

E-Commerce Adoption in SMEs: A Literature Review

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Abstract. Development of information technology (IT) has been driven changes in various fields, one of which is in marketing. The use of IT in marketing will not be separated from internet, where e-commerce services have now emerged that allow businesses to conduct face-to-face transactions by removing barriers related to distance in interacting with customers, so that every stakeholder will have same opportunity for promoting their products. On the other, Indonesia is country fourth largest population in the world, where 99.8 percent of its business units are small and medium enterprises (SMEs). Although the number of business units in the SMEs sector is very large, e-commerce adoption is still dominated by large business units, so research related to the adoption of e-commerce by SMEs is still very limited, especially in developing countries. This study aims to fill that research gap. In this study a TOE framework will be examined to determine the determinants of e-commerce adoption by SMEs. TOE framework considers technology, organization and environment variables to measure adoption of information technology. Analysis of TOE framework will consider empirical literature. This study also makes recommendations for future research.

Keywords: E-Commerce, SMEs, TOE Framework

1 Introduction

Technology Adoption is defined as the first use or acceptance of the technology or product that appears [1]. Studies on technology adopts intended to predict, understand, and explain variables influencing adoption behavior at individual as well as organizational levels to accept and use technological innovations [2]. Adoption of Information technology (IT) enables SMEs to take competitive advantage in global market [3]. Hoque, et al. [4] said, IT can give SMEs a competitive advantage in new economic era, especially in product marketing. The use of IT as a media for marketing and promotion will not be separated from internet [5]. Internet technology for sustainable trade can be done using e-commerce [6]. Rita and John [7] said, SMEs need to be encouraged to use e-commerce for they are not left behind by businesses that have adopted e-commerce. The Nielsen report, titled Indonesia Ocean of Opportunities, shows that retail sales through e-commerce in Indonesia in 2015 reached US \$ 1.68 billion. When compared with e-commerce sales in countries in ASEAN, Indonesia is the largest [8]. However, from use of e-commerce for sales, MSMEs have not been able to be implemented properly, even increase in use of e-commerce for business processes is mostly driven by large companies [9].

This study will focus on identifying factors that influence e-commerce adoption for SMEs in Indonesia, it is because e-commerce technology adoption is importance and difficulty of implementing e-commerce for SMEs in Indonesia. Identification is needed because of limited study on e-commerce adoption for SMEs in developing countries, not exception in Indonesia

[10]. From several previous studies, adoption of information technology can be measured through several theories. The most widely used theory in measuring information technology adoption is technology accepted model (TAM), technology organization environment (TOE), theory of planned behavior (TPB), diffusion of innovation (DoI), and unified theory of acceptance and use of technology (UTAUT) [11-15]. In some studies, the most likely theory to be used in examining factors that can influence e-commerce adoption by SMEs is TOE framework [16].

On TOE framework, e-commerce adoption is directly or indirectly influenced by 3 variables, namely technology, organization and environment [17]. TOE framework was first developed by Tornatzky and Fleischer [12], and currently widely used to analyze technology adoption in companies / organizations to find out which factors can influence adoption of technological innovations and implementation process [18]. This study will discuss what indicators can be used to make a model for measuring e-commerce adoption by SMEs.

2 Theoretical Foundations and Literature Review

2.1 TOE Framework

In 1990 Tornatzky and Fleischer proposed a TOE framework to explain the process of adopting innovation in companies. As the name suggests, TOE framework consider three variables: technology, organization and environment which was later shortened to TOE [12]. The TOE framework has been used to explain the adoption of various innovations [19], including: interorganization systems, e-business, e-commerce, Enterprise Applications, open source systems, and other application systems [20]. Although the problem of technology are key drivers of adoption and use of Internet, but organization and environmental aspects are considered equally important in TOE framework [21]. Technology variables refer to internal and external technologies that are relevant to needs of the organization and to adoption. Organizational variables refer to descriptive characteristics of the company, resources, and process of communication among employees. Environmental variables consist of external environment (market elements and competitors) and internal environment [12].

2.2 Technology

Technological variables are more related to perceived behavioral control, such as the user's cognitive skills in using adopted technology (eg technical knowledge and vendor support) as well as supporting resources (eg internet infrastructure, user time, and developers) needed to exploit potential proposed system [22, 23]. Technology variables also refer to internal and external technologies that apply to organizations [24]. In other studies, technology variables are associated with 3 indicators, that is relative advantage, perceived complexity and compatibility. [17, 24, 25]. Relative advantage is the level of assumption that innovation is a better idea of idea being replaced. Innovations that have clear and unambiguous advantages in creating strategic effectiveness (for example, increasing sales) and operational effectiveness (for example, reducing operating costs) have a greater incentive to adopt [24]. Perceived complexity is interpreted as a condition where the level of innovation adoption is considered

relatively difficult to use, so it requires technical knowledge about e-commerce to be able to adopt [17]. Perceived compatibility is related to the function of technology in the user's work, so compatibility becomes an important factor in adoption and use of information technology, which in this case is e-commerce [25]

2.3 Organization

Organization variables refer to characteristics and resources of the company, including connecting structures between employees, intra-company communication processes, company size, and number of slack resources [19]. Previous research stated that organization variables are the variables most often used to investigate influence of innovation adoption decisions in organizations, including SMEs [16]. Organization variables are related to several indicators, that is top management support, knowledge of information technology and size of organization [17, 24, 25]. Top management support has an important role in adoption of information technology because it provides guidance for resource allocation, service integration, and process reengineering. Top management who recognizes the benefits of e-commerce is likely to allocate resources needed for adopting e-commerce and influence organizational members to implement changes [24]. In addition, knowledge of information technology from employees is very important for ability of organizations to adopt or not adopt e-commerce for SMEs, it is because there are many changes in information technology that occur, so that technology knowledge from employees must also change in order to adjust [17]. In size of organization indicators, larger organizations are generally more likely to innovate, but many other studies criticize this because the size of the organization is not only limited in size, but also more specifically can be attributed to availability of certain resources [25].

2.4 Environment

The tendency of organizations to innovate is supported by opportunities and threats from environment [23]. Duan, et al. [26] describes the corporate environment as a macro area where organizations do business. Gono, et al. [25] said, business environment in which companies operate has important implications for SMEs to use information technology. In implementing e-commerce, organizations are more vulnerable to adopting e-commerce because competitors become more capable or accustomed to using e-commerce [27]. Some studies state that environment variables consist of competitive pressure and trading partners pressure indicators. [7, 17, 18]. Pressure from competitors often forces organizations to adopt technology to be competitive in a dynamic environment [26]. When competitors use e-commerce technology, companies will be encouraged to adopt e-commerce more broadly in order to gain a competitive advantage. Thus, the higher level of competition in the industry, the more likely the use of e-commerce by SMEs [7]. The trading partner pressure indicator is the level of impact and pressure on company caused by suppliers and customers to adopt an e-commerce, so with increasing number of people using internet in Indonesia [29], the greater pressure on SMEs to adopt information technology, in this case e-commerce [17].

3 The Theoretical Framework

3.1 Influence of Technology on E-Commerce Adoption

Technological variables are associated with 3 indicators, that is relative advantage, perceived complexity and compatibility [17, 24, 25]. Relative advantage is extent condition to which innovation adoption is considered capable of providing greater benefits to organization than maintaining previous innovations [30]. Some studies have empirically identified relative advantage as a significant determinant of technology adoption [7, 31]. Complexity indicators refer to conditions in which innovation adoption is considered relatively difficult or not to use [32]. Lack of technical knowledge about e-commerce can prevent adoption if individuals find technological applications that are difficult to use and understand, but conversely, if e-commerce technology is easy to use, adoption of innovation will be more likely [30]. Compatibility indicators refer to the level of readiness of users with prior experience, existing technological infrastructure, and desired work practices of the organization [30]. It is important for managers to assess whether adopting new technology will meet internal goals and processes of companies. Previous research shows compatibility has a positive and significant influence on e-commerce adoption and use by SMEs [33, 34].

Some studies reveal that technology variables have a significant influence on e-commerce adoption for SMEs [16, 20]. Although many studies that reveal technology have a significant effect on e-commerce adoption, it turns out there are also other studies that state that technological variables do not significantly influence information technology (e-commerce) adoption for SMEs [35, 36], so further research is needed to clarify this.

3.2 Influence of Organization on E-Commerce Adoption

Organizational variables are related to indicators of top management support, knowledge of information technology and organizational size [17, 24, 25]. Top management support refers to extent of organizational leaders to recognize essence of e-commerce [30]. The existence of support from management means obtaining adequate allocation of technological and financial resources to adopt information technology innovations [23]. Some studies reveal that management support is positively correlated to the widespread use of the internet and e-commerce adoption by SMEs [37, 38]. In addition to top management support, indicators of employee IT knowledge are very important for ability of organizations to adopt or not adopt ICT and e-commerce among SMEs [39]. On previous studies have found that knowledge of information technology and e-commerce among employees is a significant factor in use of ICT and e-commerce by SMEs [40]. While on the organization's size indicator, Wang, et al. [41] stated that companies of all sizes are aggressive to use technology to improve their position and competitive advantage. Jeyaraj, et al. [42] assessed the size of company as one of the three most important predictors of adoption. Research results from Awa and Ojiabo [43], Awa, et al. [44] show that size of company is known to be a determinant of significant information technology adoption among SMEs.

Several studies revealed that organizational variables have a significant influence on e-commerce adoption for SMEs [16]. But from other studies it was stated that organizational readiness has no significant influence on e-commerce technology adoption [36]. This is also supported by Awa and Ojiabo [43], which revealed that organizational variables did not

significantly impact the adoption of information technology by SMEs. The further research is needed to clarify this gap.

3.3 Influence of Environment on E-Commerce Adoption

Environmental variables consist of two indicators, it's competitive pressure and trading partners pressure [7,17]. Competitive pressure is level of pressure from competitors in industry perceived by the company [45]. When competitors start using e-commerce technology, companies will be encouraged to adopt e-commerce technology more broadly in order to gain competitive advantage, so that higher the level of competition in the industry, so the possibility of SMEs using e-commerce is getting bigger [23,45]. Trading partner pressure is level of effect and pressure posed by companies from relational channels such as suppliers and customers to adopt e-commerce systems [46]. Pressure on trading partners is found to be a major factor in predicting e-commerce adoption by SMEs and has a positive influence on information technology adoption [40,47].

Some studies show that environmental variables have a significant influence on adoption of various e-commerce technologies [48, 49]. However, research conducted by Yeng, et al. [16] shows insignificant influence of environment variabel on adoption of various e-commerce technologies. That is supported by Awa and Ojiabo [43] research which states that environment variables do not significantly impact of adoption information technology.

Based on previous studies discussed above, what indicators can be used for TOE framework can be obtained. The information from each indicator can be seen in Table 1 Understanding of eachm indicator is important to be presented so that further research can be easier to make operational definitions.

Table 1. Indicators in TOE Framework

Variables	Indicators	Descriptions	References
Technology: perceived behavior control, such as the cognitive skills of managers in using e-commerce technology and supporting resources is needed to exploit the potential of e-commerce technology	Relative advantage	the extent to which e-commerce technology is felt to provide greater benefits for SMEs than the ideas used previously	[7, 16, 20, 30,31]
	complexity	the extent to which e-commerce technology is perceived as more difficult or too complex to be used than old ideas that have been used before	[16, 20, 30, 32]
	compatibility	the extent to which e-commerce technology is felt in accordance with the needs, types of businesses and business processes that exist in SMEs	[16, 20, 30, 33,34]
Organization: company characteristics and resources, such as the objectives of SMEs, readiness to use e-commerce technology and business size	Top management support	the extent to which the management of SMEs want to switch to using e-commerce and would allocate its resources to adopt e-commerce	[16, 23, 37, 48]
	Knowledge of information technology	skills or knowledge of information technology from SME managers to be able to use e-commerce technology	[16, 39, 40]
	size of organization	the sufficient availability of resources owned by SMEs to adopt e-commerce technology	[16, 41-43]

Variables	Indicators	Descriptions	References
Environment: the condition of SME environment in carrying out its business processes and associated with the surrounding elements such as customers, competitors and presence of e-commerce technology service providers	Competitive pressure	the pressure experienced by SMEs from similar business competitors who have adopted e-commerce to gain a competitive advantage	[23, 45, 48, 49]
	Trading partners pressure	willingness to gain trust in trading partners (buyers / customers) by providing valid product / service information and ease of product purchase transactions	[40, 46-49]

4 Conclusions and Future Studys

As discussed in the previous chapter, it can be concluded that the TOE framework can be used to determine factors that influence e-commerce adoption by SMEs. From previous studies it is known literature on technology variables can be measured as indicators of relative advantage, perceived complexity and compatibility technology. Organizational variables can be measured by indicators of top management support, information technology knowledge and organizational size. Whereas in environmental variables can be measured by indicators of competitive pressure and trading partners pressure. In this study, it can also be seen that although many studies that reveal technology, organization, and environment variables have a significant influence on e-commerce adoption [16, 20, 48], there are also several other studies, some of which state that technology, organization, and environment variables have not significant influence on e-commerce adoption [35, 36, 43]. The results of previous studies have different findings and are mutually opposite between one study and another. It is hoped that from the different findings, additional research can be carried out to determine the factors that influence technology, organizational and environmental variables on e-commerce adoption for SMEs.

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