Analysis Adoption e-Commerce SMEs Using Innovation Diffusion Theory Framework (Case Report: Karawang District)

Lila Setiyani(✉), Dikky Andreansyah, Rahmat Gunawan, Arif Maulana Yusuf, and Dudi Awalludin

Sekolah Tinggi Manajemen Informasi Dan Komputer (STMIK) Rosma, Karawang, Indonesia
lila.setiyani@dosen.rosma.ac.id

Abstract. Karawang Regency is one of the regencies in West Java Province with many MSMEs and has much potential to improve the regional economy by increasing MSME productivity. Seeing the rapid growth of MSMEs, it is interesting for researchers to measure the level of e-commerce adoption, especially in Karawang Regency. Therefore, this study aims to conduct a study related to the adoption of e-commerce by business actors, especially MSMEs in the Karawang Regency. The sampling technique used in this research is snowball, with the number of respondents as many as 100 SMEs. This study uses the Innovation Diffusion Theory framework, and this framework identifies seven aspects, namely relative advantage, ease of use, image, visibility, compatibility, demonstrability results, voluntary use of an organization or, in this case, business actors (MSMEs) in implementing, adopting and using technological innovation. Based on the analysis results, only two variables have a significant effect on e-commerce adoption, namely the Complexity and triability variables, because they have a t-statistic value > 1.96 with a p-value < 0.05. Meanwhile, the other three variables, namely relative adaptability, compatibility, and observability, have no significant effect on e-commerce adoption because they have a t-statistic value < 1.96 with a p-value > 0.05.

Keywords: Adoption of E-commerce · MSMEs · Innovation Diffusion Theory

1 Introduction

MSMEs (Micro, Small, and Medium Enterprises) have an extremely important contribution to economic growth and the country's development. Based on data from the Ministry of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia, from 2017 to 2018, there were 26,043 small business units and 2,075 medium business units [1]. The rapid development of SMEs is certainly inseparable from the efforts involving technology adoption. Several studies reveal that businesses such as the use of e-commerce [2–5], digital marketing training [6, 7], and the use of digital marketing can increase the productivity of MSMEs [8].

E. H. Saragih et al. (Eds.): APMRC 2022, AEBMR 221, pp. 477–487, 2023.
https://doi.org/10.2991/978-94-6463-076-3_37

The results of Purwantini and Anisa's [9] research report show that social commerce positively impacts the performance of customer service, sales, marketing, and internal operations [9]. In line with this, Mumtahana et al. [10] revealed that e-commerce could encourage an increase in the income of SMEs and MSMEs (Micro, Small and Medium Enterprises) by utilizing it as a marketing strategy [10]. This is also reinforced by Helmalia and Afrinawati (2018) research, which states that e-commerce has proven to significantly affect MSME income [11].

E-commerce is a commercial activity on the internet utilizing digital technology [12]. Electronic commerce (e-commerce) occurs indirectly between customers and merchants through online platforms. An important difference between traditional commerce and e-commerce is that the transaction processes between sellers and buyers are separated and facilitated by software that enables the virtual display of goods, shopping carts, and secure payment systems and delivery channels. E-commerce customers can be accessed via the internet. By eliminating the physical interaction component of traditional commerce, e-commerce also allows manufacturers to act as merchants directly connected to customers without retailers acting as intermediaries [13].

Karawang, a district in the province of West Java, has many potentials to improve the regional economy by increasing SMEs and SMEs' productivity. In March 2016, the digital media Merdeka.Com reported that according to the Head of the Karawang Cooperatives and MSMEs Agency, Asep Junaedi, there were at least 38,904 MSMEs [14]. Meanwhile, in November 2020, digital media Tempo.co reported that 87,574 MSMEs in Karawang were registered to receive capital assistance [15]. Many factors have influenced the rapid growth of MSMEs in the last five years. Based on the research results revealed previously, e-commerce has a role in increasing the productivity of SMEs and SMEs. This attracts researchers to conduct related studies, so this study aims to analyze the adoption of e-commerce by business actors, especially SMEs in the Karawang Regency.

To measure the adoption of technology, many theories can be used, including the Technology Acceptance Model (TAM) [16, 17], Theory of Planned Behavior (TPB) [18, 19], unified theory of acceptance and use of technology (UTAUT), Innovation Diffusion Theory (Rogers 1995) [20], TOE framework [21]. In this study, researchers used the Innovation Diffusion Theory framework because this framework identifies seven aspects, namely relative advantage, ease of use, image, visibility, compatibility, result demonstrability, the voluntariness of use of an organization or, in this case, business actors (MSMEs) in implementing, adopt and use technological innovations. Using the Innovation Diffusion Theory framework, aspects that can be improved can be identified to encourage the productivity of business actors (MSMEs). Information on aspects or factors that drive the productivity of business actors (SMEs) in Karawang Regency in adopting e-commerce can be used as evaluation material as well as material in formulating strategies to increase MSME productivity by the Karawang Regency Government, especially the Karawang Cooperatives and MSMEs Service, and Information on aspects or factors that drive the productivity of business actors (SMEs) in Karawang Regency in adopting e-commerce can be used as an evaluation material and become material in formulating strategies to increase MSME productivity by the Karawang Regency Government, especially the Karawang Cooperatives and MSMEs Service.

2 Research Methods

In this study, researchers used the Innovation Diffusion Theory framework approach because this framework identifies seven aspects, namely relative advantage, ease of use, image, visibility, compatibility, result demonstrability, the voluntariness of use of an organization or, in this case, business actors (MSMEs) in implement, adopt and use technological innovations. The population is a set of observation units in research [22]. The population of this research is all SME business actors in the Karawang district. The sample of this research is SME business actors in Karawang Regency. The sampling technique uses the snowball technique, which takes several cases through the relationship of one person to another or one case to another, then looks for further relationships through the same process, and so on [23]. This technique was chosen because it is difficult to get the total population, namely the number of active SME business actors in the Karawang district. The number of samples is not determined directly but is limited by the time of the study and the affordability of research costs. The data analysis technique used to test the hypothesis in this study uses quantitative analysis. Quantitative research is usually analyzed using Partial Least Square (PLS) analysis tools. Partial Least Square, commonly abbreviated as PLS, is a reliable analytical method because it can be applied to any data scale, does not require many assumptions, and does not need a large sample size. The model of this research is as follows (Fig. 1).

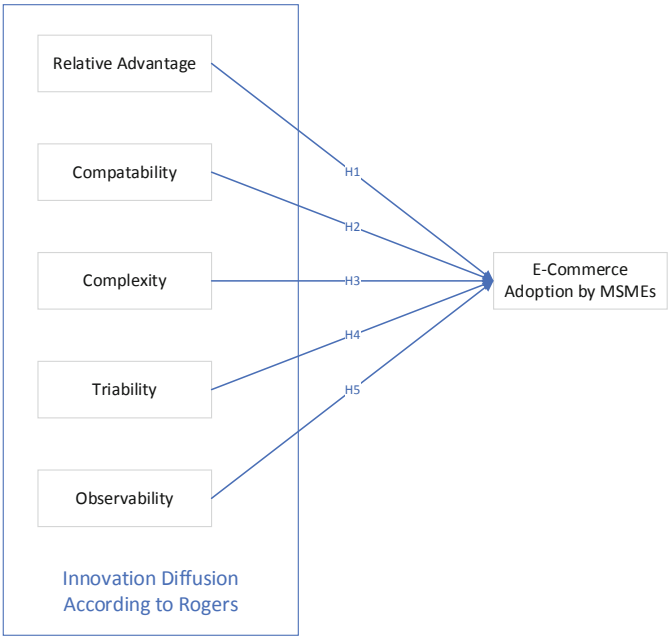

Fig. 1. Research Model. Source: Data processed, 2022

Based on the research model above, the hypothesis in this study is as follows.

a. H1: Relative advantage is suspected of having a significant effect on e-commerce adoption.
b. H2: Compatibility is suspected of having a significant effect on e-commerce adoption.
c. H3: Complexity is suspected of having a significant effect on e-commerce adoption.
d. H4: Triability is suspected of having a significant effect on e-commerce adoption.
e. H5: Observability is suspected of having a significant effect on e-commerce adoption.

3 Results and Discussions

3.1 Characteristics of Respondents

The general description of the respondents was obtained from personal data contained in the questionnaire in the respondent's characteristics section, which included length of business, number of employees, and type of business. A general description of respondents can be seen in Table 1.

Table 1. Characteristics of Respondents

Characteristics	Number	Percentage
Business Length		
<5 years	54	54%
5–10 years	18	18%
>10 years	28	28%
Total	100	100%
Number of employees		
<5 employees	71	71%
6–20 employees	25	25%
>20 employees	4	4%
Total	100	100%
Type of business		
Agribusiness	5	5%
Fashion	39	39%
Service	3	3%
Culinary	50	50%
Other	3	3%
Total	100	100%

Source: Data processed, 2022.

3.2 Evaluation of the Measurement Model (Outer Model)

3.2.1 Validity Test

Chin (2013) in [24] states that the convergent validity of the measurement model can be seen from the correlation between the indicator scores and the variable scores. The indicator is considered valid if it has an AVE value above 0.5 or shows all outer loading dimensions of the variable having a loading value > 0.7, so it can be concluded that the measurement meets the criteria for convergent validity.

In Table 2, it is known that all question items for each variable have met the requirements of the convergent validity test because they have a loading value of 0.7 and the

Table 2. Loading and AVE Value

Indicator	Code	Statement	Loading	AVE
Relative Advantage (RA)	RA1	The use of e-commerce increases time efficiency in customer service at my SME or the SME where I work	0.819	0.785
	RA2	The use of e-commerce increases operational cost efficiency in my SMEs or the SMEs where I work	0.924	
	RA3	The use of e-commerce increases the efficiency of human resources in my SMEs or the SMEs where I work	0.911	
Compatability (CT)	CT1	Consistent e-commerce provides a profitable value for my SME or the SME I work for	0.944	0.84
	CT2	The innovations found in e-commerce have significantly increased the profits of my SME or the SME I work for	0.888	
Complexity (CX)	CX1	Understanding the e-commerce used by my SME or the SME I work for is very easy	-	1
	CX2	It is very easy to learn about the e-commerce used by my SME or the SME I work for	1	
Triability (TR)	TR1	Learning manual procedures makes it easy to use e-commerce.	0.866	0.8
	TR2	Through trials, the meaning of using e-commerce in MSMEs is becoming clearer	0.922	
Observability (OB)	OB1	The transaction process becomes more systematic.	0.929	0.886
	OB2	Increase customer motivation in making transactions on my business	0.954	
E-Commerce Adoption (EA)	EA1	My SME, or the SME where I work, uses e-commerce to manage their business	0.91	0.812
	EA2	My SME, or the SME I work for, has fully implemented e-commerce	0.892	

Source: Data processed, 2022.

AVE value for each variable has a value above 0.5. Thus, all indicators in the variables in this study can be declared valid.

From Table 3, it can be concluded that the correlation value for each variable with the variable itself has a greater value than the correlation with other variables. Thus, all variables in this study were declared valid and had met the discriminant validity test. In addition to comparing the AVE roots, discriminant validity tests can also be seen from the cross-loading value between indicators and their variables. From Table 4, the correlation of items has a higher value than the correlation of these items to other items.

The Table 4 shows that the correlation of items has a higher value than the correlation of these items to other items.

Table 3. Correlation Between Variables

	EA	CT	CX	OB	RA	TR
EA	**0.901**					
CT	0.592	**0.917**				
CX	0.615	0.902	**1**			
OB	0.263	0.614	0.551	**0.941**		
RA	0.537	0.789	0.689	0.67	**0.886**	
TR	0.717	0.374	0.34	0.214	0.528	**0.894**

Source: Data processed, 2022.

Table 4. Cross Loading Value

	EA	CT	CX	OB	RA	TR
EA1	**0.91**	0.456	0.518	0.165	0.353	0.695
EA2	**0.892**	0.618	0.594	0.316	0.626	0.594
CT1	0.617	**0.944**	0.883	0.621	0.712	0.386
CT2	0.444	**0.888**	0.757	0.488	0.745	0.288
CX2	0.615	0.902	**1**	0.551	0.689	0.34
OB1	0.219	0.604	0.565	**0.929**	0.707	0.269
OB2	0.272	0.558	0.482	**0.954**	0.571	0.147
RA1	0.241	0.657	0.55	0.535	**0.819**	0.213
RA2	0.625	0.65	0.563	0.554	**0.924**	0.617
RA3	0.408	0.833	0.748	0.718	**0.911**	0.413
TR1	0.554	0.372	0.324	0.269	0.529	**0.866**
TR2	0.713	0.308	0.291	0.132	0.431	**0.922**

Source: Data processed, 2022.

Table 5. Composite Reliability

Indicator	Composite Reliability
E-Commerce Adoption (EA)	0.896
Compatability (CT)	0.913
Complexity (CX)	1
Observability (OB)	0.94
Relative Advantage (RA)	0.916
Triability (TR)	0.889

Source: Data processed, 2022

Table 6. R-Square

	R Square	R Square Adjusted
EA	0.686	0.669

Source: Data processed, 2022.

3.2.2 Reliability Test

The reliability test is the extent to which measurement results using the same object will produce the same data [25]. The reliability test of the questionnaire in this study used the split-half method. The items were divided into the odd item group and the even item group. Then each group's scores for each item are added up to produce a total score. If the correlation is 0.7, it is said that the item provides a sufficient level of reliability.

On the contrary, if the correlation value is below 0.7, it is said that the item is less reliable. From the results of the SmartPLS output in Table 5, the composite reliability value for all constructs is above the value of 0.70. All constructs have good reliability, following the minimum required value limit with the resulting value.

3.3 Evaluation of the Structural Model (Inner Model)

In assessing the structural model with PLS, we start by looking at the R-Squares value for each endogenous latent variable as the predictive power of the structural model. The interpretation is the same as in OLS (Ordinary Least Square) regression. Changes in the value of R-Squares can be used to explain the effect of certain exogenous latent variables on endogenous latent variables and whether they have a substantive effect. R-Squares values of 0.75, 0.50, and 0.25 can be concluded that the model is strong, moderate, and weak. R-square is used to see the relationship between variables, a goodness-fit test model [26].

In Table 6, it shows that the e-commerce adoption variable (EA) has an R-square value of 0.686 which means that all indicators in the Innovation Diffusion Theory affect the e-commerce adoption variable by 68.6%. Other indicators influence the remaining 31.4%.

Table 7. T-Statistics

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
CT → EA	0.149	0.096	0.189	0.791	0.429
CX → EA	0.41	0.448	0.16	**2.558**	**0.011**
OB → EA	−0.111	−0.128	0.159	0.7	0.484
RA → EA	−0.107	−0.086	0.158	0.677	0.499
TR → EA	0.602	0.601	0.103	**5.823**	**0**

Source: Data processed, 2022.

3.4 Hypothesis Testing

Hypothesis testing can use path coefficients and T-Statistics. If the path coefficient is positive, the independent variable has a positive effect. If the T-statistics value is greater than 1.96, this indicates that between variables has a significant influence so that the hypothesis can be accepted. On the contrary, if the T-statistics is less than 1.96, it shows that the two variables do not have a significant effect, so the hypothesis is rejected (Table 7).

H1. Relative advantage is suspected of having a significant effect on e-commerce adoption.

The first hypothesis tests whether Relative advantage has a positive effect on e-commerce adoption. The test results show that the beta coefficient of relative advantage anxiety to e-commerce adoption is −0.107, and the t-statistic is 0.667. From these results, it is stated that the t-statistic is not significant. The first hypothesis is rejected because <1.96 with a p-value < 0.05. This proves that Relative advantage is not proven to influence e-commerce adoption positively.

H2. Compatibility is suspected of having a significant effect on e-commerce adoption.

The second hypothesis examines whether Compatibility has a positive effect on e-commerce adoption. The test results show that the beta compatibility coefficient on e-commerce adoption is 0.149, and the t-statistic is 0.791. From these results, it is stated that the t-statistic is not significant. The second hypothesis is rejected because <1.96 with a p-value < 0.05. This proves that Compatibility is not proven to influence e-commerce adoption positively.

H3. Complexity is suspected of having a significant effect on e-commerce adoption.

The third hypothesis examines whether Complexity positively influences e-commerce adoption. The test results show that the beta Complexity coefficient on e-commerce adoption is 0.410, and the t-statistic is 2.558. From these results, it is stated that the t-statistic is significant. Because >1.96 with a p-value < 0.05, the third hypothesis is accepted. In conclusion, this proves that Complexity is proven to influence e-commerce adoption positively.

H4. Triability is suspected of having a significant effect on e-commerce adoption.

The fourth hypothesis examines whether Triability has a positive effect on e-commerce adoption. The test results show that the beta Triability coefficient on e-commerce adoption is 0.602, and the t-statistic is 5.823. From these results, it is stated that the t-statistic is significant. Because >1.96 with a p-value < 0.05, the fourth hypothesis is accepted. This proves that Triability is proven to have a positive influence on e-commerce adoption.

H5. Observability is suspected of having a significant effect on e-commerce adoption.

The fifth hypothesis tests whether observability has a positive effect on e-commerce adoption. The test results show that the beta coefficient of Observability anxiety on e-commerce adoption is -0.111, and the t-statistic is 0.700. From these results, it is stated that the t-statistic is not significant. The fifth hypothesis is rejected because <1.96 with a p-value < 0.05. This proves that observability is not proven to influence e-commerce adoption positively.

4 Conclusion

This study identifies the factors that support or influence the adoption of e-commerce by SMEs in the Karawang Regency using the Innovation Diffusion Theory framework. Based on the analysis results, it shows that the factors that significantly affect the adoption of e-commerce in MSMEs are the complexity and triability variables because they have a t-statistic value > 1.96 with a p-value < 0.05. The results of this study are expected to be useful for the Karawang Regency Government as an evaluation material by the results of the analysis that has been carried out regarding the factors that support or influence the adoption of e-commerce by SMEs in Karawang Regency to increase productivity.

Acknowledgments. We take this opportunity to thank you for your efforts and expertise as a reviewer. Your help allows us to meet scheduled times and maintain peer-reviewed journal standards. Thanks also to STMIK Rosma Karawang, who has facilitated and provided support to the authors in preparing this journal.

References

1. Depkop. (2018). Perkembangan Data Usaha Mikro, Kecil , Menengah Dan Usaha Besar.
2. Jauhari, J. (2010). Upaya Pengembangan Usaha Kecil Dan Menengah (Ukm) Dengan Memanfaatkan E-Commerce. *Jurnal Sistem Informasi, 2*(1), 159–168. https://doi.org/10.36706/jsi.v2i1.718
3. Magdalena, H. (2017). Strategi Memanfaatkan E-Commerce Dalam Memasarkan Makanan Khas Bangka (Studi Kasus: Aneka Citra Snack) The Strategy of Exploiting E-Commerce in The Marketing Of Bangka Peculiar Food (Case Study: Aneka Citra Snack). *Cogito Smart, 3*(2), 286–298.
4. Hakim, M. M., & Nurkamid, M. (2017). Model Adopsi Ukm Di Kudus Terhadap E-Commerce. *Simetris Jurnal Teknik Mesin Elektro dan Ilmu Komputer, 8*(1), 339–344. https://doi.org/10.24176/simet.v8i1.974.
5. Darnis, F., & Azdy, R. A. (2019). Pemanfaatan Media Informasi Website Promosi (e-Commerce) sebagai Upaya Peningkatan Pendapatan UMKM Desa Pedado. *Sindimas, 29*(1), 275–278.
6. Veranita, M., Syahidin, Y., & Gunardi, G. (2018). Mengembangkan Ukm Melalui Pelatihan Internet Marketing Di Kecamatan Lengkong Kota Bandung. *Jurnal Keuangan Umum dan Akuntansi Terapan (KUAT), 1*(1), 41–48. https://doi.org/10.31092/kuat.v1i1.461
7. Rachman, A. N., & Ramdani, C. M. S. (2016). IbM Pelatihan Pemanfaatan E-Commerce Sebagai Media Pemasaran Global Untuk Peningkatan Penjualan Produk Kelom Geulis (Studi Kasus: UKM kelom geulis Tamansari Tasikmalaya). *Jurnal Pengabdian Siliwangi, 2*(1), 64–68.
8. Wardhana, A. (2015). Strategi Digital Marketing dan Implikasinya Pada Keunggulan Bersaing UMK di Indonesia. In *Seminar Nasional Keuangan dan Bisnis IV*, April 2015 (pp. 327–337).
9. Purwantini, A. H., & Anisa, F. (2018). Analisis Pemanfaatan Social Commerce bagi UMKM: Anteseden dan Konsekuen. *Kompartemen Jurnal Ilmiah Akuntansi, 16*(1), 47–63. https://doi.org/10.30595/kompartemen.v16i1.2413
10. Mumtahana, S., Atun, H, Nita, & Tito, A. W. (2017). khazanah informatika Pemanfaatan Web E-Commerce untuk Meningkatkan Strategi Pemasaran. *Pemanfaatan Web E-Commerce untuk Meningkatkan Strategi Pemasaran, 3*(1), 6–15.
11. Helmalia, & Afrinawati. (2018). Pengaruh E-Commerce Terhadap Peningkatan Pendapatan Usaha Mikro Kecil Dan Menengah Di Kota Padang. *JEBI (Jurnal Ekonomi dan Bisnis Islam), 3*(2), 237. https://doi.org/10.15548/jebi.v3i2.182
12. Morris, G. D., McKay, S., & Oates, A. (2009). Chapter 9 - E-commerce. In *Finance director's handbook* (5th ed., pp. 403–417). https://doi.org/10.1016/B978-0-7506-8701-0.00009-6
13. Jaag, C., & Bach, C. (2010). *The effect of payment reversibility on e-commerce and postal quality*, no. 2010. Elsevier Inc.
14. Merdeka.com. (2016). B2B e-commerce makin cerah, UMKM jadi incaran.
15. Tempo.co. (2020). 87.574 UMKM di Karawang Terdaftar Menerima Bantuan Modal.
16. Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science, 35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982
17. Davis, F. D. (1985, January). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* (Ph. D. thesis, p. 291). Massachusetts Institute of Technology. Doi: oclc/56932490
18. Ajzen, I. (1985). Ajzen.From Intentions to Actions-TPB.1985.pdf.
19. Ajzen, I. (1991). The theory of planned behavior, 179–203. https://doi.org/10.1080/10410236.2018.1493416

20. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). Human acceptance of information technology. In *International encyclopedia of ergonomics and human factors* (2nd ed., Vol. 27, pp. 425–478). https://doi.org/10.1201/9780849375477.ch230.
21. Tornatzky, L. G., Eveland, J. D., Boylan, M. G., Hetzner, W. A., Johnson, E. C., Roitman, D., & Schneider, J. (1983). *The process of technological innovation: Reviewing the literature* (no. May, p. 264). National Science Foundation.
22. Nurdiani, N. (2014). Teknik Sampling Snowball dalam Penelitian Lapangan. *ComTech Computer, Mathematics, and Engineering Applications, 5*(2), 1110. https://doi.org/10.21512/comtech.v5i2.2427
23. Neuman, W. L. (2012). *Basics of social research: Qualitative and quantitative approaches* (no. July).
24. Aini, N., Nasri, R. (2018). Determinan Persepsi Nazhir Serta Implikasinya Terhadap Pengelolaan Wakaf Tunai (Badan Wakaf Indonesia). In *National Conferences Management and Business "Pemberdayaan dan Penguatan Daya Saing Bisnis Dalam Era Digital"* (pp. 561–586).
25. Sugiyono. (2012). *Memahami Penelitian Kualitatif*. Bandung: Alfabeta.
26. Anggraeni, M., & Pradhana, M. S. (2016). Kepuasan Kerja, Komitmen Organisasi Dan Turnover Intentiondi Pt. Hillconjaya Sakti, Cakung, Jakarta Timur. *Diponegoro Journal of Management, 5*(4), 1–29.