

# Analysis of Factors That Affect E-Commerce Technology Adoption MSMEs In Indonesia

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## Abstract

MSMEs (Micro, Small, and Medium Enterprises) play a significant role in Indonesia's economy. E-commerce has many advantages for MSMEs which includes competitive advantage, greater market share and better customer service, among others. Indonesian users are already proficient with e-commerce but unfortunately only 19% of Indonesian MSMEs have adopted e-commerce. This research investigates the variables that influence e-commerce technology adoption in Indonesian MSMEs using Technology Acceptance Model, Technology Organization Environment (TOE) framework and Diffusion of Innovation (DOI) Theory. A survey questionnaire was conducted to collect data from 260 MSME owners in the food and beverage industry who have or have not adopted e-commerce technology for their business. The result was calculated using logistic regression and Relative Importance Index (RII) to get which variables are relevant in e-commerce adoption in Indonesia MSMEs. From the research, it is revealed that relative advantage, perceived usefulness, security, employee's IT knowledge and government's support have a crucial influence in e-commerce adoption for MSME owners. An e-commerce adoption strategy was recommended based on the study's results. It is focused on the most significant factors of e-commerce adoption for MSMEs to increase the chances of adoption.

## Keywords

E-commerce adoption, MSMEs, Technology Adoption Models, Technology Organization Environment, Technology Acceptance Models

## 1. Introduction

The COVID-19 Pandemic shook the world completely when it started in 2020, including Indonesia. MSMEs (Micro, Small, and Medium Enterprises) are one of the sectors worst impacted by the Covid-19 outbreak, and they're bringing the country's economy down with them. The contribution of SMEs to Indonesia's national GDP is significant (Dachyar et al., 2018), according to data from the Ministry of Cooperatives and SME, the number of MSME players in Indonesia was 64.2 million in 2018, accounting for 99.99 percent of all business actors. Meanwhile, MSMEs provided 61.1 percent of the national economy (GDP), whereas major business players contributed 38.9% of the entire number of business actors, which amounted to just 5,550 or 0.01 percent of the total number of business actors (Badan Pusat Statistik, 2021).

The government targets the growth of the digital economy to increase eightfold by 2030. Last year, the digital economy accounted for 4 percent of gross domestic product. Meanwhile, the e-commerce sector is predicted to have a big role, which is Rp. 1,900 trillion, equivalent to 34 percent of the total digital economy. In addition, business to business is projected to contribute 13 percent or Rp. 763 trillion. It is concluded that the digital economic growth will grow 8 times from IDR 632 trillion to IDR 4,531 trillion (Indonesian Government, 2021). With such a wide market and digitally sophisticated consumers, it's no surprise that Indonesia's e-commerce sector has risen to become the region's largest, accounting for over half of the total market. During the COVID-19 epidemic, Indonesia was one of the region's leading adopters of electronic commerce and mobile electronic commerce: in October, about 78 percent of Indonesian internet users purchased items online using mobile devices, rising to 87 percent when this coverage is extended to any device (Deloitte, 2021). Within Indonesia's digital economy, MSMEs have become a hot topic of discussion. Given that MSMEs account for over 60% of Indonesia's GDP, making them active participants in the digital economy and embracing digital transformation to keep up with the times should be a priority.

### **1.1 Research Objective**

The goal of this study is to find out what factors influence Indonesian MSME actors' decisions to use e-commerce technology. Based on the result of the research, a strategy will be formulated to increase e-commerce adoption in Indonesian MSMEs.

## **2. Theoretical Review**

### **Micro Small Medium Enterprises in General**

MSMEs have long been recognized for their contributions to economic development and social well-being (Sun, 2021). They are known as key participants in producing domestic-led investment and stimulating economic expansion in most countries (Octora et al., 2021). They are important players in the global economy since they contribute considerably to GDP (Gross Domestic Product), which improves the level of living in society. It also employs more people in a variety of industries than larger corporations, resulting in poverty reduction. (Oba & Onuoha, 2013).

In average, SMEs account for 90% of all enterprises in advanced nations, which is why it is one of the most significant reasons for their economic development. (De Giorgi & Rahman, 2013). Meanwhile, the small medium enterprises sector is critical to meeting the Sustainable Development Goals (SDGs) in developing countries because it creates jobs, reduces poverty, promotes innovation and sustainable industrialization. (Littlewood & Holt, 2018)

### **E-commerce in General**

E-commerce, according to one author, encompasses the act of placing an order for goods or services until they are delivered to the consumer or customer, as well as the technology, business, society, and skills involved in buying and selling goods and services over the internet and through computers or mobile devices (Dan, 2014). Apart from buying and selling, many people use the Internet to compare costs and check what's new before making a purchase, whether online or in a shop. The terms "process" and "e-business" are frequently used interchangeably. It's a term that's widely used to describe how the Internet is changing how businesses work, connect with consumers and suppliers, and think about marketing and logistics. E-commerce is defined as doing business through the internet for the sake of this study. (Khan, 2016).

The use of telecommunication networks to disseminate commercial information, develop business relationships, and conduct business transactions is another definition of e-commerce (Vladimir, 1996). Another definition of E-commerce is that it serves as a facilitator in the digital transaction process, whether for online vendors or purchasers. Interactivity, enhanced product variety and information, and personalization are just a few of the benefits. (Dachyar et al., 2019).

### **E-commerce Adoption for MSMEs**

Electronic commerce's emergence has been critical in such a business change. In today's competitive company climate, e-commerce is one of the most important factors to success and development (Dahbi & Benmoussa, 2019). Because SMEs are so important to the nation's economy, convincing them to adopt e-commerce to gain a competitive edge is crucial. E-commerce is used by businesses for a variety of reasons. Some businesses think that e-commerce provides their customers more choices, fosters the development of new goods and services, and reduces expenses. Furthermore, some businesses use e-commerce to boost sales, save expenses, improve customer service, gather market data, boost efficiency, and find and keep new clients (Poorangi et al., 2013).

E-commerce, according to Poon and Swatman, may enhance SMEs' productivity, allowing them to compete with bigger firms. (Poon & Swatman, 1997). SMEs may use e-commerce to advertise and sell new items, increase client communications, and expand their marketing knowledge and data collecting at a minimal cost (Hunaiti et al., 2009). Furthermore, SMEs' use of e-commerce provides them with a unique opportunity to interact with international enterprises, something they couldn't accomplish before.

### **Technology Acceptance Model**

In the area of technology, the TAM (Technology Acceptance Model) is a widely used hypothesis. Davis created TAM in 1986 with the objective of forecasting and defining the elements that influence technology adoption by users. According to TAM, perceived usability and perceived ease of use are the two most important factors of consumption (Davis, 1989). The degree to which a person believes that employing a given technology will improve his or her performance is known as perceived usefulness (PU). PEOU, on the other hand, refers to a person's idea that utilizing a certain technology would enhance his bodily and mental health (Davis, 1989).

### **Diffusion of Innovation Theory**

When it comes to adopting new technology, the diffusion of innovation hypothesis is the most commonly utilized theory among scholars. Advantage, intricacy, compatibility, observability, and trialability are all considered features of innovation that can aid or impede development. According to the concept of innovation spread, adoption (Sila, 2013). Rogers' Diffusion of Innovation Theory (DOI), which was established in 1995 and is based on earlier research, is widely recognized as a supporting theory in technology adoption and diffusion. The definition from the DOI is as follows: (Rogers, 1995): adoption is a decision to employ innovation as a method of action, while diffusion is the process of an innovation being disseminated through time through many outlets. Humans consider innovation to be a novel idea, activity, or item.

### **Technology – Environment – Organization Framework**

The use of technological advancements is studied using the Technological Organizing Environmental (TOE) framework. They argue that environmental and organizational elements, as well as technological attributes, sway people's minds on whether or not to accept technological innovation. As a result, this framework envisions a three-fold framework for assuming and executing technological innovation: the technical, structural, and environmental contexts (Ahmed, 2020). Every organization that will adopt and implement technological innovations must go through a decision-making process that involves these three areas (Tornatzky & Klein, 1982).

### **Logistic Regression**

Logistic regression is one method for identifying the relationship between one or more continuous or categorical independent factors and a categorical dependent variable (Field, 2009). The purpose of logistic regression is to forecast the value of the dependent variable based on the independent variable's value, and it may also be used to define the relationship between the two variables (Park, 2013).

Other statistical approaches have disadvantages as compared to logistic regression. First, depending on numerous independent factors, this technique may be utilized to predict discrete outcomes. Second, regardless of whether the data are regularly or abnormally distributed, logistic regression is consistent in all instances and produces accurate findings. Although logistic regression and multiple linear regression are similar, logistic regression's dependent variable might be categorical, continuous, or mixed, whereas multiple regression's dependent variable is a metric or numerical value. (Field, 2009).

### **Relative Importance Index**

To determine the relative significance of items, the Relative Importance Index (RII) is utilized (Azman et al., 2019; Khaleel & Nassar, 2018). According to Egemen and Mohamed (2005), the RII is frequently and favorably utilized in research to determine respondents' opinions on scale-measured variables. The value of W, the respondent's weighting given to each factor, is equal to the points of the Likert scale employed. Equation 1 was used to generate the Relative Importance Index (RII).

$$RII = \frac{\sum W}{A \times N}$$

Where

W: the respondent's weighting of each component.

N: total number of replies

A: greatest weight in the study

## **3. Methods**

Logistic regression is the chosen method of this research due to the binary nature of the e-commerce adoption or not prediction model. This is also because logistic regression does not need the independent variables to be distributed in a regular manner, linearly distributed, or equal to variance, it is regarded more versatile and resilient than discriminant analysis. When there are less than three categories in the dependent variable, logistic regression is recommended; when there are more than three categories, discriminant analysis is chosen. Because the dependent variable, whether or not to adopt e-commerce, is binary, binary logistic regression was employed for this study.

This research was initiated by conducting literature review regarding e-commerce adoption factors on MSMEs. It is then followed by an expert interview from the government, e-commerce companies and MSME organizations discussing the possible factors for e-commerce adoption. It is centered on the food and beverage sector since the Ministry of Industry has designated it as one of the major industries for the industrial development plan through 2035.(Dachyar et al., 2018). Further validation of the factors was conducted to confirm which factors are possibly significant for e-commerce adoption. Then it was continued by a pilot testing with the questionnaire involving 30 respondents of MSME owners and the final questionnaire with 260 respondents from greater Jakarta Area.

#### 4. Data Collection

Data collected from this research are conducted in Indonesia from different session and data are received to support the entire research, in accordance with data gathering activities, with the detailed activities are shown in Table 1 as follows:

Table 1. Data Gathering Activities

Activities	Data Collection
Literature Review	Literature review of identified factors of e-commerce adoption in MSMEs to find the factors suitable to Indonesia.
Experts Validation	Validation review feedback from expert in e-commerce, SME organizations and the government regarding the validation of the questionnaire from 6 experts in e-commerce and MSMEs sector.
Pilot-Testing	Testing for validity and reliability of the questionnaire after being validated by expert by using geomean using a likert scale of 5 from 30 respondents.
Final Questionnaire	Final questionnaire from 260 respondents, an ordinal and even Likert scale from 1 to 5 for each indicator.

#### 5. Result and Discussion

After completing the data gathering activities and processing the data through SPSS software, this paper concluded the results to be analyzed and to formulated the alternative solutions to solve which factors are significant in e-commerce technology adoption for MSMEs. This conceptual model used in this research is from the validated factors from literature review and expert interview, as illustrated in Figure 1. The model reveals various parameters that lead to e-commerce adoption for MSMEs using the TOE framework and the dependent variable of adopting or not adopting e-commerce.

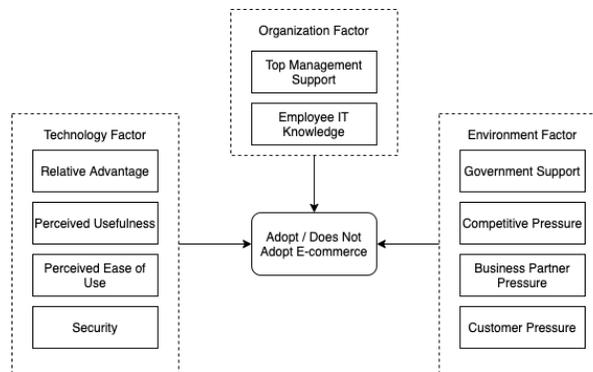


Figure 1. Research Model

This study used the logistic regression approach (logit model), which is the logarithm of the the likelihood of an event occurring against the likelihood of it not occurring. The first logistic regression model, which is impacted by relative advantage, perceived usefulness, perceived ease of use, security, top management support, staff IT expertise, government support, competitive pressure, business partner pressure, and consumer pressure, may be shown below:

$$\ln \left[ \frac{P_i}{1 - P_i} \right] = \beta_0 + \beta_1 \text{Relative Advantage} + \beta_2 \text{Perceived Usefulness} + \beta_3 \text{Perceived Ease of Use} \\ + \beta_4 \text{Security} + \beta_5 \text{Top Management Support} + \beta_6 \text{Employee's IT Knowledge} \\ + \beta_7 \text{Government Support} + \beta_8 \text{Competitive Pressure} + \beta_9 \text{Business Partner Pressure} \\ + \beta_{10} \text{Customer Pressure}$$

Where:

Ln = Natural logarithm

P = Probability of business owners choosing e-commerce adoption, where Y=0 if they do not adopt e-commerce and Y=1 if they adopt e-commerce

$\beta_0$  = constant

## 5.1 Numerical Results

### Model Significance Test

The omnibus test's significant value should be less than 0.5 at a 95% confidence level. The p-value of the omnibus test with 10 independent variables was shown in Table 2 which was 0,009 < 0,05, this indicates that it is significant. Aside from that, the SPSS Chi Square Model, which was 23,663, > the Chi Square table, which was 18,307.

Table 2. Model Significance Test

		df	Chi-square	Sig.
Step 1	Step	23.663	10	.009
	Block	23.663	10	.009
	Model	23.663	10	.009

The Cox & Snell R Square and Nagelkerke R Square values, in addition to the omnibus test, may be used to calculate the independent variable's capacity to explain the dependent variable, as seen below on Table 3.

Table 3. Pseudo R Square Logistic Regression

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	127.084 <sup>1</sup>	.357	.480

### Partial Test

The purpose of this study was to see how each factor affected the choice to use e-commerce, including relative advantage, perceived usefulness, perceived ease of use, security, top management support, employee IT knowledge, government support, competitive pressure, business partner pressure, and customer pressure. The partial testing was carried out using the SPSS 21 program and the Wald Test (W) and p-value (Sig.) as stated in Table 4. The following is the partial test hypothesis:

H0: The independent variable has no impact on the choice to use e-commerce by small businesses.

H1: The independent variable has a considerable impact on MSME's choice to use e-commerce.

<sup>1</sup> Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Table 4. Partial Test

	B	S.E	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Step 1								
Relative_Advantage	2.230	.836	6.544	1	0.11	8.836	1.676	44.396
Perceived_Usefulness	3.204	.696	12.265	1	0.02	18.201	.559	8.564
Perceived_Ease_Of_Use	-.317	.616	.265	1	.607	.728	.217	2.437
Security	-1.215	.608	3.999	1	.046	.297	.090	.976
Top_Management	.807	.670	1.451	1	.228	2.242	.603	8.342
Employee_IT_Knowledge	.820	.536	3.780	1	.037	1.607	.561	4.598
Government_Support	-1.450	.625	5.387	1	0.20	.235	.069	.798
Competitive_Pressure	.941	.549	2.942	1	.086	2.564	.874	7.518
Business_Partner_Pressure	.108	.413	.045	1	.833	1.114	.408	3.044
Customer_Pressure	.313	.395	.629	1	.428	1.368	.631	2.968
Constant	-2.928	2.375	1.520	1	.008	.054		

According to the table, the p-value of relative advantage is  $0.011 < 0,05$ , perceived usefulness is  $0,02 < 0,05$ , perceived ease of use is  $0,607 < 0,05$ , security is  $0,046 < 0,05$ , top management is  $0,228 < 0,05$ , employee's IT knowledge is  $0,037 < 0,05$ , government support is  $0,020 < 0,05$ , competitive pressure  $0,086 < 0,05$ , business partner pressure,  $0,833 > 0,05$ , customer pressure,  $0,48 > 0,05$ . It is apparent that relative advantage, perceived usefulness, security, employee's IT knowledge and government support all reject  $H_0$ , which means that they are significant factors in the decision of adopting e-commerce for MSMEs.

#### Goodness of Fit Test

With the data provided, the model appropriateness test was applied to evaluate the model. In contrast to the omnibus test, the Hosmer and Lemeshow test results are considered good if the significance value is more than 0.05, indicating that  $H_0$  is accepted. Acceptance of  $H_0$  shows that the logistic regression model can explain the data and that the model and the observed value are same. It can also show how to use the logistic regression equation to explain the relationship between independent and dependent variables. The results of the model fit test are shown in Table 5.

Table 5. Goodness of Fit Test (Hosmer and Lemeshow Test)

Step	Chi-square	df	Sig.
1	1.847	7	.968

Table 6 is a classification table that shows the amount of MSME actors who use e-commerce technology and those who do not. The logistic regression model utilized was quite good, according to the table, because it was able to properly predict 91.5% of the circumstances that happened. The number of persons who did not use e-commerce technology was 1, while the number of people who should not have adopted e-commerce technology but did were 21 according to the logistic regression model. The number of samples who accept e-commerce is 237, however the logistic regression model suggests that 1 people do not, despite the fact that the number of samples who do adopt e-commerce is 237.

Table 6. Prediction on E-commerce Adoption

	Observed		Predicted		
			Adoption		Percentage Correct
	Does not adopt E-commerce	Adopt E-commerce	Does not adopt E-commerce	Adopt E-commerce	
Step 1	Adoption	Does not adopt E-commerce	1	21	4.5
		Adopt E-commerce	1	237	99.6
Overall Percentage					91.5

### Relative Importance Index

The questionnaire used a 5-likert scale and therefore 5 is the highest weight in the research. Then, the total number of responses was 260 people. After calculation, Table 7 is obtained with a ranking from 1 to 5. According to (Egemen & Mohamed, 2005) the RII is frequently and favorably utilized in research to determine respondents' opinions on scale-measured variables.

Understanding the importance of the ranking of the major elements is crucial in determining which factors should be the focus of the e-commerce adoption strategy. The highest ranking goes to Employee's IT Knowledge with the RII score of 0.9569, followed by a close second which is security with the RII score of 0.9500 and the lowest score goes to government support with RII score of 0.9023.

Table 7. Relative Importance Index

Summary		
Rank	Factor	RII
1	Employee's IT Knowledge	0.9569
2	Security	0.9500
3	Perceived Usefulness	0.9492
4	Relative Advantage	0.9408
5	Government Support	0.9023

### 5.2 Result Analysis

Upon the completion of the statistical calculation output of logistic regression through SPSS 21 software and from 260 respondents, it was discovered that the formulation of logistic regression to predict e-commerce adoption in Indonesian MSME is as follows:

$$\ln \left[ \frac{P_i}{1 - P_i} \right] = -2.928 + 2.230 \text{ Relative Advantage} + 3.024 \text{ Perceived Usefulness} - 1.215 \text{ Security} \\ + 0.820 \text{ Employee's IT Knowledge} + -1.450 \text{ Government Support}$$

According to the criteria listed in Table 4, "Perceived Usefulness" is the highest significant variable in MSMEs' e-commerce adoption, alongside another variable with the greatest Exp(B) or odds ratio, the "Relative Advantage" factor. Based on the result of Relative Importance Index in Table 7, the highest priority is "Employee's IT Knowledge" which has the highest RII score. This result represents each variable's contribution to e-commerce adoption for MSMEs in Indonesia. Furthermore, based on this result, the author of this study constructs the strategy formulation to achieve the goal of e-commerce adoption in Indonesian MSMEs, in accordance with logistic regression and Relative Importance Analysis results as a quantitative basis to rank the order of priority as a proposed recommendation for associated stakeholders.

### 5.3 Proposed Recommendations

Given the importance of SMEs in Indonesia's economy, making things simpler for them to be more competitive and productive in today's market is vital. Based on the results of logistic regression and the relative relevance index, a plan was developed to enhance e-commerce adoption among Indonesian MSMEs. The strategy's focus is on relative advantage and staff IT competence. E-commerce training is a viable alternative for Indonesian MSMEs, based on the conclusions of this research. Electronic commerce training and awareness programs that can be conducted both formally and informally to educate the general public and business owners in order for them to compete in an online economy (Al-Tayyar et al., 2021). The output of the proposed e-commerce adoption strategy for Indonesian MSMEs in food and beverage industry can be seen on Figure 2. It is then followed by the group of technology factors which are security, perceived usefulness and relative advantage as the training material. Lastly, government support is an environmental factor that will support the training program.

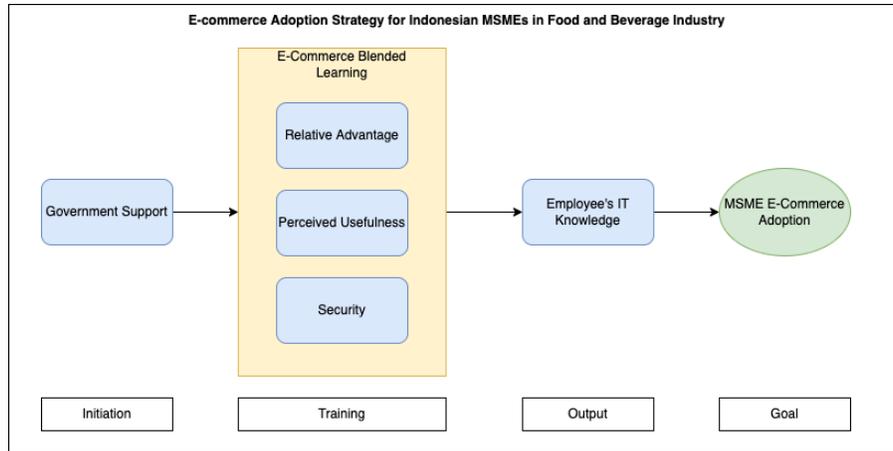


Figure 2. Blended Training Strategy

Blended learning for e-commerce training was advised in a prior study done in Sweden to boost the likelihood of adoption. According to the findings, blended learning can help SME owner-managers get a better understanding of and expertise in using online technologies to grow their businesses. The "Selling Web" project's training curriculum is built on three main design elements: Support is accessible via Skype, face-to-face meetings, as well as a platform for online learning. A team is needed to supervise and anchor the participating SMEs' project operations in acknowledged best practices, as well as give strategic viewpoints (Kuttainen & Lexhagen, 2011). Since the blended method has a lot of benefits, it should be implemented in the MSME e-commerce training. The training will be accessible both offline and online for all MSME owners and employees in Indonesia.

The design of the program should highlight the technology factors of e-commerce which are relative advantage, perceived usefulness and security as it was proven to be significant determinants in e-commerce adoption. Since perceived usefulness has the highest likelihood of adoption, it will have the highest portion of the curriculum, followed by relative advantage and security.

The expected output of e-commerce training for MSMEs is higher proficiency in e-commerce technology. Participants should be able to clearly recognize progress after completing the blended training project, Regardless of their e-commerce fundamental skills and understanding. They should be able to use the technology on a daily basis and extract information for their company plan.

## 6. Conclusion

MSMEs are an important and major part of Indonesia's economy. In this research 10 variables were determined as e-commerce adoption factors for MSMEs from literature review and experts. Then, 5 variables are found to be statistically significant: relative advantage, perceived usefulness, security, employee's IT knowledge, and government support. From the 5 significant factors, relative importance index was conducted and employee IT knowledge was discovered to be the most important element in e-commerce adoption for MSMEs in Indonesia. A strategy was formulated based on the findings of the study called "E-commerce Blended Training" to achieve e-commerce adoption in MSMEs.

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