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DETERMINANTS OF E-COMMERCE ADOPTION AMONG SMALL AND MEDIUM ENTERPRISES IN NORTH SUMATRA PROVINCE: THE ROLE OF TECHNOLOGY READINESS AND PERCEIVED BENEFITS

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ABSTRACT

This study investigates the determinants of e-commerce adoption among Micro, Small, and Medium-sized Enterprises (MSMEs) in North Sumatra Province, Indonesia, emphasizing the roles of technology readiness and perceived benefits. Using a quantitative approach, data were collected from 384 MSME respondents through a structured survey and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS 4.0 software. The results reveal that perceived benefits have a significant positive effect on e-commerce adoption (β = 1.578, t = 5.519, p < 0.001), while technology readiness shows a significant negative effect (β = –1.025, t = 3.543, p < 0.001). The model's explanatory power is strong, with R^2 = 0.642, indicating that 64.2% of the variance in adoption is explained by these two variables. The findings highlight that MSMEs are more motivated to adopt e-commerce when they clearly perceive its tangible advantages, such as increased operational efficiency, broader market reach, and higher sales, rather than solely relying on technological readiness. This paradox suggests that infrastructure alone does not guarantee adoption without adequate digital literacy and trust in online transactions. Policymakers should therefore prioritize programs that enhance digital capabilities and demonstrate practical benefits to strengthen e-commerce adoption among MSMEs.

Keywords: e-commerce adoption, MSMEs, technology readiness, perceived benefits, North Sumatra

INTRODUCTION

The MSME (Small and Medium Enterprises) sector is one of the mainstays that can increase national income. It can be seen that in 2023 MSMEs will play a role of 61.8% in contributing to the State's foreign exchange income from all total MSMEs in Indonesia. The existence of MSMEs is very important for state revenue, especially in the current digital era. According to (BPS 2023), the number of E-commerce businesses in Indonesia in 2023 is estimated to reach 3,816,750 business actors. The development of the digital era, especially the use of information technology such as E-Commerce, has changed the business landscape globally, including Indonesia. E-Commerce is a business transaction that occurs in an electronic network such as the internet that is used to conduct transactions (Munoz et al., 2023; Vermaat et al, 2007). E-Commerce is one of the important strategies to expand the market, increase MSME income and interact better with customers. One of the provinces that has the largest MSMEs in Indonesia today is North Sumatra (North Sumatra). However, the adoption of E-commerce among MSMEs in Prov. North Sumatra is still low. It can be seen in the data in Table 1. The following are the uses of E-Commerce in Indonesia.

Table 1 below, shows that North Sumatra Province has not been included in the top 10 nominations that utilize E-commerce in doing business. It is proven that, the adoption of E-commerce among MSME actors in Prov. North Sumatra is not optimal and is still low. Several factors such as limited human resources in understanding technology and the perception of benefits that are not optimal are suspected to be obstacles to the readiness of MSME actors in utilizing E-commerce as a forum to increase sales. According to (Ariansyah et al., 2021); Olivera & Martins, 2010), it emphasizes that technological readiness is a facilitator of E-Commerce adoption because it includes professional, user and E-Business skills.

Table 1. Percentage of Non-E-Commerce Businesses by Province and Reasons for Not Making Online Transactions, 2023

Provinsi/*Province*	Alasan/*Reason*			
	1	2	3	4
(1)	(2)	(3)	(4)	(5)
Aceh	38,60	75,41	0,64	1,22
Sumatera Utara	28,51	86,46	1,89	3,65
Sumatera Barat	24,61	81,80	0,94	1,27
Riau	33,22	76,66	2,16	1,47
Jambi	16,35	82,71	1,82	1,68
Sumatera Selatan	39,35	82,50	1,99	1,18
Bengkulu	32,47	85,91	0,53	0,39
Lampung	25,97	72,63	0,43	0,44
Kep. Bangka Belitung	29,99	86,74	1,21	3,34
Kepulauan Riau	33,19	77,07	1,12	1,91
DKI Jakarta	28,86	73,57	0,49	2,18
Jawa Barat	24,89	73,31	0,67	1,55
Jawa Tengah	32,02	77,68	0,65	4,60
D.I. Yogyakarta	29,06	78,91	0,47	0,69
Jawa Timur	29,70	75,51	1,53	1,51
Banten	25,30	76,27	1,13	1,46
Bali	36,89	81,66	1,21	1,65
Nusa Tenggara Barat	32,29	78,27	3,29	3,29
Nusa Tenggara Timur	30,71	88,36	4,28	3,08
Kalimantan Barat	19,04	83,89	1,21	1,02
Kalimantan Tengah	25,80	88,23	3,03	1,24
Kalimantan Selatan	26,93	73,62	0,34	0,55
Kalimantan Timur	19,95	75,99	0,76	1,60
Kalimantan Utara	22,31	78,53	0,85	0,89
Sulawesi Utara	27,58	86,69	0,31	0,41
Sulawesi Tengah	31,15	76,75	1,98	4,03
Sulawesi Selatan	28,28	86,49	1,39	2,70
Sulawesi Tenggara	32,71	69,43	1,20	0,93
Gorontalo	31,21	78,48	0,47	0,66
Sulawesi Barat	24,58	83,86	0,38	0,40
Maluku	32,30	86,89	0,32	0,39
Maluku Utara	23,58	80,04	2,91	2,88
Papua Barat	39,44	90,45	1,17	0,82
Papua Barat Daya	29,71	86,65	1,34	1,11
Papua	35,46	85,25	0,69	1,52
Papua Selatan	18,84	88,19	1,04	1,07
Papua Tengah[1]	NA	NA	NA	NA
Papua Pegunungan[1]	NA	NA	NA	NA
Indonesia	28,84	77,60	1,10	2,20

Catatan/*Note*: Pertanyaan dengan kemungkinan jawaban lebih dari satu pilihan/*questions with multiple answers*

[1]Data tidak dapat ditampilkan karena RSE >25%/ *Not Applicable due to RSE >25%*

Kode/*Code*:
1: Tidak tertarik berjualan onlineNot interested in selling online
2: Lebih nyaman berjualan secara langsung/More comfortable selling offline
3: Kekhawatiran tentang keamanan (informasi kartu debit, dll)/ Concerns about security (debit card information, etc.)
4: Kekhawatiran tentang privasi data/Concerns about data privacy

Source: (BPS Data, 2023 Processed by the Author)

Technology readiness and perceived benefits are crucial factors that significantly determine the decision of MSMEs to adopt E-commerce. Technology readiness includes aspects of technological infrastructure, technical expertise and knowledge, confidence in technology and innovative and proactive

towards technology (Kaushik & Agrawal, 2021; Parasuraman, 2020). This study aims to identify and analyze the determinants of E-Commerce adoption among MSMEs in Prov. North Sumatra with the main focus on the role of technology readiness and the benefits felt by MSME actors. And the formulation of the problem in this study is to analyze how the readiness and perceived benefits affect the adoption of E-commerce among MSMEs in North Sumatra Province. Therefore, it is important to understand the factors that can provide insights for MSME actors in collaboration with local governments and E-comerrce service providers in formulating effective strategies to encourage the adoption of E-comerrce among MSMEs in North Sumatra.

The problem of this research is the lack of readiness of MSME actors in adopting E-Commerce optimally. Where E-Commerce is one of the containers that can be used by MSME actors in developing their businesses. In this case, it is necessary for MSME actors to adapt to E-Commerce adoption. The approach that will be used in solving the problem of this research is to use a quantitative approach with a direct field survey method. This quantitative approach is used to test between variables in this study in a systematic and measurable manner. The problem-solving strategy used to answer the problem formulation and achieve the research goal is to develop valid and reliable research instruments such as the distribution of questionnaires.

The questionnaire should be structured with clear and unambiguous questions that will be answered using a likert scale of 1 to 5 on each indicator of each available statement. The results of the distribution of the questionnaire of each statement were then tested to determine the relevance of each variable and concluded the measurement results carried out to make managerial implications that became new information and knowledge for MSME actors in the North Sumatra Province Area. And it is hoped that it can provide a comprehensive understanding of the determination of E-Commerce adoption among MSMEs in North Sumatra, especially the readiness of technology and the benefits felt.

METHODS

The location of this research was carried out in MSMEs in North Sumatra Province. The research method that will be used in this study is descriptive analysis with a quantitative approach. Quantitative Analysis is data analysis with statistical approaches, both descriptive and inferential statistics used to test hypotheses (Sugiyono, 2017). The population in this study is all MSMEs in North Sumatra. The sample collection technique used in this study is to use probability sampling by sampling using cluster sampling because the amount of data on the population of MSME actors who must have used E-commerce is incomplete and it is difficult to get the data. Cluster sampling is a sampling method where a large population is divided into small groups, then samples will be randomly selected from the cluster (Ghozali, 2013).

This method is useful when it is difficult to get a complete list of research objects (MSMEs). Because at this time, the popuplasty in the use of E-commerce in MSME actors does not have valid data, therefore there is a way to determine the research sample. One of the formulas in finding samples is the Limeshow formula with the criteria of an estimated population level of 50% and a confidence level of 95%.

$$n0 = Z^2.p.(\frac{1.p}{d^2})$$

$$n0 = \frac{1.962 \text{ x } 0.5\ (1\text{-}0.5)}{0{,}052}$$

$$n0 = \frac{3.8416 \text{ x } 0.25}{}$$

0.0025

n0 = 384,16 = 384 responden

Description :n : Number of samples

Z: Z score on confidence (95%)

P : Maximum estimate (50%)

d : Error rate (5%)

The data processing method carried out in this study is by using SPSS 26 software rocks to tabulate data, and quantitative analysis using the SEM-PLS program tool. This research instrument uses a questionnaire measuring tool using a likert scale. Where, each answer is classified into five (5) categories and given a score of 1 to 5. To explain more about this study, the following is the definition of the explanation of variables in the research conducted.

Table 2. Definition of Research Variables

No	Variabel	Definition	Indicator	Scale
1	Technology Readiness (X1)	Technology Readiness is the extent to which an organization has relevant technological power, such as hardware, software, networks and technical capabilities to support the integration of new technologies (Chwelos et al., 2001).	1. Optimism 2. Innovative 3. Discomfort 4. Insecurity (Parasurama n, 2000).	Likert
2	Perception of Benefit (X2)	The perception of E-commerce is how organizations can improve performance, reduce costs, increase customer satisfaction and expand market access (Turban et al., 2006).	1. efficiency 2. Market expansion 3. Cost reduction 4. Improved company image (Zhu & Kraemer, 2005).	
3	Adoption E-commerce (Y)	E-commerce adoption is an organization's decision to start using internet applications and systems in business processes, including for transaction, communication, and internal and external activities (Zhu & Kraemer, 2005).	1. Platforms used 2. Transaction Frequency and Volume 3. Compatibility between the product or Service with the digital Platform 4. Length of time e-commerce use (Ifineedo, 2011).	Likert

Source: (Data Processed by the Author, 2025)

DISCUSSIONS AND CONCLUSIONS

Respondent Characteristics

Table 3. Respondent Characteristics

Characteristics	Category	Frequency (n)	Percentage (%)
Age	< 25 years old	35	9,1
	25 – 35 years old	162	42,2
	36 – 45 years old	118	30,7
	> 45 years old	69	18,0
Education	SD	21	5,5
	SMP	45	11,7
	SMA	186	48,4
	S1/S2	126	32,8
	Other	6	1,6
Business Field	Culinary & Trade	171	44,5
	Fashion	84	21,9
	Service	67	17,5
	Craft	38	9,9
	Other	24	6,2
Long Term of Effort	< 1 year	50	13,0
	1 – 2 years	81	21,1
	3 – 5 years	106	27,6
	> 5 years	147	38,3
Number of Employees	None	77	20,1
	1 – 3 orang	209	54,4
	4 – 6 orang	60	15,6
	> 10 people	38	9,9
Net Income/Month	< IDR 2,500,000	96	25,0
	IDR 2,500,000 – IDR 5,000,000	160	41,7
	IDR 5,000,001 – IDR 10,000,000	78	20,3
	> IDR 10,000,000	50	13,0

Source: (Data Processed by Author, 2025)

Based on the table above, it can be concluded that this study involved 384 respondents of MSME actors in North Sumatra Province who were selected using the cluster sampling technique. The majority of respondents were in the age group of 25–35 years (42.1%), followed by 36–45 years old (30.7%), age over 45 years old (18.2%), and under 25 years old (9.0%). This shows that most MSME actors in this region are at a productive age that is relatively adaptive to digital technology.

In terms of education, respondents with a high school background dominated (48.4%), followed by S1/S2 (32.8%), junior high school (11.7%), elementary (5.5%), and other categories (1.6%). The relatively high level of education in most respondents indicates the potential to accept and utilize e-commerce more effectively.

Based on business sectors, the culinary and retail trade sectors are the largest category (44.6%), followed by fashion (21.8%), services (17.5%), handicrafts (9.9%), and others (6.2%). This variation shows that the adoption of e-commerce has the potential to touch various types of MSME businesses, although the trade and consumption sectors still dominate.

The length of the respondent's business also varies. Most MSMEs have been running for >5 years (38.2%), followed by the categories of 3–5 years (27.6%), 1–2 years (21.1%), and less than 1 year (13.1%). This data shows that most MSME actors have long enough business experience so that they have a stronger motivation to utilize technology for efficiency.

In terms of the number of employees, MSMEs with 1–3 workers dominate (54.4%), followed by no employees (20.1%), 4–6 people (15.6%), and >10 people (9.9%). This composition is in

accordance with the characteristics of MSMEs in Indonesia, which are generally micro and small-scale.

Net income per month shows that most respondents earn between IDR 2,500,000 – IDR 5,000,000 (41.7%), followed by < IDR 2,500,000 (25.0%), IDR 5,000,001 – IDR 10,000,000 (20.3%), and > IDR 10,000,000 (13.0%). This distribution emphasizes that e-commerce can be one of the important strategies to increase MSME income.

PLS SEM Analysis Results

Data Analysis

The data processing of this study uses the Structural Equation Modeling-Partial Least Squares (SEM-PLS) method with the help of SmartPLS 4.0 software. The analysis was carried out through two stages, namely the measurement model test (outer model) and the structural model test (inner model). The validity and reliability test was carried out by referring to the value of loading factor (>0.7), composite reliability (>0.7), and average variance extracted (AVE) (>0.5). Furthermore, the hypothesis test was carried out through path coefficient, t-statistic, and p-value values to determine the influence between variables with a significance level of 5% (p < 0.05).

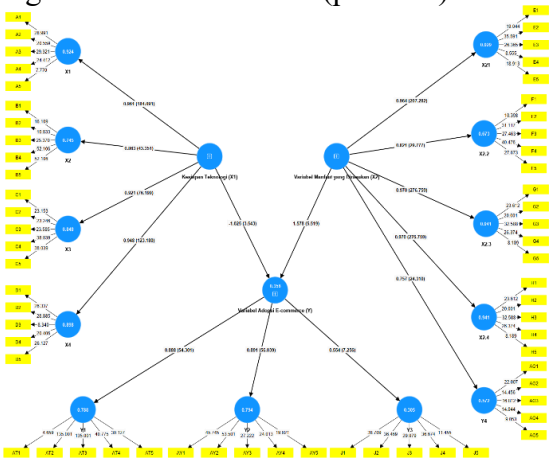

Figure 4. SEM-PLS Results
Source: (Data Processed by Author, 2025)

Measurement Results of Research Model

The following are the results of the measurement of the research model conducted using the calculation of SEM PLS 4.

Table 4. SEM -PLS Measurement Model

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Technology Readiness (X1) -> E-commerce Adoption Variables (Y)	-1.025	-1.01	0.289	3.543	0
Technology Readiness (X1) -> X1	0.961	0.961	0.005	184.091	0
Technology Readiness (X1) -> X2	0.863	0.863	0.02	43.351	0
Technology Readiness (X1) -> X3	0.921	0.921	0.012	76.199	0
Technology Readiness (X1)-> X4	0.948	0.948	0.008	123.18	0
E-commerce Adoption Variable (Y) -> Y1	0.888	0.89	0.016	54.301	0
E-commerce Adoption Variable (Y) -> Y2	0.891	0.893	0.016	56.039	0
E-commerce Adoption Variable (Y) -> Y3	0.554	0.55	0.076	7.256	0
Perceived Benefits Variable (X2) -> E-commerce Adoption Variable (Y)	1.578	1.559	0.286	5.519	0
Perceived Benefit Variable (X2) -> X2.2	0.821	0.82	0.028	29.777	0
Perceived Benefit Variable (X2) -> X2.3	0.97	0.97	0.004	276.759	0
Perceived Benefit Variable (X2) -> X2.4	0.97	0.97	0.004	276.759	0
Perceived Benefit Variables (X2) -> X21	0.964	0.964	0.005	207.282	0
Perceived Benefit Variable (X2) -> Y4	0.757	0.759	0.031	24.31	0

Source: (Data Processed by Author, 2025)

Outer Model

Outer model testing was carried out to assess the validity and reliability of indicators against latent constructs. Some of the tests used include:

1. **Convergent Validity**
   a. The loading factor value of the entire indicator is above 0.70, which means that each indicator has a strong correlation with the constructed being measured.
   b. The Average Variance Extracted (AVE) value for all constructs is above 0.50, indicating that the latent variable is able to explain more than 50% of the variance of the indicator.
   c. Thus, the research construct is declared valid in convergent validity.
2. **Discriminant Validity**
   a. The value of the Fornell-Larcker Criterion shows that the square root of AVE for each construct is greater than the correlation between constructs.

b. These results confirm that each latent variable is unique and capable of distinguishing itself from other constructs.

3. Construct Reliability

Composite Reliability (CR) value and Cronbach's Alpha of the entire construct are greater than 0.70, which means that each latent variable has excellent internal consistency. Thus, all the variables in this model are reliable.

Based on the table above, the outer model that meets the requirements for validity and reliability shows that the research instrument is appropriate and suitable for hypothesis testing.

Inner Model (Model Structural)

Internal model testing was carried out to evaluate the relationship between latent variables. Some of the criteria tested include:

1. Coefficient of Determination (R^2)

a. The R^2 value for the E-commerce Adoption variable (Y) is 0.642.
b. This means that 64.2% of the variation in e-commerce adoption can be explained by the variables Technology Readiness (X1) and Perceived Benefits (X2), while the remaining 35.8% can be explained by factors other than the model (e.g. policy support, capital, and social factors).
c. This value is included in the strong category according to (Hair et al., 2019).

2. Predictive Relevance (Q^2),

The value of Q^2 was obtained >0, which indicates that the research model has good predictive ability for dependent variables.

Table 4. Results of Inner Model Evaluation (Path Analysis)

Relationship Between Variables (Hypothesis)	Path Coefficients	T-Statistics	P-Value
Technology Readiness (X1) → E-commerce Adoption (Y)	-1,025	3,543	0,000
Benefits Felt (X2) → E-commerce Adoption (Y)	1,578	5,519	0,000

Source: (Data Processed by Author, 2025)

Interpretasi Inner Model (Path Analysis SEM-PLS)

1. The Influence of Technology Readiness (X1) on E-commerce Adoption (Y)

The results of the analysis showed that the Technology Readiness variable had a significant negative effect on E-commerce Adoption with a path coefficient of -1.025, a T-statistical value = 3.543, and a p-value = 0.000. This means that the higher the readiness of technology (for example, the availability of digital infrastructure, internet access, and the readiness of human resources), does not necessarily increase the adoption of e-commerce. This can be explained by the phenomenon that many MSME actors, despite having access to technology, still face limitations in digital literacy, the cost of maintaining online platforms, and anxiety about transaction security risks. These findings are in line with several previous studies that have emphasized the importance of digital mentoring and training, not just the provision of infrastructure.

2. Effect of Perceived Benefits (X2) on E-commerce Adoption (Y)

   The Perceived Benefits variable had a significant positive influence on E-commerce Adoption, with a path coefficient of 1.578, a statistical T-value = 5.519, and a p-value = 0.000. This shows that the perception of benefits such as operational cost efficiency, expanded market access, increased sales turnover, and ease of transactions encourages MSMEs to be more active in adopting e-commerce. These findings reinforce the Technology Acceptance Model (TAM) theory, which emphasizes that perceived usefulness is a major determinant of technology acceptance. Thus, the greater the benefits that can be directly felt by business actors, the higher the e-commerce adoption rate.
3. Coefficient of Determination (R^2)

   The R^2 value of 0.642 for the E-commerce Adoption variable shows that 64.2% of the variation in e-commerce adoption can be explained by two variables, namely Technology Readiness and Perceived Benefits, while the remaining 35.8% is influenced by other factors outside the model, such as government policy support, funding/access to capital, digital consumer trends, and socio-cultural factors. According to the criteria of (Hair et al., 2019), the R^2 value is included in the strong category, so the model used has good explanatory ability.

Research Results

Based on the table above, the results of the analysis show that:

1. Technology Readiness (X1) → E-commerce Adoption (Y), The path coefficient value is -1.025, with a t-statistic of 3.543 and a p-value of 0.000. These results indicate that technology readiness has a significant effect on e-commerce adoption, although the direction of negative relationships indicates that there are obstacles in technology readiness that actually reduce the intensity of adoption.
2. Perceived Benefits (X2) → E-commerce Adoption (Y), Path Coefficient of 1.578, with a t-statistic of 5.519 and a p-value of 0.000. These results show that the perception of benefits has a positive and significant effect on e-commerce adoption. This means that the greater the benefits felt by MSMEs, the higher the adoption rate of e-commerce technology.
3. Construct Reliability Test, All indicators of latent variables show a loading factor value of >0.70 and an AVE value of >0.5 so that it can be concluded that this research instrument is valid and reliable.
4. Coefficient of Determination (R^2), The R^2 value for the e-commerce adoption variable is 0.642, which means that 64.2% of the variation in e-commerce adoption can be explained by technological readiness and perceived benefits, while the remaining 35.8% is influenced by other factors outside the model.

Discussion

The results of this study confirm that perceived benefits are the most dominant determinant in encouraging MSMEs to adopt e-commerce. The path coefficient showed that the perceived benefits had a significant positive effect on e-commerce adoption, with a very strong significance value ($p < 0.001$). These findings show that MSMEs will be more encouraged to integrate e-commerce into their business activities if they feel real benefits, both in the form of cost efficiency, increased turnover, and market network expansion.

These findings are consistent with the (Rahayu & Day, 2015) study which emphasizes that perceived benefits are the

main factor influencing the adoption of e-commerce among MSMEs in developing countries. Similarly, research by (Effendi & Subroto, 2021) shows that MSMEs are more interested in adopting e-commerce if they are aware of the direct benefits obtained, such as ease of transactions, improved business image, and opportunities to reach new consumers outside the local area. Thus, the results of this study strengthen the argument that the perceived benefits have a dominant influence over other technical factors.

On the contrary, the test results show that technology readiness actually has a significant negative influence on e-commerce adoption. This condition seems paradoxical, considering that the availability of infrastructure and technology should support the increased use of e-commerce. However, this phenomenon can be explained by the gap between the availability of technology and the capabilities of its users. Even though digital devices and internet access are relatively available, many MSME actors still experience limitations in digital literacy, technology-based managerial skills, and trust in the security of online transactions. This causes high technological readiness not to automatically encourage adoption, and can even cause resistance if it is not balanced with the competence of human resources.

These findings are in line with the research of (Oliveira & Martins, 2010) which emphasizes that technological readiness is not a stand-alone factor, but must be accompanied by the readiness of human resources and organizational support. Without an adequate understanding of the use of technology, the existing infrastructure has the potential to be underutilized. In the context of MSMEs in North Sumatra, this condition can be seen from the low utilization of e-commerce platforms optimally, even though most business actors already have digital devices and internet access.

From a theoretical perspective, the results of this study strengthen the framework of the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB). According to TAM, perceived usefulness is the main predictor of technology acceptance, while perceived ease of use will affect adoption rates only if the benefits are clearly visible. This is in accordance with the results of the study that the perceived benefits are the dominant factor, while the readiness of technology that reflects the technical aspect does not contribute positively directly. Meanwhile, within the framework of the SDGs, belief in outcomes is the determinant of attitudes towards behavior, which in this case is the adoption of e-commerce.

In addition, this study also contributes to the literature on technology adoption in the MSME sector by showing that e-commerce adoption is not only determined by the availability of technology, but more by the value perception of users. This indicates that the development of MSME digitalization strategies should not only focus on providing infrastructure, but must also pay attention to how business actors understand, internalize, and feel the benefits of this technology.

Practically, the results of this study have important implications for the development of MSMEs in North Sumatra. First, the strategy to increase e-commerce adoption needs to place more emphasis on increasing the perception of benefits through education, training, and mentoring programs. Mentoring programs should be designed to show the real benefits of e-commerce, for example with case studies of the success of MSMEs that have successfully increased income through digitalization. Second, public policy interventions are needed that can overcome obstacles to technological

readiness, such as providing access to digital literacy training on a sustainable basis, improving the quality of internet infrastructure, and ensuring the security of online transactions through regulations and consumer protection mechanisms. Third, collaboration between the government, financial institutions, and e-commerce platform providers needs to be strengthened to create an ecosystem that is more conducive to the digitalization of MSMEs.

Overall, this study confirms that the adoption of e-commerce in MSMEs is the result of a complex interaction between technical and non-technical factors. Although technology readiness is important, the benefit perception factor proves to be more dominant. Therefore, an integrative approach between the provision of technology, strengthening human resource capabilities, and increasing added value will be the key to the success of the digital transformation of MSMEs in North Sumatra and in Indonesia in general.

Conclusion

This study examined the determinants of e-commerce adoption among Micro, Small, and Medium-sized Enterprises (MSMEs) in North Sumatra Province, focusing on the roles of technology readiness and perceived benefits. Using SEM-PLS analysis on data from 384 respondents, the results reveal that perceived benefits have a significant positive influence on e-commerce adoption ($\beta = 1.578$, $p < 0.001$), while technology readiness shows a significant negative effect ($\beta = –1.025$, $p < 0.001$). The research model explains 64.2% ($R^2 = 0.642$) of the variance in e-commerce adoption, indicating a strong predictive power.

The findings suggest that MSMEs are more likely to adopt e-commerce when they clearly perceive its tangible benefits, including increased operational efficiency, broader market reach, and higher sales performance. In contrast, limited digital literacy, inadequate technical competence, and security concerns reduce the positive impact of available technology. This gap highlights that infrastructure alone is not sufficient without strengthening human capabilities.

Practically, policymakers, educators, and e-commerce platform providers should focus on building digital skills, demonstrating measurable business outcomes, and enhancing trust in digital platforms. Collaborative programs involving government, academia, and industry are crucial to sustain MSME digital transformation.

Theoretically, this study reinforces the Technology Acceptance Model (TAM), confirming that perceived usefulness remains the dominant driver of technology adoption among MSMEs in developing countries. Future studies should explore moderating factors such as financial access, policy support, and digital ecosystem maturity to accelerate inclusive e-commerce adoption.

Suggestion

Based on the results of the research, discussion, and conclusions obtained, the following suggestions can be proposed:

1. For MSME Actors

   MSMEs need to improve digital literacy and competence in utilizing e-commerce technology. Business actors are expected not only to focus on device ownership or internet access, but also to understand digital marketing strategies, online transaction management, and data security management. Active participation in digital training and mentoring will be an important step to maximize the benefits of e-commerce.
2. For Governments and Policymakers

   The government needs to provide broader support through policies that

favor the digitalization of MSMEs. This can be realized in the form of providing continuous digital literacy training, the development of an even and stable internet infrastructure, and regulations that ensure the security of online transactions. Collaborative programs between the government, e-commerce platforms, and educational institutions are also urgently needed to strengthen the MSME digital ecosystem.

3. For E-commerce Platform Providers

   E-commerce platforms are expected to provide simpler, user-friendly, and more user-friendly features in accordance with the characteristics of local MSMEs. In addition, platform providers can also act as strategic partners by providing educational services, technical support, and consumer protection systems so that MSME actors are more confident in adopting and utilizing digital technology.

REFERENCE

Achmad, F., & Erwin, F. (2020). Home industry sebagai strategi pemberdayaan usaha mikro dalam meningkatkan financial revenues masyarakat. *Al Qalam: Jurnal Ilmiah Keagamaan dan Kemasyarakatan*, *14*(1).

Abdullah, & Gufronul, M. (2020). Gaya kepemimpinan kiai dalam membangun kemandirian ekonomi pesantren. *Jurnal Akuntansi dan Keuangan Islam*, *1*(2), 13–22.

Aldina, R. P., & Margunani. (2022). Pengaruh inovasi produk, tenaga kerja, dan pemasaran terhadap perkembangan UMKM kerajinan di Kecamatan Purwanegara Banjarnegara. *Business and Accounting Education Journal*, *3*(1), 83–91.

Arianty, R., Nasution, M., & Amalia, N. (2023). Analisis Pengaruh E-Commerce terhadap Peningkatan Kinerja UMKM (Studi Kasus pada UMKM di Kota Makassar). *Jurnal Sains Manajemen Nitro*, *1*(2), 174–181. https://doi.org/10.56858/jsmn.v1i2.99

Ariansyah, K., Kasmad, K., & others. (2021). *Drivers of and barriers to e-commerce adoption in Indonesia: Individuals' perspectives and the implications. Telecommunications Policy, 45*(8), 102219. https://doi.org/10.1016/j.telpol.2021.102219

Anastasya, G. P., & Riska, F. A. (2024). Pengaruh keterampilan kewirausahaan perempuan terhadap peningkatan pendapatan di Kabupaten Jember. *JUSBIT: Jurnal Strategi Bisnis Teknologi*, *1*(3), 23–32.

Auliandari, T., Suriyanti, L. H., & Azmi, Z. (2022). Determinan Adopsi E-Commerce dan Pengaruhnya Terhadap Kinerja UMKM (Studi Kasus Pada UMKM Fashion di Pekanbaru). *Accounting Journal*, *4*(2), 169–188.

Badan Pusat Statistik. (2023). *Data Statistik UMKM Indonesia*. Badan Pusat Statistik.

Chwelos, P., Benbasat, I., & Dexter, A. S. (2001). Research Report: Empirical Test of an EDI Adoption Model. *Information Systems Research*, *12*(3), 304–321.

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). SAGE Publications.

Effendi, A. P., & Subroto, B. (2021). Analysis of E-Commerce Adoption Factors by Micro, Small, and Medium Enterprise, and Its

Effect on Operating Revenue. *Jurnal Reviu Akuntansi dan Keuangan*, *11*(2), 250–265.

Ghozali, I. (2016). *Structural Equation Modeling: Metode Alternatif dengan Partial Least Square (PLS)*. Universitas Diponegoro.

Ghozali, I. (2017). *Model Persamaan Struktural: Konsep dan Aplikasi dengan Program AMOS 24* (7th ed.). Badan Penerbit Universitas Diponegoro.

Ghozali, I., & Latan, H. (2015). *Partial Least Squares: Konsep, Teknik, dan Aplikasi Menggunakan Program SmartPLS 3.0* (2nd ed.). Badan Penerbit Universitas Diponegoro.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2019). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (2nd ed.). SAGE Publications.

Ifinedo, P. (2011). Internet/e-business technologies acceptance in Canada's SMEs: An exploratory investigation. *Internet Research*, *21*(3), 255–281.

Itha, I., Mursidah, M., & Rahayuningsih, Y. (2022). Analisis Hubungan E-Commerce terhadap UMKM di Indonesia. *JDEP (Jurnal Dinamika Ekonomi Pembangunan)*, *5*(2), 95–105. https://doi.org/10.33005/jdep.v5i2.401

Kaushik, M. K., & Agrawal, D. (2021). *Influence of technology readiness in adoption of e-learning. International Journal of Educational Management, 35*(2), 483–495. https://doi.org/10.1108/IJEM-04-2020-0176

Mashuda, A., & Laily, N. (2021). Entrepreneurial skills and entrepreneurial attitude mahasiswa akuntansi. *Jurnal Pendidikan Ekonomi (JUPE)*, *9*(2), 72–76.

Munoz, F., Holsapple, C. W., & Sasidharan, S. (2023). *E-commerce.* In S. Y. Nof (Ed.), *Springer handbook of automation* (pp. 1411–1430). Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-030-89000-3_56

Nurlinda, N., & Fathimah, V. (2019). Determinan Adopsi E-Commerce dan Dampaknya Pada Kinerja Usaha Mikro Kecil Menengah (UMKM). *Jurnal Riset Akuntansi dan Keuangan*, *7*(3), 445–464.

Nugroho, R. (2020). Inovasi produk sebagai mediasi antara kompetensi kewirausahaan dan kinerja UMKM. *Jurnal Manajemen dan Kewirausahaan*, *22*(3), 145–156.

Oliveira, T., & Martins, M. F. (2010a). Firms Patterns of E-Business Adoption: Evidence for the European Union-27. *The Electronic Journal Information Systems Evaluation*, *13*(1), 47–56.

Oliveira, T., & Martins, M. F. (2010b). Understanding e-business adoption across industries in European countries. *Industrial Management & Data Systems*, *110*(9), 1337–1354.

Parasuraman, A. (2000). Technology Readiness Index (TRI): A multiple-item scale to measure readiness to embrace new technologies. *Journal of Service Research*, *2*(4), 307–320. https://doi.org/10.1177/109467050024001

Rahayu, R., & Day, J. (2015). Determinant factors of e-commerce adoption by SMEs in developing country: Evidence from Indonesia. *Procedia - Social and Behavioral Sciences*, *195*, 142–150.

Rusdianti, R., Hartati, H., & Yuliana, N. (2019). Dampak motivasi kewirausahaan sosial terhadap pemberdayaan perempuan dan pengentasan kemiskinan. *JUSS (Jurnal Sosial Soedirman)*, *3*(2), 16–31.

Sabiti, T. N., Jayanti, E., & Sugiharto, I. S. (2024). Determinanan Adopsi E-Commerce dan Pengaruhnya terhadap Kinerja UMKM di Cilacap. *Kajian Bisnis Sekolah Tinggi Ilmu Ekonomi Widya Wiwaha*, *25*(1), 1–10.

Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.

Supriadi, S., & Choncho, Y. (2024). Entrepreneurial skills, innovation, and competitive advantage of women SMEs. *International Journal of Entrepreneurship and Small Business*, *48*(1), 77–92.

Tjiptono, F. (2017). *Strategi Pemasaran* (4th ed.). Andi Offset.

Turban, E., King, D., Lee, J., Liang, T.-P., & Turban, D. (2006). *Electronic Commerce: A Managerial Perspective*. Pearson Prentice Hall.

Vermaat, M. E., Shelly, G. B., & Cashman, T. J. (2007). *Microsoft Office 2007: Introductory Concepts and Techniques*. Course Technology.

Wiwik, W., Dharmawati, M., & Candra, E. (2021). *Metodologi Penelitian*. Yayasan Kita Menulis.

Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry. *Information Systems Research*, *16*(1), 61–84.