

Linking E-Commerce Adoption and Performance for Indonesian SMEs: Analyzing the Contingency Role of Information Systems Strategy

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Abstract This study investigated the linkage between e-commerce marketplace adoption and SME performance in Indonesia, surveying 402 SMEs assisted by government e-commerce initiatives. The direct relationship was analyzed using PLS-SEM. Based on a contingency theory perspective, information systems strategy was also tested as a moderating factor between adoption and performance. The results demonstrated a significant positive association between e-commerce adoption levels and SME performance. However, IS strategy does not have a moderating impact in the context of government-supported SME digitalization.

Keywords: information systems strategy, e-commerce adoption, SME performance

1. Introduction

Small and medium-sized enterprises (SMEs) significantly impact gross domestic product (GDP) and employment opportunities. SMEs can generate up to 50% of gross domestic product (GDP) and provide 60% of employment in developed countries, up to 33% of GDP, and 45% in developing countries (Diana et al., 2022; Wahab et al., 2020). The flexibility of SMEs is greater than that of large enterprises due to their specific and specialized market share (Manzoor et al., 2019). However, in the era of the digital economy, SMEs struggle to remain competitive. One of the problems SMEs face is increasing market share with limited resources (Kumar et al., 2020). To overcome this problem, SMEs have started adopting e-commerce marketplaces to increase efficiency. The Indonesian E-Commerce Association (idEA) reports that 21.8 million MSMEs in Indonesia adopt e-commerce by 2022 (Ibrahim, 2023). However, not all organizations (SMEs) adopting the e-commerce marketplace will directly improve their performance (Hajli et al., 2015; Stankovska et al., 2016). In the Indonesian context, e-commerce cannot improve its performance optimally due to low human resources (Scupola & Dwivedi, 2009), so the selection of information systems does not follow the needs of SMEs (Alrousan & Jones, 2016). In other words, SMEs in Indonesia still cannot implement a good information system strategy.

Strategic alignment of information systems with the business can be a dominant issue in creating performance (Nugroho, 2021). Errors in selecting and implementing digital applications (adoption) can thwart financial performance improvements from digital transformation (Ukko et al., 2019). Ukko et al. (2019) emphasized that the critical issue of digital transformation success lies in managerial issues, not technical or operational issues. Managerial capabilities can include selecting information system strategies to manage the organization. The ability to choose information system strategies (managerial capabilities) is still a significant problem for SMEs in developing countries such as Indonesia. Utilization of accounting information systems is more dominant than budget participation in honing managerial capabilities. (Astuty et al., 2022). Information system strategy can be interpreted as the organization's ability to manage information system resources to encourage innovation (Nugroho et al., 2020). Using the right information system strategy can encourage businesses to identify and capture opportunities and quickly adjust to changes caused by digital transformation to improve the performance of SMEs.

Previous studies have explored the relationship between e-commerce adoption and SME performance (Dang et al., 2022; Hussain et al., 2022; Purba et al., 2021; Riadi et al., 2022). Previous studies explain a direct and indirect relationship between e-commerce adoption and SME performance. Hussain et al. (2022) found a positive relationship between e-commerce use and SME performance in Pakistan. The same findings also occurred in Vietnam (Dang et al., 2022). In the context of Indonesia, Riadi et al. (2022) found a positive relationship between the use of e-commerce and the performance of SMEs. In contrast, Purba et al. (2021) have not found a consistent relationship between e-commerce adoption and SME performance in Indonesia. In other words, there is still a gap in the relationship between using e-commerce marketplaces and performance. This gap can be seen from the contingency theory point of view.

From the contingency theory perspective, the findings of Purba et al. (2021) prove that no one generic formula to manage SMEs exists. Information system strategy is one of the essential contingency factors in explaining the relationship between the use of information systems (e-commerce) and performance. (Nugroho et al., 2020). Previous studies have shown that strategy can act as a moderating variable (Chaudhuri et al., 2022; Cho & Lee, 2018). In short, contingency factors (i.e., IS strategy) can be essential in the relationship between information system usage (e-commerce) and performance. This study explores the moderating role of IS Strategy on the relationship between e-commerce marketplace adoption and SME performance in Indonesia. Such exploration is still rare in previous studies. This study asks two questions: 1) whether marketplace e-commerce adoption is related to SME performance, and 2). Does information strategy modify the relationship between e-commerce marketplace adoption and SME performance?

2. Literature Review and Hypothesis Development

2.1. Resource-based view (RBV) theory and contingency theory

The resource-based view (RBV) theory introduced by Penrose (1959) views that increasing organizational resources in information technology can increase competitive advantage. (Adnan et al., 2018; Madhani, 2010; Sameera, 2018; Wade & Hulland, 2004). From the RBV point of view, the use (adoption) and investment in information technology will be able to drive performance. Technically, information technology will increase productivity and encourage performance (Kazakov et al., 2021; Mohsen et al., 2021). Using technology to assist business processes affects productivity (Ollo-López & Aramendía-Muneta, 2012; Parker et al., 2009; J. Yoon et al., 2020). Furthermore, internet technology is proven to make business organizations operate more effectively and efficiently (Zafar et al., 2009). (Zafar et al., 2014). The RBV theory views that increased organizational capabilities (such as adopting e-commerce marketplaces) can result in overall organizational performance (e.g., Ong & Chen, 2013; Sook Ling, 2017; Turulja & Bajgorić, 2016). In the context of this research, adopting an e-commerce marketplace in Indonesia has been massively carried out (Ibrahim, 2023) with the hope of improving the performance of MSMEs. Some research supporting RBV theory proves that using technology (e-commerce marketplace) can improve performance (Cassia & Magno, 2021; Ramanathan et al., 2012). On the other hand, there are contrasting findings that users of information technology (e-commerce marketplace) instead reduce performance (Hajli et al., 2015; Purba et al., 2021). This debate raises the issue of contingency factors that play a role in the relationship between information technology adoption and MSME performance. This study raises contingency factors in the relationship between e-commerce marketplace adoption and MSME performance.

Contingency theory views that there is no one generic way to manage organizations. The effectiveness of organizational management depends on the organization's environment (Chapman, 1997; Otley, 1980). In the perspective of contingency theory, the performance of a company or organization depends on interacting contingency factors. These contingency factors include technology (Soobaroyen & Poorundersing, 2008), strategy (Boulianne, 2007), environment (Agbejule & Burrowes, 2007), and culture (Van der Stede, 2003). Consequently, the claim that increased organizational resources (e-commerce adoption) can necessarily improve performance is questionable. Hajli et al. (2015) found that not every increase in organizational resources (adoption of information technology) does not always increase productivity (performance). From the perspective of contingency theory, contingency factors such as information systems strategy (IS Strategy) can affect the ability of resources to produce outcomes in the form of performance. (e.g. Leidner et al., 2010; Leidner et al., 2011; Peppard & Ward, 2004; Ward & Peppard, 2002; Yeh et al., 2012). Nugroho (2021) uses IS strategy as a contingency factor, which plays a role in the relationship between information system resources (IS Capability) and organizational performance. Specifically, IS strategy is important in the e-commerce marketplace adoption relationship (Reinking, 2012). In the context of this study, contingency factors (such as IS strategy) can have a significant impact on the relationship between organizational resources (e-commerce marketplace) and the outcome (SME performance) of increasing organizational resources. Briefly, the conceptual interaction between RBV theory and contingency theory in the context of this study (e-commerce market place adoption) is presented in Figure 1.

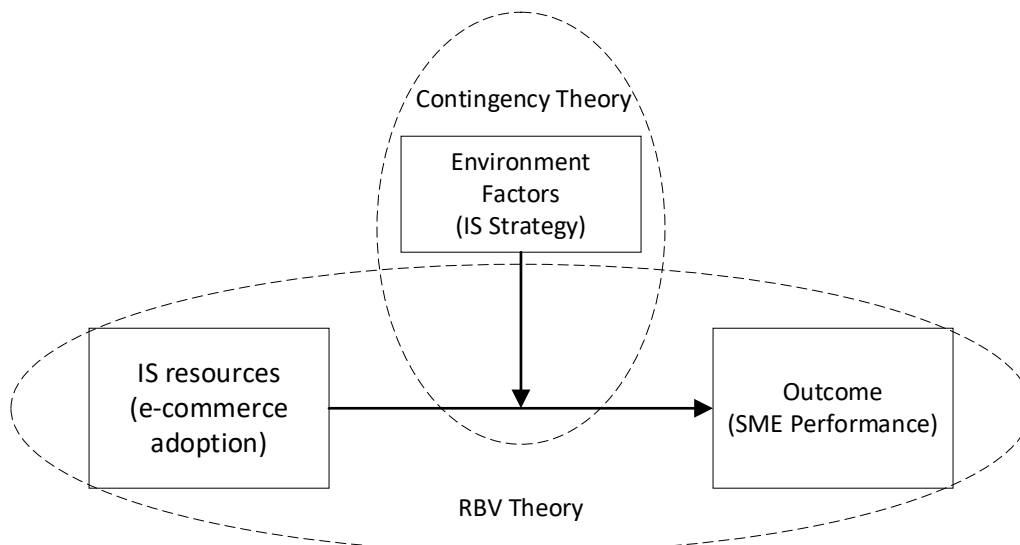


Fig. 1. Underlying Theories Frameworks

2.2. Relationship between E-commerce adoption and SME Performance

The adoption of an e-commerce marketplace refers to the acceptance of all transaction activities in business to be carried out online by utilizing the Internet network. E-commerce has changed the way companies interact with customers. The continuous advancement of information and communication technology dramatically expands the possibilities of cross-border e-commerce as a new form of accessing international markets (Deng & Wang, 2016; Watson et al., 2018). E-commerce means sellers do not need to meet buyers in person when offering products or services. E-commerce transactions are selling or purchasing goods or services over a computer network using methods designed to receive or place orders. Ordering goods or services can be done using e-commerce, although payment and final delivery of goods or services offline (Cassia & Magno, 2021). Gabriëlsson and Gabriëlsson (2011) demonstrated the ability to use cross-border B2C e-commerce as a gateway for SME exporters to foreign markets. Watson et al. (2018) found that firms are likelier to use B2C e-commerce channels when intermediaries in foreign markets are weaker. However, Stankovska et al. (2016) explained that there is no relationship between the use of digital channels and marketing in SMEs. These findings are inversely proportional to the opinion of Kilay et al. (2022), which explains that adopting e-commerce causes companies to market their products worldwide without any geographical restrictions. E-commerce adoption positively and significantly impacts SMEs' average sales growth rate (Abebe, 2014). SMEs that use e-commerce have a higher average sales growth rate than companies that do not use e-commerce (Abebe, 2014). Goldman et al. (2020) indicated that the e-commerce activities of small and medium exporters are limited to analyzing digital marketing tactics. Cassia and Magno (2021) showed that SMEs' information technology, marketing, and operational capabilities are prerequisites for obtaining financial and marketing performance.

The adoption of e-commerce does not only positively impact product sales. In recent years, e-commerce has helped many companies exchange information and integrate operations to serve customers better and help them enter international markets (Cassia & Magno, 2021; Ramanathan et al., 2012). E-commerce adoption is related to the performance of SMEs, especially so that internal business processes become more efficient and streamlined (Abebe, 2014; Gao et al., 2023; Kilay et al., 2022). E-commerce will ultimately lead to significant cost savings and profitability (Abebe, 2014). Gao et al. (2023) explained that e-commerce significantly relates to the performance of SMEs in Bangladesh during the pandemic. These findings do not align with Purba et al. (2021), which suggests that e-commerce does not affect the performance of SMEs. Jovanović et al. (2020) showed similar results. E-commerce adoption only has a strong positive effect on large-scale companies and not SMEs. Zhu and Kraemer (2005) analyze a dataset of 624 firms in 10 countries and find that the level of e-commerce

adoption and e-business capabilities contribute to e-commerce value creation. Furthermore, the use of third-party e-commerce platforms can accelerate the adoption and performance of cross-border e-commerce of SMEs (Deng & Wang, 2016; Wang, 2016). (Deng & Wang, 2016; Wang et al., 2020). SMEs can efficiently conduct export transactions technical tools support them to analyze customer data (Wang et al., 2020). (Wang et al., 2020). Established platforms like Amazon also offer payment and logistics services, which makes cross-border e-commerce management much more manageable for SMEs. However, if SME exporters rely too much on established e-commerce platforms, the negative impact is that internal performance capabilities are weakened (Cassia & Magno, 2021). Meanwhile, Kilay et al. (2022) showed that e-commerce services positively and significantly impact the performance of SMEs in Indonesia. Furthermore, e-commerce marketplace adoption has a significant relationship with organizational performance. (Ausat et al., 2022; Siagian, 2021; Yadnya & Santika, 2017). UNCTAD (2017) report shows that SMEs using e-platforms can export when foreign buyers find them. However, their long-term success requires specialized skills related to relevant technologies, compliance with legal and tax requirements of target markets, availability of logistics, and effective demand management and relationships with foreign customers. From the above discussion, this study proposes the following hypothesis:

H1: Marketplace e-commerce adoption is related to SME performance.

2.3. The moderating role of IS strategy on the relationship between E-commerce marketplace adoption and SME Performance

During the Covid-19 pandemic, many SMEs are taking advantage of e-commerce opportunities. According to the World Trade Organization (WTO) (2020), the situation caused by COVID-19 has led to the growth of business-to-business (B2B) e-commerce (Jovanović et al., 2020). Unfortunately, many SMEs do not have a proper plan when implementing e-commerce. This reactive approach (use of e-commerce) results in SMEs not achieving sustainable growth despite the high level of sales achieved (Cassia & Magno, 2021). (Cassia & Magno, 2021). E-commerce adoption has a positive relationship with average sales growth in SMEs. (Abebe, 2014). However, Stankovska et al. (2016) showed that digital channels do not affect marketing in SMEs. Adopting e-commerce should make it easier for companies to market their products worldwide because there are no geographical barriers. (Kilay et al., 2022). Meanwhile, Gao et al. (2023) explained that e-commerce positively correlates with performance. Kilay et al. (2022) explain that e-commerce services are positively related to the performance of SMEs in Indonesia. However, Purba et al. (2021) found that the application of e-commerce does not affect the performance of SMEs.

Contingency theory explains that there is no best way to design the structure of a relationship. Therefore, the relationship between e-commerce marketplace adoption and SME performance can be influenced by a moderating variable (such as IS Strategy) that will affect the relationship between the two variables. Cho and Lee (2018) found that strategy can moderate the relationship between internationalization and SME performance. Zhang and Chen (2022) found that strategy can moderate the relationship between organizational resources and performance. Jia (2019) found that strategy can moderate the relationship between corporate social responsibility and company performance. These studies' findings show that strategy as a contingency factor can act as a moderating variable. In the context of this study, Information system strategy as a contingency variable moderates the relationship between organizational resources (e-commerce adoption) and outcomes (SME performance). This study proposes the following hypothesis:

H2: Information Systems Strategy moderates the relationship between e-commerce marketplace adoption and SME performance.

The literature review above briefly presents the research framework in Figure 2.

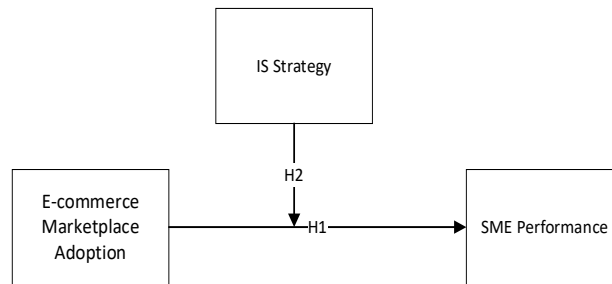


Fig. 2: Research Framework

3. Research Method

3.1. Operational Definition and Measurement of Variables

This study utilizes three main variables: IS strategy, e-commerce marketplace adoption, and SME performance. IS strategy refers to the definition proposed by Nugroho (2021): the use or application of information systems to support sharing perspectives among information components to support innovation. Adopting an e-commerce marketplace is defined as using an e-commerce marketplace to support company activities. SME performance refers to relative performance compared to the company's main competitors. All variables are measured using a Likert scale of 1-7, with 1 strongly disagree and 7 strongly agree.

This study measures all variables by adopting questionnaires that previous studies have used. Adopting and adapting the questionnaire refers to the procedure proposed by Tsang et al. (2017). The e-commerce marketplace adoption variable adopted from Chen et al. (2021) and C. Yoon et al. (2020) five-question items, SME performance adopts Heeseok and Byounggu (2003) five items of the SME performance questionnaire, and information system strategy adapts Sabherwal and Chan (2001) and Chen et al. (2010) four questionnaire.

3.2. Sample

The minimum sample size for this study incorporates the approach proposed by Pallant (2010), Gefen et al. (2000), Kock and Hadaya (2016) for minimum sample size estimation in PLS-SEM. In addition, this study also considers the power analysis proposed by (Faul et al., 2007, 2009). Based on sample calculations using some of the methods mentioned above, the sample size for this study can range from 52 to 75 samples. This study surveyed all of the 1514 SMEs that registered at SiBakul Jogja e-commerce. 402 valid responses were used for data analysis (response rate 28%). Theoretically, the number of respondents has met the minimum sample size required (52 - 75). The questionnaire was distributed online via WhatsApp messenger. Online surveys were chosen because they allow researchers to complete the process more efficiently, ask a variety of questions to the sample, and provide a higher level of information and interactivity (Cobanoglu & Cobanoglu, 2003; Ilieva et al., 2018). Furthermore, online surveys have become one of the most prominent qualitative research methods due to their low cost and high speed.

3.3. Data Analysis Technique

All hypotheses of this study were tested using the Structural Equation Modeling approach through the partial least square method (SEM-PLS). This research uses Smart PLS 4 developed by Ringle et al. (2022) to estimate measurement and structural models for hypothesis testing decision-making. SEM-PLS is suitable for prediction and theory building, and the sample required is relatively small, at least

10 times the most complex construct items (Chin, 1998). Furthermore, PLS estimates the model's size on the validity and reliability of the measure, and using indicators of the latent construct, PLS produces parameters of the structural model that test the strength of the hypothesized relationship (Ho et al., 2003). In testing the moderation hypothesis using a variance-based structural equation modeling approach (such as Partial Least Square), there are at least four approaches to measuring interactions between variables: product indicator, two-stage, hybrid, and orthogonal approaches (Henseler & Chin, 2010). Each approach has a different character in treating the measured latent variable indicators. Testing moderation and interaction in this study uses the PLS moderation model approach by following the approach proposed by Becker et al. (2022) and Hair et al. (2022).

4. Results

4.1. Measurement Model

The measurement model tests the validity and reliability of the instrument before it is used to test the hypothesis in the structural model. The analysis results show that the instrument meets convergent validity because it has a loading value of more than 0.7 (>0.7) and an average variance extracted (AVE) of more than 0.5 (>0.5) (see Table 1) (Chin, 1998; Hair et al., 2019). The discriminant validity of the research instrument is met with the results of the analysis showing the Heterotrait-monotrait (HTMT) ratio value below 0.9 (<0.9) (see Table 2). (Hair et al., 2017; Henseler et al., 2014). Instrument reliability is indicated by Cronbach's alpha (α), rho alpha ($\rho\alpha$), and composite reliability (ρc) values of more than 0.7 (>0.7) (see Table 1) (Dijkstra & Henseler, 2015; Hair et al., 2014, 2017).

Table 1. Validity and reliability

Constructs	Code	Loading	AVE	α	$\rho\alpha$	ρc
SMEs Performance (SP)	SP1	0.84	0.78	0.89	0.94	0.92
	SP2	0.88				
	SP3	0.90				
	SP4	0.91				
	SP5	0.87				
Information System Strategy (ISS)	ISS1	0.88	0.79	0.91	0.91	0.94
	ISS2	0.91				
	ISS3	0.90				
	ISS4	0.88				
E-commerce adoption (EA)	EA1	0.81	0.70	0.89	0.90	0.95
	EA2	0.83				
	EA3	0.85				
	EA4	0.87				
	EA5	0.82				

Table 2. HTMT Ratio

	UA	ISS	SP
EA			
ISS	0.68		
SP	0.56	0.39	

4.2. Structural Model

4.2.1. Direct Model

Direct model analysis tests the relationship between e-commerce adoption and SME performance (H1). The direct effect test uses a bootstrapping procedure with 500 resamples. Figure 3 presents the test model and test results. The test results show a significant relationship between e-commerce adoption and SME performance ($\beta = 0.52$; $p < 0.01$). Based on the results of the analysis, it can be concluded that H1 is supported. The analysis results are presented briefly in Table 3

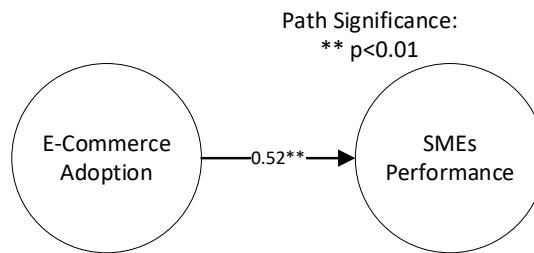


Fig 3. Direct model

Table 3. Direct model result

Path	β	Mean	St.Dev	t	P values
EA → SP	0.52	0.53	0.04	13.32	0.00

4.2.2. Moderation Model

The moderation model tests the moderating effect of Information system strategy on the relationship between e-commerce adoption and SME performance (H2). Figure 4 presents the test model and moderation model test results. The moderation model analysis results indicate a significant relationship between e-commerce adoption and SME performance ($\beta = 0.49$; $p < 0.01$). On the other hand, the relationship between information system strategy and SME performance indicates an insignificant relationship ($\beta = 0.07$, P value = 0.25). Furthermore, the interaction between information system strategy and e-commerce adoption has an insignificant relationship with SME performance ($\beta = 0.00$, P value = 0.96). These findings indicate that information system strategy does not moderate the relationship between e-commerce adoption and SME performance (H2 is not supported). The analysis results are presented briefly in Table 4

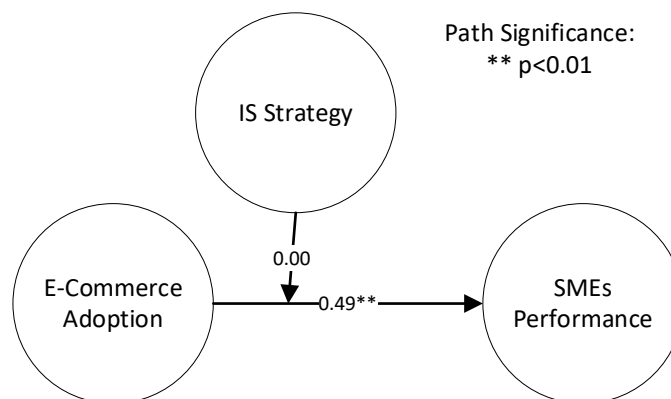


Fig. 4. Moderation model

Table 4 moderation model result

Path	β	Mean	St.Dev	t	P values
EA → SP	0.49	0.49	0.05	9.17	0.00
ISS → SP	0.07	0.07	0.06	1.15	0.25
ISS x EA → SP	0.00	0.00	0.04	0.06	0.96

5. Discussion

This study examines the relationship between e-commerce marketplace adoption and SME performance. The data analysis results show that e-commerce marketplace adoption is related to SME performance (p-value: 0.000). This finding is in line with previous studies exploring the relationship between e-commerce adoption and performance (Abebe, 2014; Alzahrani, 2019; Gao et al., 2023; Hussain et al., 2022; Kilay et al., 2022; Mechman et al., 2022; Octavia et al., 2020; Ramanathan et al., 2012; Shahzad et al., 2020; Yacob et al., 2021). Abebe (2014) stated that e-commerce adoption is positively related to the performance of SMEs in Texas. Furthermore, Gao et al. (2023) stated that e-commerce has a significant relationship with the financial performance of SMEs in Bangladesh during the Covid-19 pandemic. Gao et al. (2023) explained that e-commerce can improve the overall performance of SMEs, reduce business waste and energy costs, increase financial growth and high profitability, expand the customer base, and increase the value of company output. Octavia et al. (2020) stated that e-commerce adoption positively correlates with SME performance in Jambi Province, Indonesia. Octavia et al. (2020) underlined that e-commerce adoption can help SMEs maximize product sales by introducing products widely to customers and increasing sales turnover. However, the results of this study are not in line with the findings of research conducted by Purba et al. (2021) and Stankovska et al. (2016). Purba et al. (2021) stated that e-commerce does not affect the financial performance of SMEs in Banten, Indonesia. Although e-commerce can significantly increase revenue, SMEs often do not understand how to create content and lack customer response to the content that has been created. Different findings may occur due to differences in the context of the country and the type of industry that is the object of the study. (Gao et al., 2023).

This study examines the moderating role of information system strategy on the relationship between e-commerce marketplace adoption and SME performance. Data analysis shows that information system strategy does not moderate the relationship between e-commerce marketplace adoption and SME performance (p-value: 0.95). This study's findings align with previous studies that found no role of contingency factors (strategy) as a moderating variable (Cacciolatti & Lee, 2016; Oltra & Luisa Flor, 2010; Rubera & Droge, 2013). However, this study is inversely proportional to previous studies, which found that strategy can significantly act as a moderating variable. (Brouthers et al., 2015; Chaudhuri et al., 2022; Cho & Lee, 2018; Jia, 2019; Zhang & Chen, 2022). In the context of this study, it is clear that information system strategy as a contingency factor has no moderating effect on the e-commerce adoption relationship. This condition most likely occurs because the research sample used in this study is government-assisted SMEs. Thus, government support can influence SMEs in e-commerce adoption decisions. In other words, SMEs adopt e-commerce not because of the strategy used but because of the government's strong encouragement. The results show that the information system strategy does not have a significant relationship with the performance of SMEs. This finding contradicts the findings of (Nugroho et al., 2020), which indicates that information system strategy has a significant role in organizational performance in an organizational environment that adopts information systems for daily operations. These findings indicate that it is practically sufficient for MSMEs in Indonesia to follow government policies in using e-commerce to compete. Business strategies that follow orders appear more beneficial than implementing different information system strategies.

6. Limitations and Future Research

This study has several limitations in drawing conclusions that future studies can consider. First, this study used an online survey distributed via WhatsApp messenger. This approach makes it difficult to control who fills out the questionnaire. Second, this study uses SMEs the government fully supports to use the e-commerce marketplace. With these conditions, biased perceptions of using the e-commerce marketplace are possible. Third, the analysis results indicate the absence of the role of information system strategy in the relationship between the use of e-commerce marketplaces and the performance of SMEs. The analysis results generate an opportunity to use other variables. Future studies can consider several variables such as website quality (Nugroho et al., 2019), Usefulness, Ease of Use (Nugroho et al., 2018), risk (Nugroho & Novitasari, 2023), or exploration of alignment variables (Nugroho et al., 2020).

7. Conclusion

In conclusion, while e-commerce adoption directly relates to improved SME performance, information systems strategy does not play a complementary role as hypothesized. This finding implies that internal strategic factors may be overridden in environments where external interventions strongly shape technology adoption. The study contributes by contextualizing and validating linkages between digital platforms, strategic choice factors, and SME outcomes specifically for developing country SMEs assisted in e-commerce integration. However, further research needs to probe the underlying mechanisms at play using qualitative methods. Additionally, exploring alternative moderating factors could provide a more nuanced understanding of variation in adoption-performance relationships.

Acknowledgment

This study was funded by DIPA UNY in 2023 through the PUPT 2023 scheme. The authors thank Yogyakarta's Department of Cooperatives and SMEs for supporting and facilitating this study.

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