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E-commerce Adoption by Indonesian SMEs

Yen Yen Maryeni, Rajesri Govindaraju, Budhi Prihartono, Iman Sudirman

Institute of Technology, Industrial Engineering Department, Faculty of Industrial Technology, Jalan Ganesha 10, Bandung, Indonesia 40132,

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ABSTRACT

Background E-commerce adoption by small and medium enterprises (SMEs) has become a crucial topic in many studies because the potential benefits of e-commerce. In several developing such as Malaysia, Thailand, Iran, Brunei, research on e-commerce adoption by SMEs has been done. Unfortunately, studies carried out on this subject in Indonesian SMEs are still very few. **Objective:** The aim of our study is to identify factors influencing adoption of e-commerce by West Java SMEs (Indonesia). **Results:** We adopt the Technology, Organization, Environment framework (TOE) as a basis for the development of the model and combine it with other models that are considered relevant. There are two groups of factors included in the model of this study namely technological factors and organizational factors. The variables in each group were identified based on literature study and the result of a preliminary investigation in four SMEs in West Java. The technological factors include: compatibility, observability, complexity, infrastructure, IT planning and security. The organizational factors include: users IT skill, owner/manager IT knowledge, funding capacity, management support, the required effort and turnover. **Conclusion:** E-commerce adoption by SMEs in West Java, Indonesia is influenced by four factors, namely: complexity, IT planning, users IT skill, and management support.

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INTRODUCTION

The number of small and medium enterprises (SMEs) in Asian countries, including Indonesia, have grown significantly over the last twenty years. Indonesian SMEs have shown their dynamic capability during the recent financial crisis. The important roles of Indonesian SMEs are among others: to absorb employment, to support poverty reduction and to facilitate the increase of income from exports (DEPKOP, 2010).

Due to the globalization of the world economy, SMEs need to be able to compete in the global marketplace. One way to increase their competitiveness is through the adoption of ICT (Information and Communication Technologies) including e-commerce adoption.

Previous studies have been executed to identify the e-commerce adoption barriers and drivers of a successful e-commerce implementation in SMEs (Chong, 2008; Kapurubandara and Lawson, 2008; Kurnia, 2009; Mendo and Fitzgerald, 2005; Migiros, 2006; Sarkar, 2009). Several studies have been conducted to develop a conceptual model of e-commerce adoption by SMEs in different countries, such as New Zealand (Al-Qirim, 2007; Sarkar, 2009), Australia and Singapore (Chong, 2008; Chong and Pervan, 2009), Sri Lanka (Kapurubandara and Lawson, 2008; 2006), Malaysia (Kurnia, 2008; Masrek *et al.*, 2009) and other countries.

Studies that aims at examining e-commerce adoption by SMEs in developing countries are relatively limited, especially in Indonesia. Such studies that can be used for comparison are the study of e-commerce adoption by SMEs in Malaysia (Kurnia, 2009), Thailand (Intrapariot and Srivihok, 2003; Pooparadai and Smutkput, 2005), Sri Lanka (Kapurubandara and Lawson, 2008; 2006), Iran (Sarlak *et al.*, 2009; Sarlak and Hastiani, 2008), Kenya (Migiros, 2006), and China (Han and Jin, 2009). Existing studies that were conducted in Indonesia include the studies by Kartiwi (2006), Kartiwi and MacGregor (2007), Kurnia (2006), and Govindaraju (2012).

Basic theories/models used in those studies include the innovation diffusion model (Rogers, 1995), the tri-radiate model (co-structural factors, content factors and context factors) (Sarlak and Hastiani, 2009), the business environment framework (internal-external factors) (Chong, 2008; Chong and Pervan, 2009; Kapurubandara and Lawson, 2008; 2006), and the TOE framework (Sarkar, 2009; Al-Qirim, 2007; Kurnia,

Corresponding Author: Yen Yen Maryeni, Industrial Engineering Department, Faculty of Industrial Technology, Bandung Institute of Technology, Jalan Ganesha 10, Bandung, Indonesia 40132,
Tel: +62-22-2504189; E-mail: yenyen_maryeni@yahoo.com

2008; Zhu *et al.*, 2002; Safa and Ismail, 2013; Consoli, 2012). Building on previous related studies, this study aims at developing an e-commerce adoption model in the context of Indonesian manufacturing SMEs, especially in West Java. The scope of e-commerce application in this study is limited to the use of the internet as a communication technology infrastructure to conduct information exchange and business transactions with business partners. This study is focused on *business to business* (B2B) e-commerce.

Model development:

Previous studies have used several basic models such the diffusion of innovation (Rogers, 1995), the internal-external factors, business environment, technology, organization, environment framework (TOE) and others innovation adoption theories. Each basic model has its own strengths and weaknesses. Studies using diffusion of innovation model have the weakness of ignoring some external factors such as government regulations or government support. The theory of internal-external factors and business environment models also have weaknesses considering that there are factors that can be included in both internal factors and external factors, such as technological factors. Technological factors can be classified as an internal technology, external technology, equipment, and processes (Tornatzky and Fleischer, 1990).

Based on the above considerations, the TOE framework is used as the basis for the development of the model. The selection of relevant factors was done based on literature studies and a preliminary investigation in four SMEs in Bandung. There are two groups of factors included in the conceptual model, namely technological factors and organizational factors (Figure 1). These two groups of factors are considered internal factors that can be controlled by a company. Environmental factors are external factors that are not fully controlled by a company, and the influence of these factors are not examined in this study.

The technological variables were mainly adopted from the theory of diffusion of innovation. The adoption of innovations is influenced by five factors: relative advantage, compatibility, trialability, observability, and complexity (Rogers, 1995). Only four factors were included in this study. Trialability was not included in this study because the e-commerce technology is too complex and requires high effort and high investment, which makes a trial and error approach to the adoption process too risky for SMEs. The adoption process requires careful planning and preparation (Tucker and Lafferty, 2004). Further, SMEs in developing countries face many obstacles related to infrastructure, including the technological aspects of infrastructure, supporting facilities and infrastructure costs (Kapurubandara and Lawson, 2006; Kurnia, 2008; Pooparadai and Smutkput, 2005; Sarlak *et al.*, 2009; Sarlak and Hastiani, 2008; Zhu *et al.*, 2002; Stansfield, and Grant, 2003). Besides that, there is a significant risk related to security in e-commerce adoption, especially security in product ordering and online payment systems (Pooparadai and Smutkput, 200). Another security aspect that is vulnerable is security in delivery systems (Sarlak *et al.*, 2009; Sarlak and Hastiani, 200).

Organizational factors are internal factors that influence the adoption of e-commerce. In this study five variables were retrieved that constitute the organizational factors, namely: IT skills of the users, IT knowledge of the owner/manager, management support, funding capacity, the required effort and turnover of staff.

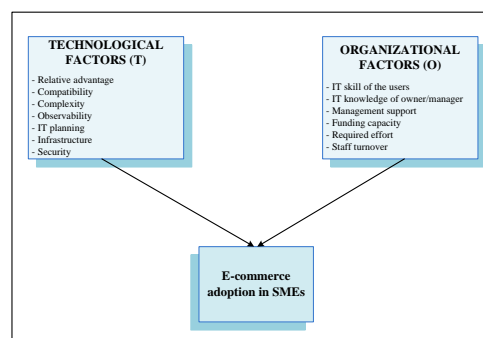


Fig. 1: Conceptual research model.

MATERIALS AN METHODS

The developed model was tested through a field survey. The samples are various manufacturing SMEs in West Java, Indonesia. Questionnaires were distributed to a number of SMEs for approximately 2 years (2011-2013). From a total of 474 sets of questionnaires distributed, 351 sets were returned and from the collected questionnaires only 177 sets of data can be used for analysis. The sample SMEs come from 13 of 26 districts in West Java. The sample set is dominated by medium-sized companies, with the majority of textile (107 SMEs) and textile product/garment (16 SMEs) manufacturing companies. The other samples are food and beverage (10

SMEs), paper (5 SMEs), metal (6 SMEs), chemical, and pharmaceutical (13 SMEs). Table 1. describes the variables and indicators in this study.

Table 1: Technological and organizational variables and their indicators.

Factor	Variable	Indicator	Label	Factor	Variable	Indicator	Label	
Technological	Compatibility	Suitability e-commerce with the company business needs	T1	Technological	Relative Advantage	E-commerce reduces purchasing and procurement cost	T27	
		Suitability e-commerce with the characteristics of the products or	T2			E-commerce improves communication within the organization	T28	
		Suitability e-commerce with the company's goals or desires	T3		E-commerce reduces the number of intermediaries in the sale of	T29		
		Correspondence between consumer habits with e-commerce	T4		The existence of e-commerce adoption planning	T30		
	Observability	The number of companies that you know success in the use of e-	T5		IT Planning	The company's experience in using information technology or marketing	T31	
		The number of organizations that assist your company in using the	T6			The existence of the enterprise database	T32	
		The number of media information on e-commerce	T7			Company technology infrastructure	T33	
		The number of trainees/socialization of e-commerce	T8			Conditions of telecommunications infrastructure and Internet	T34	
	Complexity	The current use of the internet	T9		Infrastructure	Condition of roads and means of transportation as a medium of	T35	
		The current website creation	T10			Internet access speed	T36	
		The use of e-commerce	T11			Number of service delivery as a partner in running the business of e	T37	
		The current use of the online payment system (e- payment)	T12			The number of bank that help transactions online for SMEs	T38	
	Relative Advantage	The time required for the implementation of e-commerce	T13		Security	Online payment security on the internet	T39	
		The time required for the socialization of e-commerce system to	T14			Security in the internet	T40	
		E-commerce expands the reach of the market (consumers)	T15		Security in the delivery of goods	T41		
		E-commerce improves service to customers	T16		Organization	E-commerce knowledge of human resources in your company	O1	
		E-commerce increase customer loyalty	T17			Users IT skill	Your or your employees technical ability in the use and care of e-	O2
		E-commerce improves the competitive position	T18			IT knowledge owner/manager	The owner or manager understanding about IT	O3
		E-commerce improves relations with suppliers	T19			Management support	The owner or manager understanding about the importance of e-	O4
		E-commerce enhances the company image or brand name	T20			Management support	Management support in adopting e - commerce	O5
		E-commerce increases sales	T21			Funding capacity	Management courage to take risk	O6
		E-commerce increases the profit	T22			Financial ability of your company to adopt e-commerce	The cost of internet usage	O7
	E-commerce increases productivity	T23	The cost of buying technology			The level of required effort for the e-commerce adoption	O9	
	E-commerce facilitates the order process	T24	Required effort			Staff turnover rate	O10	
	E-commerce improves the flow of business processes	T25	Staff turnover				O11	
	E-commerce reduces operating costs	T26						

Data Processing and Analysis:

Descriptive analysis was performed with the support of SPSS 18 (PASW Statistics 18). SEM (Structural Equation Modeling) methods with Partial Least Square (SmartPLS 2.0 software) is used in the data processing to check both the measurement model/outer model and structural model/inner model.

Convergent validity and discriminant validity were used to test the construct validity while the Cronbach's alpha and composite reliability are used to test the reliability of the measurement model. The value of 0.60 is the lowest limit of Cronbach alpha in a confirmatory study (Hair *et al.*, 2006). Based on this, the measurement instrument was concluded to be reliable.

RESULTS AND DISCUSSION

Descriptive analysis indicates that the SMEs have significant problems in identifying opportunities to adopt e-commerce strategy. This is evidenced by the statistics for the level of adoption of e-commerce, that show that the majority (61.01%) of respondents is at the level of the early adoption: zero level adoption (in the preparation stage, 33.33%) and level 1 (static websites with one-way communication, 27.68%). The others: level 2 (using the website for interactive communication with customers and suppliers, 27.68%), level 3 (using the website for interactive communication with online payment and online order fulfillment, 6:21%) and level 4 (internal process integration with online ordering, having supplier relationship management (SRM) and customer relationship management (CRM), 5.08%).

Value of Cronbach alpha, composite reliability and average variance extracted (AVE) are used to test the reliability of the indicators. Table 2 shows these values. The result shows that the AVE value above 0.50, the composite reliability value above 0.60 and Cronbach's alpha values above 0.60 except for the variables complexity, infrastructure, and security. This suggests that the overall reliability of variables is good.

Loading factor value (convergent validity) and cross loading factor value (discriminant validity) are used to test the validity. If an indicator does not meet the factor loading value above 0.50 then the indicator is excluded from the model. There are nine indicators that did not meet the factor loading value above 0.50, which are T9, T12, T34, T35, T36, T37, T38, T39, and T41. The model has good discriminant validity if the loading value of each indicator of a latent variable has a value greater than other loading values against other latent variables. There are 4 indicators that do not have the greatest value of cross loading, namely, T34, T35, T41, and O7.

After the measurement model evaluation, the analysis process is followed by hypotheses testing. This analysis process was done using path analysis to measure the path coefficient and the t-test results. Table 4 shows the path coefficient between variables and t-test results that are the basis in our hypotheses testing. Figure 2 shows relations between latent variables resulted from SmartPLS process. The value of R^2 is 0.246, which means that the independent variables used in the model can explain 24.6% the the adoption of e-commerce by SMEs.

Conclusion:

This study found that e-commerce adoption by SMEs in West Java, Indonesia is influenced by four factors, namely: complexity, IT planning, users IT skill, and management support. E-commerce is perceived to be too complex to implement by the SMEs.. A static website is quite easy to design, but the customization is the most complicated step, especially if it is not supported by the availability of an adequate database. In addition, the

manufacturing SMEs in West Java are part of a labor-intensive industry with a majority of low educated employees. It can be seen that the complexity of e-commerce and lack of IT skills among staff are obstacles to the e-commerce adoption by SMEs.

The result shows that one of the important problems faced by SMEs in our study is IT planning. This is often forgotten in the preparation of adoption. The planning is not only meant for the initial adoption of e-commerce, but also for the continuous improvement of the implemented systems. A company that has stagnated at the lower level of e-commerce adoption typically does not have the awareness that system improvement or enhancement is necessary. Management commitment and support are also important for the success of adoption. This is due to the fact that the adoption of an innovation will lead to change, and not everyone likes change. The role of the owner/manager is in decision-making as well as being the driver for consistent implementation.

Table 2: Composite reliability, AVE, and Cronbach's Alpha.

Variable	AVE	Composite Reliability	Cronbach's Alpha
Compatibility	0,67	0,89	0,84
Observability	0,58	0,84	0,77
Complexity	0,39	0,78	0,73
Relative advantage	0,58	0,95	0,95
IT planning	0,66	0,85	0,75
Infrastructure	0,23	0,57	0,72
Security	0,32	0,39	0,71
Users IT skill	0,86	0,92	0,84
IT knowledge of the owner/ manager	0,85	0,92	0,82
Management support	0,65	0,85	0,74
Funding capacity	0,74	0,84	0,70
Required effort	1,00	1,00	1,00
Staff turnover	1,00	1,00	1,00

Table 3: Results of hypotheses testing.

	Path Coefficients	T Statistics (O/STERR)	Hypothesis test result
Compatibility-> EC Adopt.	0,13	1,41	
Observability -> EC Adopt.	-0,04	0,79	
Complexity -> EC Adopt.	0,14	2,55	Accepted*
Rel. Advantage -> EC Adopt.	-0,08	0,97	
IT Planning-> EC Adopt.	0,11	1,78	Accepted***
Infrastructure -> EC Adopt.	0,08	0,80	
Security -> EC Adopt.	0,09	0,02	
Users IT skill -> EC Adopt.	0,18	2,25	Accepted**
IT knowledge -> EC Adopt.	-0,08	1,11	
Management support -> EC Adopt.	0,20	2,31	Accepted*
Funding Capacity -> EC Adopt.	-0,02	0,15	
Effort -> EC Adopt.	0,03	0,34	
Turnover -> EC Adopt.	0,003	0,20	

Notes: * significant at p<0,025, ** significant at p<0,05, *** significant at p<0,10

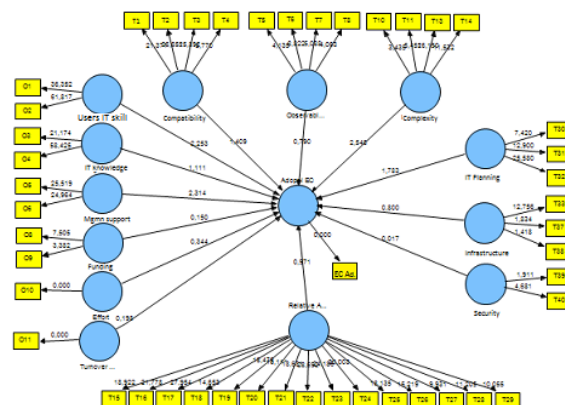


Fig. 2: Model testing result from SmartPLS.

The findings of this model is expected to provide an overview of the factors that influence e-commerce adoption in Indonesian SMEs so they can be used as an input in determining the strategy the adoption of e-commerce. R-square values of various variables explained 24.6% of the variation in the e-commerce which

indicates that there is a need for further research to examine other variables that influence the e-commerce adoption by SMEs in Indonesia.

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