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# Factors Influencing E-Commerce Adoption in SMEs: Evidence From Thai Nguyen, Vietnam

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***Abstract***
*This paper explores the factors influencing e-commerce adoption among small and medium-sized enterprises (SMEs) in Thai Nguyen, Vietnam. Employing a mixed-methods approach grounded in the Technology-Organization-Environment (TOE) framework, the study analyzes survey data from 287 SMEs alongside qualitative interviews with managers. The findings indicate that IT infrastructure, managerial awareness, competitive pressure, and organizational readiness significantly impact e-commerce adoption. This study contributes to a deeper understanding of digital transformation in emerging markets and offers strategic and policy recommendations for relevant stakeholders.*
***Keywords:*** *E-commerce, SMEs, TOE framework, Vietnam, digital transformation*

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## I. Introduction

Vietnam's e-commerce sector has witnessed strong growth, particularly during the Covid-19 pandemic, driven by the rising number of online shoppers and increased digital transformation efforts by businesses. Despite global economic uncertainties, e-commerce continues to expand rapidly, with a projected growth rate of over 22% in 2023 and sustained development expected through 2025.

In this context, e-commerce plays a crucial role in promoting regional economic competitiveness, especially in provinces like Thai Nguyen, which possesses abundant industrial resources and a strategic location for logistics and transportation. However, limited participation in service chains and high logistics costs have hindered the province's competitiveness and the effective flow of goods.

This study focuses on identifying **factors influencing the adoption of e-commerce in SMEs in Thai Nguyen**. It acknowledges that the adoption process is influenced by multiple variables, including technological infrastructure, managerial awareness, employee skills, competitiveness, customer behavior, and government regulations.

Despite the potential, SMEs in Thai Nguyen face numerous barriers to e-commerce adoption such as inadequate IT infrastructure, lack of skilled personnel, high operating costs, and concerns about security and reliability. Previous studies highlight challenges like weak website design, unclear responsibility for transactions, limited internet access, and privacy concerns. These barriers underline the urgent need for targeted support and strategic investment to enable SMEs to leverage e-commerce effectively.

## II. Conceptual Framework

The theoretical model used for the study is illustrated in the figure above. This study will investigate four factors that may influence the adoption of e-commerce in small and medium enterprises (SMEs) in Thai Nguyen, including technological factors, organizational factors, environmental factors, and management factors.

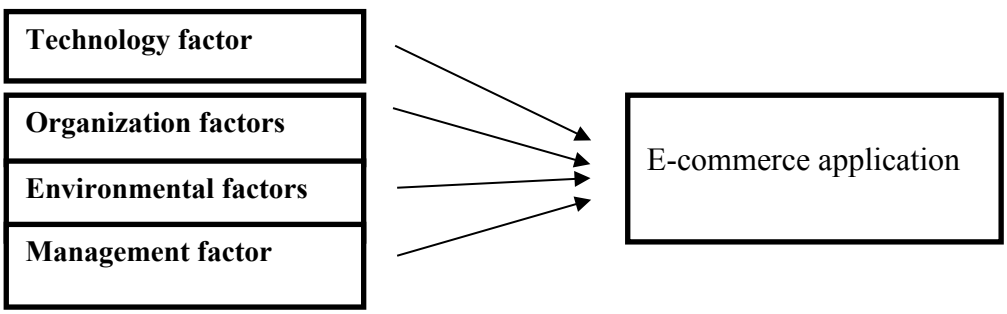

Figure 1: Conceptual Model of E-Commerce Adoption in SMEs

## III. Research Methodology

This study is based on quantitative research methods. Quantitative research methods are considered the most suitable for collecting data to address the research questions of this topic. Data will be converted into statistical significance to produce the most accurate results. Quantitative research methods are scientific and highly reliable, helping us to draw accurate conclusions and generalize into a whole through the application of statistical methods to data processing. The use of quantitative methods with the support of computational software helps researchers analyze and control large volumes of data quickly, accurately and minimize errors in calculations to test the four hypotheses mentioned above, this study is based on previous studies in identifying factors affecting the application of e-commerce in small and medium enterprises (SMEs). Technological factors, organizational factors, environmental factors, and managerial factors are identified as the key determinants driving the adoption and integration of e-commerce solutions (Tornatzky & Fleischer, 1990).

Additionally, based on the work of Zhu and Kraemer (2005), demographic characteristics such as firm size, firm age, industry type, and market scope are used as control variables when assessing the role of technological, organizational, environmental, and managerial factors in e-commerce adoption.

**Characteristics of the survey respondent group**

***Table 4.1: Characteristics of survey respondents (n=287)***

| Measuring factor | Measuring factor | Characteristic | % | Sample Number |
|---|---|---|---|---|
| | Sex | Male | 52.6 | 151 |
| | | Female | 47.4 | 136 |
| Effective | Education level | Dr. | 0 | 0 |
| | | Master | 7.0 | 20 |
| | | University | 81.5 | 234 |
| | | College, high school | 11.5 | 33 |
| | Areas of expertise | Business Administration/Marketing | 36.6 | 105 |
| | | Finance, accounting | 33.8 | 97 |
| | | Manufacture | 4.5 | 13 |
| | | Information technology | 11.1 | 32 |
| | | Other | 13.9 | 40 |
| | Interviewee's position | Chairman (Board of Directors) | 0.7 | 2 |
| | | Manager | 14.6 | 42 |
| | | Head of Department | 20.2 | 58 |
| | | Specialist | 47.0 | 135 |
| | | Other | 17.4 | 50 |

Source: Author's survey, 2024

The survey respondents showed diversity in gender, education level, professional field, and job position. Gender distribution was relatively balanced with 52.6% male and 47.4% female. Most respondents held a university degree (81.5%), while 7.0% had a master's degree and 11.5% had a college or high school education; no one held a doctorate. In terms of professional fields, Business Administration/Marketing (36.6%) and Finance/Accounting (33.8%) were the most common. The majority held specialist positions (47.0%), followed by department heads (20.2%) and directors (14.6%), with few in top executive roles..

**Characteristics of the research sample.**

The total number of survey forms issued was 350. The number of valid survey forms was 287, accounting for 82%, the number of invalid forms due to missing information and incorrect data was 63 forms eliminated.

**Distribution of small and medium enterprises by production and business sector.**

***Table 4.2: Main production and business fields of Vietnamese SMEs.***

| | Field of operation | Frequency | Percent (%) | Accumulated Percentage (%) |
|---|---|---|---|---|
| Effective | Trade and services | 169 | 58.9 | 58.9 |
| | Industry and construction | 67 | 23.3 | 82.2 |
| | Agriculture, forestry and fishery | 16 | 5.6 | 87.9 |
| | Other | 35 | 12.2 | 100.0 |
| | Total | 287 | 100.0 | |

Source: Author's survey, 2024

The table analyzing enterprise activity fields reveals the industry structure of the survey sample. Trade and Services dominated with 58.9% (169 enterprises), indicating strong potential for e-commerce adoption.

Industry and Construction followed with 23.3% (67 enterprises), showing opportunities for digital optimization. Agriculture, Forestry, and Fishery made up 5.6% (16 enterprises), facing more challenges in e-commerce adoption but still holding untapped potential. The remaining 12.2% (35 enterprises) fell into a diverse "Other" category, reflecting broad participation across various niche sectors.

**Distribution of Small and Medium Enterprises by Type and Size of Enterprise.**

***Table 4.3: Distribution of number of employees in types of SMEs***

| Business type | Number of employees in the enterprise | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Under 10 | | From 10 to 50 | | From 50 to 200 | | From 200 to 300 | |
| | Quantity | Percent (%) | Quantity | Percent (%) | Quantity | Percent (%) | Quantity | Percent (%) |
| Private Enterprise | 16 | 22 .5 | 15 | 11 .4 | 9 | 16 .1 | 2 | 7.1 |
| Company Limited | 47 | 66.2 | 68 | 51.5 | 26 | 46.4 | 5 | 17.9 |
| Joint Stock Company | 4 | 5.6 | 20 | 15.2 | 11 | 29.6 | 16 | 57.1 |
| Partnership | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Other | 4 | 5.6 | 29 | 22.0 | 10 | 17.9 | 5 | 17.9 |
| Total | 71 | 100 | 132 | 100 | 56 | 100 | 28 | 100 |

Source: Author's survey, 2024

The analysis of enterprise types and employee numbers reveals a clear trend toward small and medium-sized businesses. Limited liability companies (LLCs) dominate, especially in groups with fewer than 50 employees. Joint stock companies (JSCs) are less common in smaller groups but more prevalent in larger enterprises, indicating strong scalability. Private enterprises (PEs) are mostly very small and struggle to scale, while partnerships are absent, suggesting low local popularity. Other enterprise types are evenly distributed but not significant. Overall, the survey highlights that businesses in Thai Nguyen mainly operate on a small to medium scale, with only a few, like JSCs, showing potential for large-scale growth.

**Internet connection form**

All SMEs participating in the survey are equipped with computers and have Internet connection.

**Application of E-commerce to serve production and business activities.**

79.8% of Vietnamese SMEs have built websites to serve their production and business activities.

## IV. Results And Analysis

The number of samples applied to process the official scale is N= 287 .

The Cronbach's Alpha method will eliminate observed variables with total correlation coefficients (item-total correlation) below 0.3. Next, variables with weights (factor loading) less than 0.4 in the exploratory factor analysis (EFA) will continue to be eliminated and the total variance extracted must be greater than or equal to 60%. In the EFA analysis, the Principal Axis Factoring method with Varimax rotation and the stopping point when extracting factors with Eigenvalue equal to 1 is used. This process allows to extract the weights of observed variables (factor loading) for comparison and to decide whether to eliminate or retain in the study.

**Crombach Alpha reliability coefficient**

***Table 4.5: Cronbach's Alpha analysis for independent variables***

**Technology factor (TE)**

| Item-Total Statistics | | | | |
|---|---|---|---|---|
| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| TE01 | 10.53 | 4,052 | .656 | .787 |
| TE02 | 10.52 | 3,947 | .681 | .776 |
| TE03 | 10.56 | 4,090 | .647 | .791 |
| TE04 | 10.57 | 4.131 | .648 | .791 |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .831 | 4 |

The scale with four items (TE01 - TE04) has high reliability (Cronbach's Alpha = 0.831), and all items contribute well to the overall consistency. Therefore, all items should be retained for further analysis.

**Organizational factors (OR)**

| Item-Total Statistics | | | | |
|---|---|---|---|---|
| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| OR01 | 14.02 | 7,372 | .680 | .847 |
| OR02 | 14.04 | 7,190 | .716 | .838 |
| OR03 | 14.00 | 7,330 | .677 | .848 |
| OR04 | 14.00 | 7,243 | .699 | .843 |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .871 | 5 |

The reliability analysis indicates that the scale, with a Cronbach's Alpha of 0.871, has high internal consistency, exceeding the standard threshold of 0.7. The Corrected Item-Total Correlation (CITC) values for all items (OR01 to OR04) are above 0.3, demonstrating that each item is strongly correlated with the overall scale. Additionally, the Cronbach's Alpha if Item Deleted values range between 0.838 and 0.848, showing that removing any item would not significantly reduce the scale's reliability. These results confirm that the scale is reliable and all items contribute effectively to its consistency.

**Environmental factors (EN)**

| Item-Total Statistics | | | | |
|---|---|---|---|---|
| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| EN01 | 17.76 | 9.105 | .593 | .789 |
| EN02 | 17.65 | 8,977 | .659 | .775 |
| EN03 | 17.81 | 8,578 | .643 | .778 |
| EN04 | 17.82 | 8,978 | .576 | .793 |
| EN05 | 17.78 | 9,823 | .506 | .806 |
| EN06 | 17.75 | 9,673 | .531 | .802 |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .819 | 6 |

The reliability analysis shows that the scale has a Cronbach's Alpha of 0.819, indicating good internal consistency, as it exceeds the commonly accepted threshold of 0.7. The Corrected Item-Total Correlation (CITC) values for all items (EN01 to EN06) are above 0.3, confirming that each item is sufficiently correlated with the overall scale. The Cronbach's Alpha if Item Deleted ranges between 0.775 and 0.806, suggesting that removing any item would not significantly improve or reduce the reliability of the scale.

**Management Factor (MA)**

| Item-Total Statistics | | | | |
|---|---|---|---|---|
| | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
| MA01 | 10.64 | 3.611 | .666 | .738 |
| MA02 | 10.77 | 4,019 | .592 | .774 |
| MA03 | 10.47 | 4,061 | .654 | .745 |
| MA04 | 10.51 | 4,270 | .591 | .774 |

| Reliability Statistics | |
|---|---|
| Cronbach's Alpha | N of Items |
| .807 | 4 |

The reliability analysis reveals a Cronbach's Alpha of 0.807, indicating a high level of internal consistency, surpassing the commonly accepted threshold of 0.7. The Corrected Item-Total Correlation (CITC) values for all items (MA01 to MA04) exceed 0.3, demonstrating a strong correlation between each item and the overall scale. The Cronbach's Alpha if Item Deleted ranges between 0.738 and 0.774, indicating that removing any item would not significantly enhance the reliability. These results confirm that the scale is reliable, and all four items contribute effectively to its consistency, making them appropriate for further analysis.

***Table 4.6: Exploratory factor analysis (EFA) for independent variables***

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| | Total | % of Variance | cumulative % | Total | % of Variance | cumulative % | Total | % of Variance | cumulative % |
| 1 | 5,608 | 31,154 | 31,154 | 5,608 | 31,154 | 31,154 | 3.334 | 18,520 | 18,520 |
| 2 | 2,491 | 13,836 | 44,990 | 2,491 | 13,836 | 44,990 | 2,834 | 15,745 | 34,265 |
| 3 | 1,890 | 10,502 | 55,492 | 1,890 | 10,502 | 55,492 | 2,694 | 14,966 | 49,231 |
| 4 | 1,432 | 7,958 | 63,450 | 1,432 | 7,958 | 63,450 | 2,559 | 14,219 | 63,450 |
| 5 | .871 | 4,838 | 68,287 | | | | | | |
| 6 | .702 | 3,902 | 72,189 | | | | | | |
| 7 | .520 | 2,888 | 75,077 | | | | | | |
| 8 | .495 | 2,747 | 77,825 | | | | | | |
| 9 | .472 | 2,625 | 80,450 | | | | | | |
| 10 | .466 | 2,589 | 83,038 | | | | | | |
| 11 | .450 | 2,499 | 85,538 | | | | | | |
| 12 | .426 | 2,365 | 87,902 | | | | | | |
| 13 | .423 | 2,350 | 90,252 | | | | | | |
| 14 | .396 | 2,200 | 92,452 | | | | | | |
| 15 | .377 | 2,093 | 94,545 | | | | | | |
| 16 | .364 | 2.020 | 96,565 | | | | | | |
| 17 | .334 | 1,856 | 98,421 | | | | | | |
| 18 | .284 | 1,579 | 100,000 | | | | | | |
| Extraction Method: Principal Component Analysis. | | | | | | | | | |
| KMO and Bartlett's Test | | | | | | | | | |
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | | | | | .874 | | | |
| Bartlett's Test of Sphericity | | | | Approx. Chi- Square | | 5200.168 | | | |
| | | | | df | | 153 | | | |
| | | | | Sig. | | .000 | | | |

***Table 4.7: Exploratory factor analysis for dependent variable***

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .876 |
| Bartlett's Test of Sphericity | Approx. Chi- Square | 1526,075 |
| | df | 10 |
| | Sig. | .000 |

| Total Variance Explained | | |
|---|---|---|
| | Initial Eigenvalues | Extraction Sums of Squared Loadings |

| Component | Total | % of Variance | cumulative % | Total | % of Variance | cumulative % |
|---|---|---|---|---|---|---|
| 1 | 3,272 | 65,437 | 65,437 | 3,272 | 65,437 | 65,437 |
| 2 | .484 | 9,671 | 75,108 | | | |
| 3 | .460 | 9.201 | 84,309 | | | |
| 4 | .409 | 8,178 | 92,487 | | | |
| 5 | .376 | 7,513 | 100,000 | | | |
| Extraction Method: Principal Component Analysis. | | | | | | |

| Component Matrix | |
|---|---|
| | Component |
| | 1 |
| AD05 | .826 |
| AD04 | .826 |
| AD02 | .808 |
| AD03 | .797 |
| AD01 | .787 |
| Extraction Method: Principal Component Analysis. | |
| a. 1 components extracted | |

***Table 4.8: ANOVA and regression analysis***

| ANOVA a | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 151,528 | 4 | 37,882 | 360,497 | .000 b |
| | Residual | 73,032 | 695 | .105 | | |
| | Total | 224,560 | 699 | | | |
| a. Dependent Variable: AD | | | | | | |
| b. Predictors: (Constant), GHOST, TE, OR, EN | | | | | | |

| Model Summaryb | | | | | |
|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin- Watson |
| 1 | .821a | .675 | .673 | .32416 | 2,075 |
| a. Predictors: (Constant), GHOST, TE, OR, EN | | | | | |
| b. Dependent Variable: AD | | | | | |

| Coefficients a | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | Collinearity Statistics | |
| | | B | Std. Error | Beta | | | Tolerance | VIF |
| 1 | (Constant) | .231 | .098 | | 2,359 | .019 | | |
| | OR | .196 | .021 | .229 | 9,441 | .000 | .796 | 1,256 |
| | TE | .528 | .020 | .608 | 25,832 | .000 | .844 | 1,185 |
| | EN | .081 | .024 | .085 | 3,417 | .001 | .751 | 1,332 |
| | GHOST | .137 | .023 | .156 | 6,070 | .000 | .708 | 1,413 |
| a. Dependent Variable: AD | | | | | | | | |

**Regression analysis**

The regression analysis results give a value of R Square = 0.675 and the adjusted R Square is 0.673. This means that the relationship between the variables variable toxic set up prize prefer Okay 67.3% give variable extra belong To be "Pressure commercial use trade electricity death belong to the SMEs". Via conclude fruit stool square root wrong ANOVA give price treat F = 360,497 with idea meaning system list Sig. = 0.000 < 0.05. This result shows the existence of a relationship between the independent variables and the dependent variable, and the model in this study ensures reliability.

Multiple regression analysis is used to assess the relationship between independent and dependent variables. Results fruit research rescue also give see price treat Sig. belong to socks chief the variables are all less than 0.05; therefore, all hypotheses are accepted.

The unstandardized regression model of factors affecting e-commerce application of SMEs is determined as follows:

**AD= 0.231 + 0.196*OR + 0.528*TE + 0.081*EN + 0.137*MA**

***Table 4.9: Regression model results from actual survey***

| Coefficients a | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model B | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. Tolerance | Collinearity Statistics | |
| | | Std. Error | Beta | | | | VIF | |
| 1 | (Constant) | 0.231 | 0.098 | | 2,359 | 0.019 | | |
| | OR | 0.196 | 0.021 | 0.229 | 9,441 | 0.000 | 0.796 | 1,256 |
| | TE | 0.528 | 0.020 | 0.608 | 25,832 | 0.000 | 0.844 | 1,185 |
| | EN | 0.081 | 0.024 | 0.085 | 3,417 | 0.001 | 0.751 | 1,332 |
| | GHOST | 0.137 | 0.023 | 0.156 | 6,070 | 0.000 | 0.708 | 1,413 |
| Dependent Variable: AD (e-commerce adoption by SMEs)<br>Predictors: (Constant), MA (Managerial), TE (Technological), OR (Organizational), EN (Environmental) | | | | | | | | |

## V. Conclusion

The development of a research model on factors influencing e-commerce adoption in SMEs in Thai Nguyen city plays a crucial role in helping businesses make informed decisions to enhance competitiveness. It also provides practical insights for government agencies to support SMEs effectively.

The study identifies several key factors affecting e-commerce adoption, including internal organizational capacity, product characteristics, enterprise size, leadership awareness, managerial attitude toward innovation, competition intensity, external pressure, government support, IT infrastructure, perceived benefits, and system complexity.

Based on these findings, specific solutions are proposed:

For state agencies: Invest in IT infrastructure, promote awareness and training on e-commerce, offer technical and legal support, simplify procedures, and create a favorable environment for SMEs to operate and grow online.

For SMEs: Restructure and strategize toward e-commerce development, invest in IT infrastructure, strengthen cybersecurity, enhance digital financial access, and improve supply chain capacity to meet international standards.

In terms of enterprise management: E-commerce enables more agile, interconnected organizational models, improving internal communication, decision-making, and employee engagement.

In conclusion, promoting e-commerce adoption among SMEs in Thai Nguyen requires a dual effort: proactive transformation within enterprises and strong policy, infrastructure, and legal support from the government. Only through this synergy can SMEs fully integrate into the digital economy and global supply chains.

## References

[1] Falk, M., & Hagsten, E. (2015). E-Commerce Trends And Impacts Across Europe. International Journal Of Production Economics, 170, 357-369.
[2] Leung, C. (2018). Smes And Digital Transformation In ASEAN. ASEAN Development Journal, 15(2), 45-62.
[3] Tran, M. T., & Nguyen, H. L. (2021). Barriers To Digital Adoption In Vietnamese Smes. Journal Of Asian Business And Economics, 12(4), 114–129.
[4] Tornatzky, L. G., & Fleischer, M. (1990). The Processes Of Technological Innovation. Lexington Books.
[5] Vietnam E-Commerce Association (VECOM). (2022). Annual E-Commerce Report.
[6] Zhu, K., & Kraemer, K. L. (2005). Post-Adoption Variations In Usage And Value Of E-Business By Organizations. Information Systems Research, 16(1), 61-84.