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Analysis of the Development of E-Commerce Transactions in the 6 Highest Transaction Countries in Southeast Asia

Indanazulfa Qurrota A'yun*, Lusiana Anggraini, Gea Dwi Asmara, and Rikha Muftia Khoirunnisa



AFFILIATION:

Department of Development Economics, Faculty of Economics and Business, Universitas Ahmad Dahlan, Special Region of Yogyakarta, Indonesia

***CORRESPONDENCE:**

indanazulfa.ayun@ep.uad.ac.id

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Abstract: The background of this study is driven by the significant growth of the internet, particularly in the Southeast Asian region, which has led to technological advancements and the emergence of e-commerce. E-commerce has become crucial for meeting consumer needs, highlighting the necessity to further enhance the potential of economic digitalization through e-commerce. This study aims to examine the impact of e-commerce development factors on the growth of e-commerce transaction values in six Southeast Asian countries. It utilizes secondary data sourced from the official e-Conomy SEA website and DataReportal. The research employs panel data regression analysis using the Random Effects Model (REM) approach. The findings indicate that increases in population, number of social media users, and mobile phone users significantly contribute to the growth of e-commerce transaction values, urging platform developers and policymakers to enhance digital infrastructure and marketing strategies to maximize the digital economy potential in Southeast Asia.

Keywords: E-Commerce GMV; Number of Mobile Phone Users; Number of Social Media Users; Population

JEL Classification: L81; O33; F63; O53; L86

Introduction

The rapid growth of the digital economy has significantly impacted various industries, including the retail sector. One of the most prominent aspects of this transformation is the emergence of e-commerce, which has revolutionized how people shop and conduct business. In Southeast Asia, e-commerce has experienced rapid growth, with several countries emerging as critical players in the regional market. Laudon & Traver (2018) explained that e-commerce is the use of the internet, web, and applications to conduct digital business transactions between companies and individuals or consumers. E-commerce is a new technology and business mode that allows buyers to make online transactions and receive local package delivery or pickup from sellers (Luo et al., 2019).

According to Google, Temasek, and Bain & Company, the internet economy in Southeast Asia reached \$50 billion in 2017 and \$100 billion in 2019, with a projected value of \$300 billion by 2025 (Google, 2022). The same source also highlights that Southeast Asia is the world's highest region in terms of average daily mobile internet usage, reaching 4.2 hours per day. This makes

Southeast Asia assessed as having the potential for accelerating e-commerce growth.

The advent of e-commerce has led to changes in consumer behavior, where shopping, which initially required physical presence, can now quickly be done online from home (Kotler & Keller, 2012). This shift in consumer behavior is driven by the convenience offered in online shopping. However, some people still have reservations about online shopping due to concerns about product quality and payment fraud. Therefore, various companies compete to provide e-commerce with the best service quality to succeed and gain respect from the public.

In Southeast Asia, six countries have become central hubs for e-commerce transactions with the highest activity levels. These countries include Indonesia, Thailand, Malaysia, Singapore, Vietnam, and the Philippines. These nations are experiencing significant growth in transaction volume, market value, and technology adoption in the e-commerce sector.

Figure 1 explains the data from the six Southeast Asian countries with the highest e-commerce transaction development. The transaction values are indicated based on e-commerce Gross Merchandise Value (GMV). GMV, or Gross Merchandise Value, represents the value of goods sold or the overall transactions on an online platform during a specific period. According to the chart, in 2021, Indonesia holds the highest position among the countries, with a value reaching 48 billion USD. The second position is held by Thailand, with a value of 21 billion USD, followed by Malaysia, the Philippines, Vietnam, and Singapore. In the e-commerce sector, various platforms provide buying and selling services through websites. Platforms such as Tokopedia, Shopee, and Bukalapak are top online shopping platforms that significantly contribute to developing e-commerce transactions in Indonesia (A'yun et al., 2021).

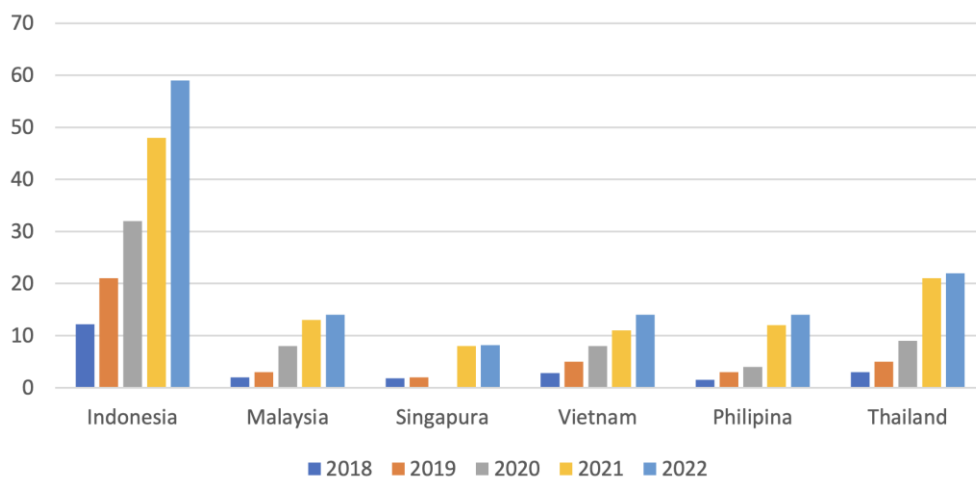


Figure 1 Diagram of E-Commerce GMV Transaction Development in 6 Southeast Asian Countries from 2018 to 2022 (Billion USD)
Source: E-economy Sea, 2023 (Processed Data)

The e-commerce industry in Indonesia is rapidly growing, leading to the emergence of new startup companies. Initially, Indonesia had only a few unicorns, but now it has reached nine and has two decacorns. Unicorns are startup companies with a valuation exceeding one billion USD. In comparison, decacorns are startup companies with a valuation above 10 billion USD. The two decacorn companies are J&T and Gojek, and notable unicorns in Indonesia include Tokopedia and Bukalapak.

The development of e-commerce transactions is supported by factors such as population size, mobile phone users, social media users, and many others. In 2019, the total number of internet users in Indonesia was 150 million. This number is expected to continuously increase yearly, reaching 204.7 million internet users in Indonesia by 2022 (Hootsuite We Are Social, 2022).

Based on the data from We Are Social in 2022, it is reported that people, on average, spend 2 hours and 31 minutes per day on social media worldwide. In Indonesia, individuals spend an average of 3 hours and 17 minutes daily on social media (Riyanto, 2022). Therefore, social media is considered highly potent for promoting and attracting consumers to engage in shopping activities.

Figure 2 is obtained from Data Reports, a website that analyzes various data, insights, and trends needed to understand the digital landscape worldwide. Figure 2 shows Indonesia has the highest number of social media users, reaching 191.4 million people in 2022. This is supported by Indonesia's population, which reached 277.7 million in 2022. The Philippines holds the second-highest position, with a social media user count of 92.05 million in 2022, followed by Vietnam, Thailand, Malaysia, and Singapura. However, the average number of social media users in these six countries has increased yearly.

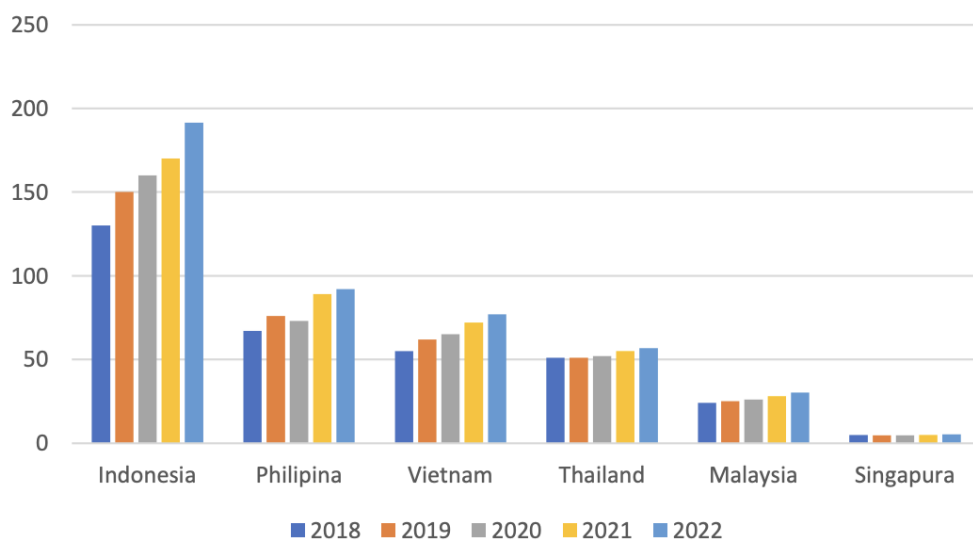


Figure 2. Diagram of the Number of Social Media Users in 6 Southeast Asian Countries from 2018 to 2022 (Million People)

Source: Data Reports, 2023 (Processed Data)

According to the OECD (2013), the Internet is closely related to digital economic activities. It directly contributes to the growth of the economy. Liu (2013) and Qu and Chen (2014) have researched the influence of the Internet on economic development, highlighting that individuals have many successful business opportunities due to the ease of obtaining information and lower production costs compared to traditional businesses.

Athalla et al. (2022) have researched the impact of information technology development on the growth of e-commerce in ASEAN countries from 2015 to 2019. The study's objective was to understand how the number of mobile phone users, internet users, and broadband telephone users influences the volume of e-commerce transactions in ASEAN. The findings indicated that the number of Internet and mobile phone users positively and significantly impacted the volume of e-commerce transactions. However, the variable of the number of broadband telephone users showed a positive but insignificant influence on the volume of e-commerce transactions.

In another study, Anwar and Aprillian (2018) conducted research to analyze the influence of trust and social media on purchasing decisions in Muslim fashion e-commerce, particularly Hijup, in Jakarta. The results showed that trust had a significant positive impact on purchasing decisions for Hijup fashion in e-commerce. Additionally, social media has had a significant positive influence on buying decisions for Hijup fashion in e-commerce.

Cheng et al. (2019) analyzed panel data to examine the relationship between population and e-commerce in China. The results showed that the population had a significant positive impact on the development of e-commerce in China. This implies that regions with a large population have a more prominent e-commerce presence than areas with a smaller population.

In a recent study examining the interplay between bank lending and technological innovation in countries with high banking system liquidity, it was found that research in this area is increasingly evolving towards environmental issues, particularly focusing on green credit (Salim et al., 2024). This shift in focus mirrors the growing importance of sustainable practices in financial sectors, highlighting the necessity for balancing technological advancements with environmental considerations, a trend that is also evident in the development of e-commerce transactions in Southeast Asia.

Limited studies have concerned the development of e-commerce transactions in Southeast Asian countries. Therefore, this research intends to further investigate whether certain factors significantly impact the growth of e-commerce transactions in the six countries with the highest e-commerce transactions in Southeast Asia, namely Indonesia, Thailand, Malaysia, Vietnam, Singapore, and the Philippines. The factors under consideration include population size, the number of social media users, and the number of mobile phone users.

The main contribution of this study is to provide insights into existing policies and regulations, the technological infrastructure supporting e-commerce, and recent

developments in the industry in each country. The results of this analysis will benefit businesses, governments, and decision-makers in formulating better policies to support e-commerce growth in the region. Additionally, this research can serve as a reference for researchers and academics interested in understanding the dynamics of the e-commerce market in Southeast Asia and identifying the long-term trends in this industry.

Research Method

The type of data used in this research is quantitative data. The data utilized in the study is panel data, which combines both time series and cross-sectional data from 2018 to 2022. All the data for this research were obtained from official websites such as economySEA, Statista, Data Reports, and several other official websites. The cross-sectional data comprises six Southeast Asian countries: Indonesia, Malaysia, Singapore, Vietnam, the Philippines, and Thailand.

Table 1 Definition of Variables

Variables	Definition
E-commerce Transactions	Utilizing data on E-Commerce GMV in billion USD for each country. GMV, or gross merchandise value, represents the value of goods sold or the total transactions on online platforms within a specific period. This data is obtained from the official e-economy SEA website. This study applies natural logarithms, transforming the E-Commerce GMV data into a percentage form.
Population	The population is the number of individuals residing in a specific region or country during a certain period. The population data for this research includes each country from 2018 to 2022, measured in millions of people. This data is obtained from the official Data Reportal website. This study applies natural logarithms, transforming the population data into a percentage form.
Number of Social Media Users	The number of social media users is the total count of individuals utilizing social media, which serves as an internet-based platform for community interaction and networking. The data on the number of social media users used in this research encompasses each country from 2018 to 2022. This information is obtained from the official Data Reportal website and is presented in percentage (%) form.
Number of Mobile Phone Users	The number of mobile phone users represents the total count of individuals using mobile phones. A mobile phone is a portable electronic communication device that does not require a cable network. The data on the number of mobile phone users in this research encompasses each country from 2018 to 2022. This data is obtained from the Data Reportal website and statista.com, presented in percentage (%)

The number of mobile phone users is a variable due to its methodological and practical advantages. Mobile phone usage is a readily available and consistent metric across the studied countries, offering a reliable indicator directly linked to e-commerce activities. Mobile phones are the primary means for conducting e-commerce transactions, providing greater mobility and accessibility than other devices. Additionally, mobile phones facilitate access to social media, a key channel for e-commerce marketing and promotion. Using this variable over internet users addresses data availability issues. It ensures a more

accurate reflection of the primary device used for e-commerce, making it a relevant and significant measure for the study.

The data analysis method used is quantitative analysis employing panel data regression. The advantage of using panel data estimation is that it is suitable for describing the dynamics of change (A'yun and Khasanah, 2022). The application of panel data regression is intended to understand the differences among individuals, in this case, the six countries with the highest transactions in Southeast Asia. Panel data is also employed to address limitations in the number of observations, as a more significant number of observations can increase the degree of freedom. Additionally, this estimation can reduce the presence of collinearity among independent variables. The general equation for panel data is as follows:

$$Y_{it} = \beta_{it} + \beta_{it}X_{it} + \varepsilon_{it} \dots\dots\dots (1)$$

In the equation, Y represents the dependent variable, β is the regression parameter, X is the independent variable, and ε is the stochastic disturbance variable. Meanwhile, i and t indicate observations and time. In this study, the model used as an approach to analyze the most significant e-commerce transactions in the six Southeast Asian countries is as follows:

$$\ln GMV_{it} = \alpha_{it} + \beta_1 \ln POP_{it} + \beta_2 SOC MED_{it} + \beta_3 MOBILE_{it} + \varepsilon_{it} \dots\dots\dots (2)$$

GMV represents e-commerce transactions, POP is the Population, $SOC MED$ is the Number of Social Media Users, $MOBILE$ is the Number of Mobile Phone Users, ε is the regression error, i is the object, and t is the period.

This study's estimation of panel data involves several testing stages, namely selecting the best model and classical assumption tests. Three testing stages are conducted to choose the best model: the Chow Test, the Hausman Test, and finally, the LM Test. The three models that will be regressed are the common, fixed, and random effect models. Subsequently, in the classical assumption tests, three stages of testing are required: the heteroskedasticity test, the autocorrelation test, and the multicollinearity test. All three tests must be satisfied to ensure the validity of the data used.

Result and Discussion

In this section, the author will first provide a detailed discussion of the results obtained from the descriptive statistical analysis of the research data. This analysis aims to provide a comprehensive overview of the characteristics and distribution of the collected data and describe the general profile of the sample under study.

Table 1 Descriptive Statistical Results

	N	Minimum	Maximum	Mean	Std. Deviation
GMV	30	1.500000	59.00000	12.41667	13.39094
POP	30	5.750000	277.7000	97.55267	86.95623
SOSMED	30	0.489827	0.917223	0.735910	0.104374
MOBILE	30	0.574793	0.948661	0.797381	0.102329

Table 1 shows that the number of data observations for each variable is 30. The variable representing e-commerce transactions (GMV) has a minimum value of 1,500.000 and a maximum value of 59,000.000. The mean value for this variable is 12,416.67, with a standard deviation of 13,390.94. Next, the population (POP) variable consists of 30 data points with a minimum value of 5.750 and a maximum value of 277.700. The mean value for this variable is 97.55267, with a standard deviation of 86.95623. The variable representing the number of social media users (SOSMED) contains 30 data points with a minimum value of 0.489827 and a maximum value of 0.917223. The mean value for this variable is 0.735910, with a standard deviation of 0.104374. Lastly, the variable representing the number of mobile phone users (MOBILE) has a minimum value of 0.574793, a maximum value of 0.948661, and a mean value of 0.797381 with a standard deviation of 0.102329.

The data analysis was conducted using the panel data regression method, which combines data between time series and cross-sections for 6 Southeast Asia countries. In panel data regression, the preferred model in this study is the Random Effect Model. Model selection was determined using the Chow, Hausman, and Lagrange tests. The Chow test was utilized to choose between the Common Effect Model (CEM) and Fixed Effect Model (FEM). In contrast, the Hausman test was employed to select between the Fixed Effect Model (FEM) and Random Effect Model (REM). The Lagrange Multiplier test chooses between the Common Effect Model (CEM) and the Random Effect Model (REM). Those tests were used to determine the best model for this research.

Table 2 Panel Data Estimation Model Result

Variables	Probability		
	Random Effect Model	Fixed Effect Model	Common Effect Model
C	0.0000	0.1070	0.0050
Population (POP)	0.0002***	0.1336	0.0001***
Social Media User (SOSMED)	0.0044***	0.1344	0.2647
Mobile Phone User (MOBILE)	0.0186**	0.2299	0.0335**
R-Squared	0.733372	0.889537	0.482372
Adjusted R-Squared	0.702608	0.847456	0.422646
F-Statistic	23.83811	21.13862	8.076379
Probability F-Statistic	0.000000	0.000000	0.000577
Durbin Watson Statistic	0.745701	1.162847	0.243730

Note: *p<0.1. **p<0.05, ***p<0.01

Classical assumption tests in panel data are considered optional, and some researchers disregard them. According to Gujarati (2012), panel data exhibits complexity in capturing the behavior within the model, thus rendering classical assumption tests unnecessary.

Therefore, the superiority of panel data regression implies the absence of a need for classical assumption tests (Verbeek, 2000; Gujarati, 2012). The results of panel data testing consisting of the common effect model, fixed effect, and random effect model are presented in Table 2.

Based on the estimation results, the best model is determined. First, this paper will check the Chow, Hausman, and Lagrange Multiplier tests. The results of the chow test are shown in Table 3.

Table 3 Chow Test Result

Test	Statistic	df	Probability
Cross Section F	15.481137	(5,21)	0.0000
Cross Section Chi-Square	46.337285	5	0.0000

This test selects the appropriate model when regressing panel data, choosing between the Fixed Effect Model and the Common Effect Model. The hypotheses for this test are H0: Common Effect Model and H1: Fixed Effect Model. In interpreting acceptance and rejection, we observe the probability values. If the probability value is > 5% (0.005), we accept H0 and use the Common Effect Model. However, if the probability value < 5% (0.05), we reject H0 and thus use the Fixed Effect Model. Based on the results of the Chow test, as shown in Table 3, it can be observed that the probability value of the chi-square test statistic is 0.0000 or less than 0.05. This indicates that H0 is rejected, meaning that the selected model is the Fixed Effect Model.

Table 4 Hausman Test Result

Test	Statistic	df	Probability
Cross Section Random	6.397387	3	0.0938

The Hausman test helps choose between the Fixed Effect and Random Effect Models. This test is conducted when Fixed Effect and Random Effect Models are considered better than the Common Effect Model. The Chi-Square test is then used to calculate the degrees of freedom corresponding to the number of independent variables. The hypotheses for this test are H0: Random Effect Model and H1: Fixed Effect Model. If the resulting probability value is < 5% (0.05), we reject H0, indicating using the Fixed Effect Model. However, suppose the probability value is > 5% (0.05). In that case, we accept H0, using the Random Effect Model, followed by the LM test. Based on the results of the Hausman test (see Table 4), the probability value of the chi-square test statistic is 0.0938, which is greater than 0.05. This indicates acceptance of H0, so the selected model is the Random Effect Model. Further testing with the Lagrange Multiplier (LM) test determines the best between the Common and Random Effect models.

Table 5 Lagrange Multiplier (LM) Test Result

Test	Cross Section	Time	Both
Breusch Pagan	19.10053 (0.0000)	0.371705 (0.5421)	19.47224 (0.0000)

Table 5 is typically helpful in selecting the appropriate model between Random Effect and Common Effect without dummy variables. The hypotheses for this test are H0: Common Effect Model and H1: Random Effect Model. The determination is made based on the probability value from the Breusch-Pagan test. If the probability value is < 0.05, we reject the null hypothesis (H0) and accept H1, indicating that the best model is the Random Effect Model. Conversely, if the probability value is > 0.05, we accept H0 and reject H1, and the best model is the Common Effect Model. Based on the results of the Hausman test, as shown in Table 5, the probability value of the cross-section Breusch-Pagan test is 0.0000, which is smaller than 0.05. This indicates rejection of the null hypothesis (H0), suggesting that the more appropriate model for this study is the Random Effect Model.

Based on the results of several tests conducted in selecting the best panel data regression model, it can be summarized and concluded that the Random Effect model is the best model for analyzing the data in this research. The results of the Random Effect Model are shown in Table 6.

Table 6 Random Effect Model Results

Variables	Dependent variable: E-Commerce Transaction		
	Coefficient of Regression	T-value	Probability
C	-9.777820	-6.637246	0.0000
Population (POP)	0.974483	4.267076	0.0002***
Social Media User (SOSMED)	5.764763	3.115401	0.0044***
Mobile Phone User (MOBILE)	4.567201	2.511656	0.0186**
R-Squared	0.733372		
Adjusted R-Squared	0.702608		
F-Statistic	23.83811		
Probability F-Statistic	0.000000		
Durbin Watson Statistic	0.745701		
Note: *p<0.1, **p<0.05, ***p<0.01			

The panel data regression analysis in this study serves to examine the influence of independent variables, namely population size, the number of social media users, and the number of mobile phone users, on the development of e-commerce transactions (dependent variable) in the 6 countries with the most significant e-commerce transactions in Southeast Asia. Based on the results of panel data regression using the random-effect model, the following equation can be obtained:

$$\ln GMV = -9,777820 + 0,974483 \ln POP_{it} + 5,764763 SOC MED_{it} + 4,567201 MOBILE_{it}$$

The constant term of -9.777820 in the regression equation indicates the expected value of the dependent variable (lnGMV, the natural logarithm of e-commerce transactions) when all independent variables (population, social media users, and mobile phone users) are zero. This negative value should not be interpreted literally, as it represents a hypothetical scenario with negligible e-commerce transactions without these factors. The primary focus should be on the positive and significant coefficients of the independent variables, which demonstrate that increases in population, social media users, and mobile

phone users are associated with increases in e-commerce transactions. Therefore, the negative constant is a necessary mathematical component of the model but does not have practical significance.

The regression coefficient for the variable population (*InPOP*) is 0.974483. This positive coefficient indicates a positive relationship between population and e-commerce transactions. If all other independent variables remain constant and the population increases by 1%, e-commerce transactions are estimated to increase by 0.974483. Then, the regression coefficient for the variable social media (*SOCMED*) is 5.764763, which also has a positive coefficient. This means that if all other independent variables remain constant and the number of social media users increases by 1%, e-commerce transactions are estimated to increase by 5.764763. The variable of mobile phone users also has a positive coefficient. It indicates a positive relationship between the number of mobile phone users (*MOBILE*) and e-commerce transactions (*InGMV*); if all other independent variables remain constant and the number of mobile phone users or *MOBILE* increases by 1%, e-commerce transactions are estimated to increase by 4.567201.

Table 6 shows that the calculated F-value is 23.83811, which is greater than the critical F-value ($23.83811 > 2.98$), and the probability value is 0.0000, which is less than 0.05. This indicates that the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. Therefore, it can be concluded that the independent variables in this study, namely population size, the number of social media users, and the number of mobile phone users, collectively significantly impact e-commerce transactions (*GMV*). The value of Adjusted R-squared is 0.702608 or 70.26% (see table 6). This value indicates that 70.26% of the variation in e-commerce transactions (*InGMV*) can be explained by the variables population size (*InPOP*), the number of social media users (*SOCMED*), and the number of mobile phone users (*MOBILE*). The remaining 29.74% is explained by other variables outside the scope of this research model.

The first hypothesis in this study examines the impact of population size on e-commerce transactions, and the result shows a significance value of 0.0002, indicating that population size significantly influences e-commerce transactions. Therefore, the first hypothesis is accepted. The coefficient for the population size variable is 0.974483 (positive), meaning that an increase in population size will lead to a rise in e-commerce transactions. Population size significantly impacts the e-commerce market because e-commerce targets the population. The larger the population in a country, the more needs must be met, including primary, secondary, and tertiary needs. In the digital era, people choose instant solutions to meet their needs, such as online shopping through e-commerce. Thus, an increase in population will result in more people shopping online, thereby increasing e-commerce transactions. The findings of this study are consistent with the data presented by the Ministry of Finance of the Republic of Indonesia in 2019. The data shows rapid growth in the middle-class category in Indonesia, amounting to 21% of the total population. The impact of this population increase is reflected in the online shopping activities of the population, with a 23% increase in the number of transactions from 2018 to 2019 (Ministry of Finance, 2023).

The second hypothesis examines the influence of social media users on e-commerce transactions, and the result shows a significance value of 0.0044, indicating that the number of social media users has a significant impact on e-commerce transactions. Therefore, the second hypothesis is accepted. The coefficient for the number of social media users variable is 5.764763 (positive), meaning that an increase in social media users will lead to a rise in e-commerce transactions. This demonstrates that social media successfully attracts users to shop online, thereby increasing e-commerce transactions. Marketing strategies through social media platforms, such as live features on platforms like TikTok and Instagram, where hosts or organizers utilize live features to market their online products in an engaging manner, offering attractive deals to entice viewers to purchase the products offered. Affiliate programs held by various e-commerce platforms also utilize social media features as tools for affiliate marketers. Therefore, increasing social media users will undoubtedly increase the volume of e-commerce transactions. The findings of this study are consistent with Purnamasari and Ismunandar (2020) in their research on the influence of social media on online shopping interest, where they obtained a calculated t-value of 5.199 and a critical t-value of 2.010, with a probability value of 0.000. This means that H_0 is rejected because the calculated t-value is greater than the critical t-value, and the probability value is below 0.05, indicating a significant influence of social media on online shopping interest.

Additionally, research conducted by Utami et al. (2022) examined the impact of social media marketing on the brand equity of the e-commerce platform Sociolla. The results showed a calculated t-value of 23.992, a critical t-value of 1.97769 (calculated t-value > critical t-value), and a probability value of 0.000. The coefficient of determination was also high at 81%, indicating that social media marketing significantly influences the brand equity of Sociolla's e-commerce platform, with the remaining 19% explained by other variables outside the model. This means that social media marketing has a positive and significant impact on the brand equity of the Sociolla e-commerce platform.

The third hypothesis in this study examines the influence of the number of mobile phone users on e-commerce transactions. The result shows a probability value of 0.0186, indicating that the number of mobile phone users significantly impacts e-commerce transactions. Therefore, the third hypothesis is accepted. The coefficient for the number of mobile phone users variable is 4.567201 (positive), meaning that an increase in mobile phone users will lead to a rise in e-commerce transactions. It is undeniable that mobile phones are essential devices in human life, and they have become indispensable companions for individuals. Consequently, almost all e-commerce platforms are designed to be accessible via mobile phones. Mobile phones offer high mobility, effectiveness, and ease of access anytime and anywhere, making them the preferred medium for the growth of e-commerce platforms. Therefore, an increase in mobile phone users will inevitably lead to a rise in e-commerce transactions. This is supported by Ipsos (a survey and research company) in 2021, stating that 98% of e-commerce users access e-commerce platforms through mobile phones (Rahayu, 2022). This is likely because accessing e-commerce platforms through laptops or computers is considered less flexible and effective. Some features are difficult to access, even for e-commerce platforms accessed via websites on laptops and computers. The findings of this study are consistent with the

research conducted by Xing (2018), where the calculated t-value was 2.18 with a critical t-value of 1.58 (calculated t-value > critical t-value), with a coefficient of 0.013 (positive). This means that mobile phones significantly positively impact the north-south trade flow.

Based on the data, Indonesia is shown to have the highest e-commerce transactions (GMV) compared to the other five countries, with the GMV ranging from 12.2 billion USD in 2018 to 59 billion USD in 2022. This is supported by Indonesia's large population, which reached 277.7 million people in 2022. However, considering Indonesia's large population, it should have even more potential for e-commerce development. This study found that the population size, the number of mobile phone users, and the number of social media users have a significant positive impact on the development of e-commerce transactions. However, in Indonesia, only 61.8% of the total population used social media in 2022, while 80.6% used mobile phones. This means that not all mobile phone users in Indonesia have or use social media. This situation may be due to various factors, such as Indonesia's archipelagic geography, making it difficult to reach remote areas for internet access. In 2022, internet users in Indonesia only accounted for 73.71% of the total population. However, internet access is crucial for e-commerce, as it is necessary to access e-commerce platforms online. Therefore, there is a need for government intervention to expand internet networks to remote areas of Indonesia, ensuring stable internet connectivity. This will help bridge the gap in internet access and enable more people to participate in e-commerce activities, ultimately contributing to the further growth of e-commerce in Indonesia.

In Malaysia, with an average population of 32 million, the GMV 2022 reached 14 billion USD. Compared to Indonesia, Malaysia performs better in terms of internet coverage, with 89.60% of its population using the internet and 91% using social media. Malaysia ranks first among the five countries studied regarding the percentage of social media users. Therefore, the government's role in providing infrastructure and expanding internet networks can be considered more effective in Malaysia than in Indonesia.

Singapore is a developed country in the Southeast Asian region, with the smallest population among the five countries studied, totaling only 5.92 million people in 2022. This small population contributes to Singapore's relatively low GMV compared to other countries. In 2022, Singapore's GMV was only 8 billion USD. However, this is also influenced by its small population. Singapore excels in internet penetration, with 92% of its population using the internet, making it the highest among the five countries. This indicates that internet coverage in Singapore is excellent, contributing to its status as a developed country in Southeast Asia.

Furthermore, the percentage of mobile phone users in Singapore is also among the highest, reaching 94.1% of the total population in 2022. Additionally, 89.5% of Singapore's population are social media users in the same year. These statistics demonstrate that Singaporeans are modern and embrace digitalization, which is supported by the government's efforts in promoting technology and digital infrastructure.

Vietnam and Malaysia have similar e-commerce developments, with a GMV of around 14 billion USD 2022. However, Vietnam has a larger population than Malaysia, with 98.56 million people in 2022. The difference lies in Vietnam's lower internet usage, with only around 73.15% of the population having access to the internet, and social media usage is even lower at 78%. Despite this, the percentage of mobile phone users in Vietnam is high, reaching 94.9% of the total population. This indicates limitations in internet access and social media adoption among Vietnamese citizens.

Similarly, the Philippines has a GMV of around 14 billion USD in 2022, similar to Vietnam and Malaysia. However, internet usage in the Philippines is lower, with only about 67.99% of the population having access to the internet. Additionally, mobile phone ownership is relatively low at 75.7% in 2022, although social media usage is higher compared to Vietnam at 82.3% in 2022.

Conversely, Thailand ranks second in e-commerce transactions (GMV) in this study, with a GMV of 22 billion USD in 2022 and a population of 70.01 million people. Mobile phone and social media usage in Thailand are relatively balanced, with 81.1% of the population using mobile phones and 81.2% using social media. Internet usage is also relatively high at 77.85% of the total population. This indicates that the Thai government's efforts in promoting digitalization are practical. However, there is still room for improvement in increasing awareness among citizens and enhancing internet accessibility to further boost e-commerce activities.

Conclusion

Based on the analysis findings in this study, it can be concluded that there is a significant favorable influence between population size, number of social media users, and number of mobile phone users on e-commerce transactions in the six countries with the highest e-commerce transactions in Southeast Asia during the period 2018-2022. One limitation of this research is the reliance on secondary data, which may not capture all relevant factors influencing e-commerce transactions. Additionally, the study focuses only on six Southeast Asian countries, which may limit the generalizability of the findings to other regions or countries with different economic and technological contexts. Future studies should consider incorporating primary data collection to capture more granular details about consumer behavior and preferences. Expanding the scope to include more countries or regions could provide a more comprehensive understanding of e-commerce dynamics globally. Researchers could also explore the impact of other potential factors, such as government policies, internet infrastructure quality, and cybersecurity measures, on e-commerce growth. This would provide a more holistic view of the determinants of e-commerce transactions and help formulate targeted strategies to boost e-commerce in various contexts. To foster economic growth through digital commerce, it is essential to implement policies that enhance digital infrastructure, internet access, and transaction security. These measures are necessary to attract and sustain investment and promote technological adoption and innovation in the e-commerce sector. Structural reforms in

financial systems and infrastructure development are crucial for creating a stable and attractive environment for domestic and foreign investors (Kurniawan & A'yun, 2022).

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