

Research Article

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The Influence of Technological, Organizational, and Environmental (TOE) Factors on MSME Performance with E-Commerce Adoption as a Mediating Variable and Entrepreneurial Orientation as a Moderating Variable in Surabaya

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Abstract: *Changes in transaction patterns from offline to online require people to be able to adapt and utilize technology to the fullest. The results of the 2020-2023 e-commerce survey show that MSMEs using e-commerce in Indonesia are increasing every year. This growth explains the positive trend of using digital technology in business operations. Therefore, this research needs to be conducted to help other business actors understand the importance of using e-commerce as a strategy to improve marketing performance and increase revenue. This study uses a quantitative method involving 154 MSMEs in Surabaya. researchers distributed questionnaires. The questionnaire consisted of a five-point Likert scale created using Google Form. After completing the data collection, the next stage was to analyze the data using SmartPLS. The results of the data analysis in this study indicate that in the context of technological, organizational and environmental have a significant influence on e-commerce adoption and e-commerce adoption has a significant influence on MSME performance. Meanwhile, entrepreneurial orientation does not have a moderating effect on the relationship between e-commerce adoption and MSME performance.*

Keywords: *Technological, Organizational, Environmental, MSME Performance, E-commerce Adoption.*

Introduction

The world of marketing has experienced significant changes from the Marketing 1.0 era to Marketing 5.0. Marketing 1.0 to Marketing 3.0 is traditional marketing, while Marketing 4.0 is a transition to digital driven by advances in technology, the internet and social media. This digitalization changes the customer path in purchasing products or services. Marketing 4.0 is a transition from traditional to digital marketing. This is caused by advances in technology and internet access. The use of this technology greatly influences organizational performance (Susanti et al., 2022).

In the digital era, technology is used by business people for various business activities, including e-commerce. E-commerce is important to attract consumers, so it requires business actors to be more creative (Gantulga and Sampil, 2021). The government can take advantage of this digitalization to educate the public to be adaptive and maximize information technology to improve the economy. E-commerce adoption has been proven to improve the performance of MSMEs, especially in annual sales growth (Abebe, 2014; Salah and Ayyash, 2024).

Table 1. Indonesian E-commerce Survey 2020-2022

Year	Amount Of SME	Percentage (%)	
		E-commerce	Non E-commerce
2022	2.995.986	37.79	62.21
2021	2.868.178	32.23	67.77

2020	2.361.423	25.25	74.75
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The results of the e-commerce survey in Indonesia show that there is growth in MSMEs using e-commerce from 2020 to 2022. This is due to several factors such as increased internet access, awareness of the usefulness of e-commerce, and government support. However, challenges such as lack of digital skills, technological infrastructure, and data security and privacy issues still exist.

The Technology, Organization and Environment (TOE) framework is used to understand the factors that influence e-commerce adoption. Technological factors include perceptions of relative advantage and compatibility, which show a significant influence on e-commerce adoption (Almunawar et al., 2022; Isa and Alenezi, 2022). In an organizational context, organizational readiness has a significant effect on e-commerce adoption (Isa and Alenezi, 2022). In an environmental context, competitive pressure has a positive impact on intention to use e-commerce (Li et al., 2022; Salah and Ayyash, 2024).

Research shows that e-commerce adoption has a positive influence on MSME performance (Abebe, 2014; Gao et al., 2023). Therefore, this research is important as a strategy guide for business actors in making maximum use of e-commerce, which ultimately has an impact on increasing MSME income.

Literature Review

Marketing Management

Marketing management is defined as the art and science of selecting target markets and building profitable relationships with them. Marketing management designs strategies that are able to engage customers and build profitable relationships with them (Kotler dan Armstrong, 2018:34).

Marketing Strategy

According to Kotler dan Armstrong (2018:74–75) marketing strategy is the marketing logic that a company hopes to create customer value and achieve profitable relationships.

Technological Organizational Environmental (TOE)

The Technology-Organization-Environment (TOE) Framework was developed by Tornatzky and Fleischer in 1990 which emphasizes the adoption of technological innovation. This theoretical framework consists of three important dimensions that influence the adoption and application of technological innovation, namely: technological context, organizational context, and environmental context (Irhas et al., 2020: 113).

Technological

The technological context represents the collection of technologies available to a company, which can be in the form of technologies available on the market and equipment that the company currently has (Bagale, 2014). Roger (2003) in (Irhas et al., 2020:123) found that perceived relative advantage (perception of the benefits and impact of electronic commerce), compatibility (both technical and organizational), trialability (the extent to which electronic commerce can be tested), The complexity (ease of use or learning of electronic commerce) and observability (the extent to which the advantages or benefits are relatively clear) of a technological innovation are important technological factors influencing adoption decisions.

Organizational

According to the TOE framework, technology adoption by organizations can be influenced by the organizational context, which defines organizational characteristics that influence the adoption of new innovative technologies by organizations (Chau & Tam, 1997) in (Abed, 2020).

Environmental

Environmental context shows external aspects that influence a company's decision to adopt new technology, which includes competitors, customers, and government involvement (Irhas et al., 2020: 129). The environment is the arena in which an organization runs its business and in the specific context of e-commerce adoption in SMEs, the environment includes competitive pressures and pressure from trading partners (Bagale, 2014).

MSME Performance

According to Kotler and Keller (2016: 49) performance is defined as holistic marketing, to capture a series of outcome measures that may have financial and non-financial implications (profitability and brand and customer equity) and implications outside the company itself (social responsibility, law, ethics, and environment). The holistic marketing concept is based on the development, design and implementation of marketing programs, processes and activities that recognize breadth and interdependence (Kotler and Keller, 2016: 43).

Marketing performance is a measure of achievement obtained from the overall marketing process activities of a company or organization (Yadnya & Santika, 2017).

E-Commerce Adoption

E-commerce can be defined as commercial transactions between organizations and individuals mediated by digital technology involving the use of the Internet, World Wide Web (Web), and mobile applications and browsers running on mobile devices (Laudon and Guercio, 2018: 8). E-commerce adoption is defined by Ghobakhloo et al. (2011) in (Al-Tit, 2020), namely the use of information and communication technology and related applications to support management, decision-making processes and business processes. MSMEs are said to adopt e-commerce when they actually use e-commerce applications to help market their products. MSMEs that adopt e-commerce are also seen through their continuous use of e-commerce (Religia et al., 2023).

Entrepreneurial Orientation

According to Covin and Slevin (1989) in Abebe (2014) entrepreneurial orientation refers to managerial attributes in the form of risk taking, innovation and proactiveness. Entrepreneurial orientation is widely used to describe the behavioral patterns of firm owners, and its moderating role in the relationship between influencing factors and business performance has been well reported.

Entrepreneurial orientation refers to the way entrepreneurs or business owners see and seek new possibilities or innovations amidst environmental uncertainty that can be applied in organizations (McMullen and Shepherd, 2006) in Li et al. (2022).

Hypothesis Development

Based on our review of the literature, the following conceptual framework was developed :

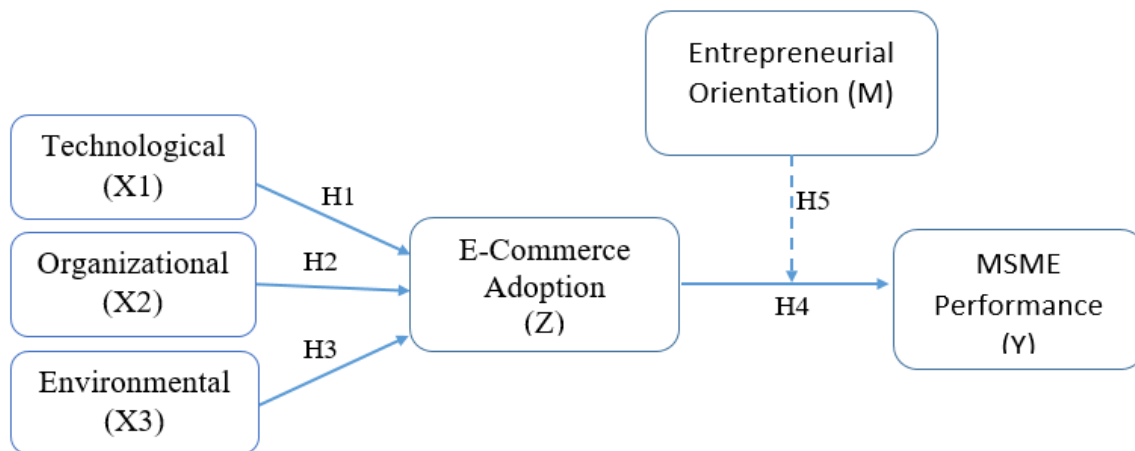


Figure 1. Conceptual Framework

In the technological context, research by Almunawar et al. (2022) shows that perceptions of relative advantage, perceptions of compatibility, perceptions of complexity have a significant and positive influence on the adoption of e-commerce by MSMEs in Brunei. This is also in line with the research results of Alam et al. (2011) which shows that relative advantage and compatibility have a significant impact on e-commerce adoption. In the research of Li et al. (2022), Garg and Choeu (2015) show that relative advantage has a significant impact on e-commerce adoption. In contrast to the research results of Isa and Alenezi (2022) which showed that relative advantage had a positive relationship with e-commerce adoption, while complexity and compatibility were found not to have a positive relationship with e-commerce adoption.

From the explanation above, it can be concluded that there is a connection between technological variables and e-commerce adoption. So the following hypothesis can be put forward.

H1: Technological has a significant effect on e-commerce adoption in Surabaya.

In the organizational context, in the research of Shahzad et al. (2020), Isa and Alenezi (2022), Religia et al. (2023) and Abed (2020) show that organizational readiness has a significant effect on e-commerce adoption. This is in line with research by Hasani et al. (2023) which proves that organizational readiness has a positive effect on the adoption of PET technology. In contrast to research by Hoang et al. (2021) which shows that in an organizational context, organizational readiness is not significantly related to e-commerce adoption.

From the explanation above, it can be concluded that there is a relationship between organizational variables and e-commerce adoption. So the following hypothesis can be put forward

H2: Organizational has a significant influence on e-commerce adoption in Surabaya

The research results of Li et al. (2022) proves that in an environmental context, competitive pressures have a positive impact on the intention to use e-commerce in micro agribusiness companies in Longshen. This is in line with the research results of Salah and Ayyash (2024) which show a significant positive relationship between competitive pressure and SME E-commerce adoption. Isa and Alenezi's (2022) research also supports this by showing that competitive pressure is positively related to e-commerce adoption by Kuwaiti SMEs. Research by Sin et al. (2016), Garg and Choeu (2015) proves that there is a significant relationship between competitive pressure and E-commerce adoption.

From the explanation above, it can be concluded that there is a relationship between organizational variables and e-commerce adoption. So the following hypothesis can be put forward:

H3: Environment has a significant effect on e-commerce adoption in Surabaya

Abebe's research (2014) proves that e-commerce adoption has a positive influence on the performance of MSMEs. This research is in line with Gao et al. (2023), Hussain et al. (2022) and Yacob et al. (2023) which prove that e-commerce adoption has a positive influence on the performance of MSMEs. Research by Hasani et al. (2023) also shows that the use of technology will have a positive impact.

From the explanation above, it can be concluded that there is a connection between the e-commerce adoption variable and the performance of MSMEs. So the following hypothesis can be put forward.

H4: The adoption of e-commerce has a significant effect on the performance of MSMEs in Surabaya

In the research of Yacob et al. (2021) found that entrepreneurial orientation contributes to the correlation between e-commerce adoption and MSME Sustainable Business Performance. This research supports Abebe's (2014) research which shows that entrepreneurial orientation (EO) positively moderates the relationship between e-commerce adoption and performance so that higher EO leads to stronger e-commerce adoption. Meanwhile, other research shows that entrepreneurial orientation is a mediator between e-commerce adoption and the performance of MSMEs (Yacob et al.,2023). Therefore, the hypothesis proposed is as follows:

H5: Entrepreneurial orientation can moderate the relationship between e-commerce adoption and the performance of MSMEs in Surabaya

Method

Population And Sample

The research population is MSMEs in Surabaya who use e-commerce, but the number is unknown due to variability in use. Samples were taken 5 times the number of research indicators, namely 110, but the data analyzed was 154. The sampling technique used was convenience sampling.

Research Instruments and Questionnaire Design

The research instrument was a questionnaire with a 5 point Likert scale (Strongly Agree to Strongly Disagree). Primary data was obtained from a questionnaire distributed to MSMEs in Surabaya. Secondary data was obtained from books and journals related to research theory. Data was collected through a questionnaire distributed using Google Form. To make it easier to prepare research instruments, the researcher describes them in table 2.

Table 2. Operational Definition of Research Variables

Variable	Dimension	Indicator	Reference
Technological (X1)	Compatibility	Consistent with socio-cultural values	(Bagale, 2014) Alam et a l.(2011)
		Aligns with previous ideas	
		Meets adopter's needs	
	Relative Advantage	Perceived benefits	
		Accelerates work	
		Ease of obtaining information	

Variable	Dimension	Indicator	Reference
Organizational (X2)	Organizational Readiness	Financial Resources	(Isa dan Alenezi, 2022)
		Technological Resources	
Environmental (X3)	Competitive Pressure	Threat of market share loss	(Salah dan Ayyash, 2024)
		Price competition	
MSME Performance (Y)	-	Sales Growth	(Hasani et al., 2023)
	-	Profitability	
	-	Market Share	
	-	Customer Retention	
E-commerce Adoption(Z)	-	Actual Usage	(Religia et al., 2023)
	-	Continuous Use	
Entrepreneurial Orientation (M)	Innovation	Creativity	(Abebe, 2014)
		Experimentation	
	Proactiveness	Market Forecasting	
		Inventory Planning	
	Risk Taking	Decision-making courage	
		Unconventional approaches	

Data Analysis Techniques

The validity of the instrument was tested using the Bivariate Product Moment Pearson correlation technique, and reliability was tested using the Cronbach Alpha method using the SPSS program. Hypothesis testing is carried out using inferential statistical tests to estimate population parameters based on sample data and make a decision to accept or reject the proposed hypothesis.

Results and Discussion

Characteristics Of Respondents

This study collected primary data by distributing questionnaires to MSME (Micro, Small, and Medium Enterprises) operators in Surabaya from June 20, 2024, to June 22, 2024. The characteristics of the respondents include their business sectors, monthly turnover, and e-commerce accounts used. Here is a summary:

Based on the questionnaire data, the business sectors of respondents are summarized in the table below:

Table 3. The Business Sectors Of Respondents Are Summarized

Business Sector	Number	Percentage (%)
Culinary	58	37.7
Beauty	7	11.0
Fashion	29	18.8
Agribusiness	7	4.5
Automotive	16	10.4
Household Appliances	11	7.1
Electronics	8	5.2

Sports (Sports Equipment)	8	5.2
Total	154	100

The monthly turnover data of respondents is summarized as follows:

Table 4. The monthly turnover data of respondents is summarized

Monthly Turnover	Number	Percentage (%)	Category
Up to IDR 160,000,000	133	86.4	Micro
IDR 160,000,000 – 1.25 Billion	21	13.6	Small
More than IDR 1.25 Billion	0	0.0	Medium
Total	154	100	

- **Micro:** 86.4% of respondents
- **Small:** 13.6% of respondents
- **Medium:** 0% of respondents

The e-commerce platforms used by respondents are illustrated in the diagram below:

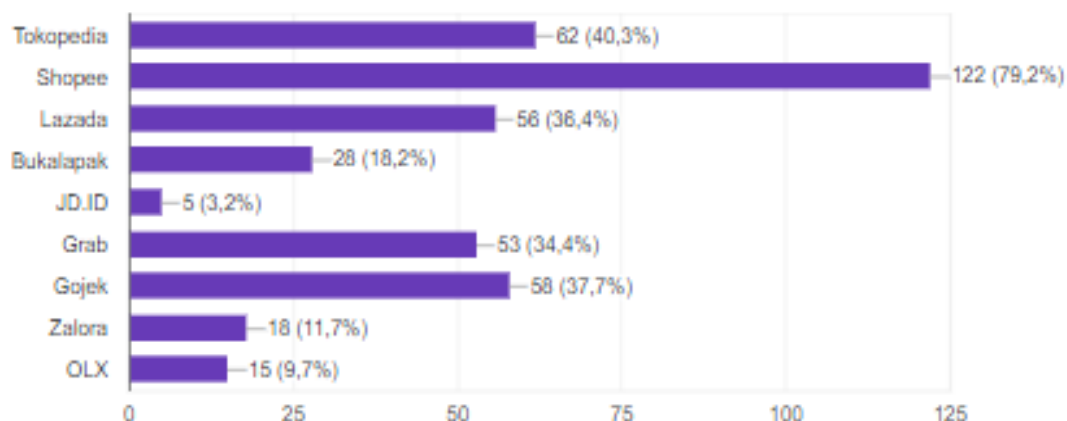


Figure 2. The e-commerce platforms used by respondents

- **Shopee:** Most commonly used, with 79.2% of respondents utilizing this platform.

In summary, the majority of respondents are involved in the culinary sector, operate as micro-enterprises with turnover up to IDR 160,000,000, and predominantly use Shopee for e-commerce

Conceptualization of the Model

The independent variables in this research are variable X (Technological, Organizational and Environmental). The dependent variable is variable Y (Performance of MSMEs). Furthermore, variable Z (e-commerce adoption) is positioned as a mediating variable between the independent and dependent variables. Then variable M (entrepreneurial orientation) is a variable that can moderate the relationship between variable Z and variable Y. The structural equation model is illustrated in Figure

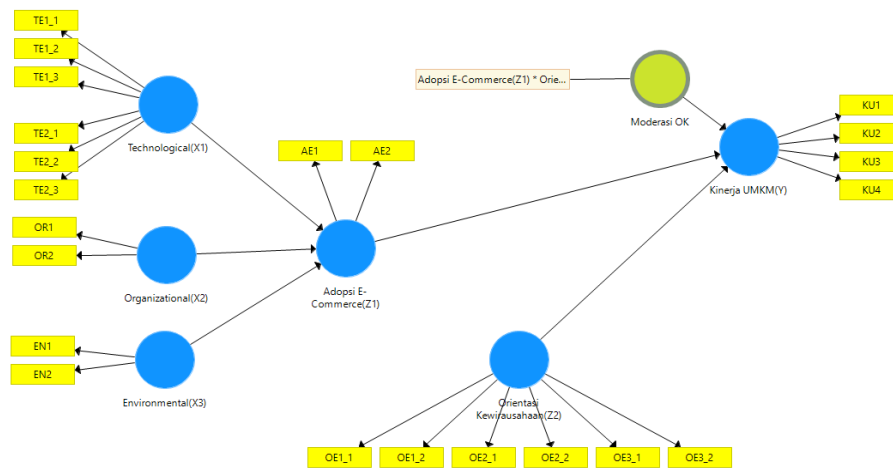


Figure 3. Conceptualization of the Model

Validity & Reliability Test

All variables have loading factors with values exceeding the recommended value of 0.70. So this proves that all the indicators used in this research are valid or have met convergent validity. This is shown in the figure 4

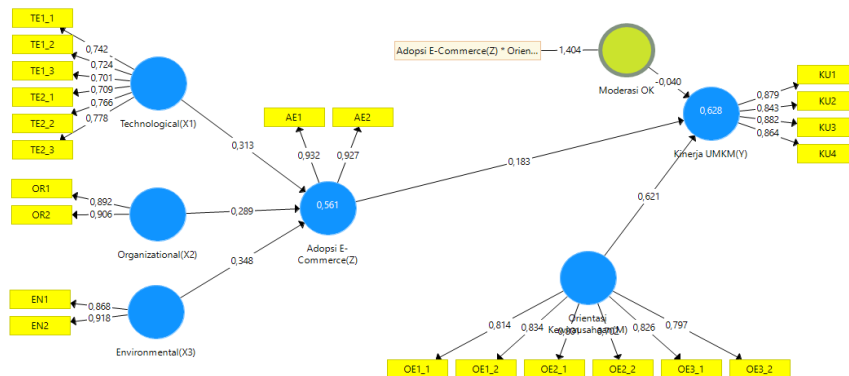


Figure 4. Loading Factor Value

Based on the results shown in Table , it can be concluded that the entire construct has a composite reliability and Cronbach alpha value above 0.7 so it can be said that all statement items in each construct are reliable.

Table 5. Reliability Test

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
E-commerce Adoption(Z)	0.843	0.843	0.927	0.864
Environmental(X3)	0.750	0.777	0.888	0.798
MSME Performance(Y)	0.890	0.892	0.924	0.752
EO Moderation	1.000	1.000	1.000	1.000
Organizational(X2)	0.762	0.764	0.893	0.807
Entrepreneurial Orientation(M)	0.884	0.889	0.912	0.635
Technological(X1)	0.833	0.840	0.877	0.544

Structural Model Testing (Inner Model)

Structural model testing (inner model) refers to the stage in data analysis carried out in quantitative research, especially in structural equation model (SEM) analysis. This stage focuses on testing the relationships between the variables that have been identified in the conceptual model, which was explained previously in the conceptualization process.

1. R Squares Testing:

Table 6. R Squares Test

	R Square	R Square Adjusted
Adoption E-commerce(Z)	0.561	0.550
MSME Performance(Y)	0.628	0.619

E-commerce adoption (Z) is explained by the independent variable by 56.1%.

MSME performance (Y) is explained by E-commerce Adoption and Entrepreneurship Orientation of 62.8%.

2. F Squares Testing:

Table 7. F Squares Test

	E-commerce Adoption (Z)	MSME Performance(Y)
Technological(X1)	0.126	
Organizational(X2)	0.136	
Environmental(X3)	0.204	
MSME Performance(Y)		
E-commerce Adoption (Z)		0.041
Entrepreneurial Orientation (M)		0.446
EO Moderation		0.006

The influence of Technological (X1) and Organizational (X2) on E-commerce Adoption (Z) is moderate.

The influence of Environmental (X3) on E-commerce Adoption (Z) is large.

The influence of E-commerce Adoption (Z) on MSME Performance (Y) is small.

The influence of Entrepreneurial Orientation (M) on MSME Performance (Y) is large.

The effect of OK moderation on MSME performance (Y) is very small.

Hypothesis Testing

Direct Hypothesis Testing:

Table 8. Direct Hypothesis Test

	Original Sample (O)	T Statistics ((O/STDEV))	P Values	Result
Technological(X1) -> E-commerce Adoption (Z)	0.313	3.571	0.000	H1 Accepted
Organizational(X2) -> E-commerce Adoption (Z)	0.289	3.767	0.000	H2 Accepted
Environmental(X3) -> E-commerce Adoption (Z)	0.348	4.314	0.000	H3 Accepted
E-commerce Adoption (Z) -> MSME Performance (Y)	0.183	1.726	0.043	H4 Accepted
EO Moderation ->MSME Performance.(Y)	-0.040	0.529	0.299	H5 Rejected

H1, H2, H3, and H4 are accepted: Technological, Organizational, and Environmental have a positive and significant influence on E-commerce Adoption, and E-commerce Adoption has a positive and significant influence on MSME Performance.

H5 is rejected: Moderation of Entrepreneurial Orientation is not significant in moderating the relationship between E-commerce Adoption and MSME Performance.

Indirect Hypothesis Testing:

Table 9. Indirect Hypothesis Test

	Original Sample (O)	T Statistik (O/STDEV)	P Values	Result
Technological(X1) -> E-commerce Adoption(Z)-> MSME Performance(Y)	0.057	1.668	0.048	Significant
Organizational(X2) -> E-commerce Adoption (Z) -> MSME Performance(Y)	0.053	1.543	0.062	not significant
Environmental(X3) -> E-commerce Adoption (Z) -> MSME Performance(Y)	0.064	1.359	0.088	not significant

Significant indirect influence: Technological (X1) -> E-commerce Adoption (Z) -> MSME Performance (Y).

The indirect effect is not significant: Organizational (X2) -> E-commerce Adoption (Z) -> MSME Performance (Y) and Environmental (X3) -> E-commerce Adoption (Z) -> MSME Performance (Y).

The results of the hypothesis test show that technology has a significant effect on e-commerce adoption. This means that the better the technology, the more encouragement MSMEs will have to adopt e-commerce. When technologies are deemed compatible and have clear relative advantages, the incentive for MSMEs to adopt e-commerce will increase. The results in this research are in line with the research results of Almunawar et al., (2022) which prove that relative advantage and compatibility in a technological context have a significant and positive influence on e-commerce adoption. Research by Alam et al. (2011) also supports the results of this research which proves that relative advantage and compatibility have a significant impact on e-commerce adoption.

The results of the hypothesis test show that organization has a significant effect on e-commerce adoption. This means that the better the MSME organization, the stronger the urge for MSMEs to adopt e-commerce. The readiness of MSME organizations can be seen from the resources they have. These resources include finances and tools that support the running of e-commerce. When the resources they have are sufficient, it will encourage MSMEs to adopt e-commerce. The results of this study are in line with the research results of Shahzad et al. (2020), Isa and Alenezi (2022), Religia et al. (2023) and Abed (2020) which show that in the environmental context the dimensions of organizational readiness have a significant influence on the adoption of e-commerce.

The results of the hypothesis test show that Environmental has a significant effect on e-commerce adoption. This means that the better the MSME environment, the stronger the urge for MSMEs to adopt e-commerce. The MSME environment with high competitive pressure will encourage MSMEs to adopt e-commerce. This competitive pressure causes price competition and fear of losing customers. So that MSMEs take steps to sell products with standard quality on e-commerce. The results of this research are in line with the research results of Li et al. (2022), Salah and Ayyash (2024) and Isa and Alenezi (2022) which prove that in an environmental context the dimension of competitive pressure shows that competitive pressure is positively and significantly related to the adoption of e-commerce.

The results of the hypothesis test show that e-commerce adoption has a significant effect on MSME performance. This means that the stronger MSMEs are in adopting e-commerce, the more MSME performance will increase. This increase in MSME performance is demonstrated by an increase in sales growth, market share, customer retention and profits obtained. The results of this research are in line with research by Abebe (2014), Gao et al. (2023), Hussain et al. (2022) and Yacob et al. (2023) which proves that e-commerce adoption has a positive and significant effect on the performance of MSMEs.

The results of hypothesis testing show that entrepreneurial orientation cannot moderate the relationship between e-commerce adoption and MSME performance. This is because there are still many MSMEs that are not taking advantage of existing opportunities. Entrepreneurial orientation which includes innovation, proactivity and the courage to take risks has not been fully implemented by many MSME players. They tend to only focus on selling their products and don't dare to take many risks.

The results of this study are not in line with the results of research by Yacob et al. (2021) and Abebe (2014) who prove that entrepreneurial orientation (EO) positively and moderates the relationship between e-commerce adoption and MSME performance.

Conclusion

Based on the results of the analysis that has been carried out, the following conclusions can be drawn:

1. Technology has a significant influence on e-commerce adoption in Surabaya. This shows that when e-commerce can be easily integrated with consumers' daily activities (compatibility) and offers better benefits than traditional methods (relative advantage), then the level of e-commerce adoption in Surabaya will increase.
3. Organizational has a significant influence on e-commerce adoption in Surabaya. This means that the better prepared an organization is to adopt e-commerce technology, the more likely they are to be successful in implementing and using e-commerce
4. Environmental influences significantly on e-commerce adoption in Surabaya. This means that the higher the level of competition among business people in Surabaya, the greater the incentive for them to adopt e-commerce.
5. The adoption of e-commerce has a significant effect on the performance of MSMEs in Surabaya. This means that the higher the level of e-commerce adoption by MSMEs, the better their performance. E-commerce allows MSMEs to reach a wider market, increase operational efficiency, and provide better service to customers. Thus, MSMEs that adopt e-commerce tend to experience an increase in sales, profitability and overall business growth.
6. Entrepreneurial orientation cannot moderate the relationship between e-commerce adoption and the performance of MSMEs in Surabaya. Although entrepreneurial orientation is important for the success of MSMEs in general. In this context, it shows that other factors such as technology, organization and environment are more dominant in determining the success of e-commerce compared to entrepreneurial orientation.

Limitation

Based on the limitations of this research, the researchers provide the following alternatives:

1. For business actors: e-commerce adoption can be used as a consideration to improve MSME performance.

2. For future researchers, it is hoped that they can develop this research by adding the dimension of management support to the Organizational variable and the dimension of customer pressure to the Environmental variable which is thought to influence MSMEs to adopt e-commerce.

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