommendations for Vietnam's business

The findings confirm that virtual social networks (VSN) are a key driver of e-commerce growth. Therefore, businesses should leverage social media platforms as strategic channels for both sales and community building by developing authentic and engaging content to convert users into loyal customers and maximize network effects.

Despite favorable urbanization (URB), consumer trust in fully online transactions remains limited. Firms should adopt a "phygital" approach by integrating online platforms with offline touchpoints such as pick-up stations, showrooms, or partnerships with local stores to reduce last-mile delivery costs and enhance customer trust, particularly in less-developed areas.

Amid intensifying competition, businesses must transition from experience-based to data-driven operations. Investing in analytics to understand customer behavior, personalize experiences, and optimize logistics in line with rising income levels (Ln_GNI) will improve efficiency, increase customer retention, and build sustainable competitive advantage.

Recommendations for the government and related departments

The findings indicate that e-commerce development relies on an integrated digital ecosystem, including infrastructure (ICT), social networks (VSN), income (GNI), and urbanization (URB). To position e-commerce as a pillar of the digital economy, the Vietnamese Government should implement coordinated policies at both macro and micro levels.

At the macro level, priorities include establishing a comprehensive legal framework for e-commerce and social commerce, strengthening data protection and platform accountability, and accelerating investment in digital and data infrastructure, particularly broadband, 5G, and rural connectivity. Promoting cross-border e-commerce agreements and developing regional logistics hubs are also essential to enhance international integration.

At the micro level, efforts should focus on improving digital capabilities for MSMEs through targeted training programs, enhancing consumer awareness and trust, and supporting logistics innovation alongside interoperable digital payment systems. Additionally, establishing a national e-commerce data monitoring system would enable evidence-based policymaking and strategic planning. The synchronized implementation of these measures will foster a resilient, inclusive, and sustainable e-commerce ecosystem in Vietnam.

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