
Drivers of E-Commerce Adoption amongst Small & Medium Sized Enterprises (SMEs) in the Business Service Sector

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Abstract - Technology has played a significant role in the development of business to business (B2B) or business to consumers' (B2C) electronic commerce (or e-commerce) over the recent decades. The purpose of this study is to empirically examine determinants of e-commerce adoption among small-and medium sized enterprises (SMEs) in the business services sector in a progressively developing nation. This study tested six hypotheses focusing on organizational, technological and environmental factors that may affect e-commerce adoption. Using judgemental sampling approach, a total of 110 feedback were gathered via online questionnaire based survey. The study employed SmartPLS 3.0 (Partial Least Square) structural equation modelling statistical software to confirm the hypotheses of this study. Structural model analysis was conducted and it was revealed that perceived relative advantage, perceived compatibility, e-commerce knowledge and expertise, external change agent and competitors' pressure have positive and significant influence on the SMEs respondents' e-commerce adoption. The study found that the most significant factors influencing e-commerce adoption among SMEs in Selangor was perceived relative advantage, to which managers or small and medium-sized enterprises see the potential advantage of e-commerce. The implication of this study is that SMEs need more exposure on the benefit of technology and intervention to guide them to change from traditional business to online business.

Keywords - *E-commerce adoption, Technological, Organizational, Environment, Small and Medium Enterprises (SMEs)*

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I. Introduction

Electronic commerce (e-commerce) is a business subset that has affected many industries and organizations. In this study, e-commerce is defined as the process of buying, selling, services, delivery, products and / or information via computer networks through the Internet. E-commerce has tremendously evolved, to which the activities of selling, buying and logistics activities are now expanding in its horizon as organizational management activities via the web. For this reason, e-commerce is the focal form of business nowadays, and it is getting more competitive in the current business environment. Ahmad & Abdul Rani (2010) stated that many business organizations have continuously struggled to improve themselves domestically and internationally in an attempt to stay competitive. In addition, there is also a need for entrepreneurs to understand leveraging

points, history and current issues of e-commerce activities, and market-oriented technology priorities in order to achieve competitive advantage (Sirisukha, 2017).

In Malaysia, the economy has increasingly evolved from a traditional based economy to digital economy. Digital economy refers to an economy that is based on digital computing technologies, to which businesses are conducted in online markets via the World Wide Web and the Internet (Jaafar, 2018). The Association of South East Asian Nation (ASEAN) countries and the rest of the world are living through a remarkable economic and society transformation driven by technology through digital economy. In this changing world, the economic growth and competitiveness are increasingly tied to the digital economy, which is a key driver of business, jobs creation and innovation respectively. Small and medium-sized enterprises (SMEs) are one of the major sources of employment, technological advancement and competitive advantage for both developed and developing countries. SMEs play a vital role in developing a nation's economic growth and it has also become the economic backbone of any country. Malaysia as a progressively developing country, is not an exception. SMEs in Malaysia, for example, are now actively growing to innovate and transform their organizations in Industry 4.0 (Lee & Wing Hooi, 2017).

However, these SMEs are mostly facing capital challenges to innovate and transform their organizations towards industry 4.0. The cost of adopting e-commerce infrastructure is expensive for SMEs in developing countries (Ahmad, 2015). The gap tends to be greater between SMEs and larger firms. Hence, this may affect long-term competitiveness and survival for SMEs. Lee & Wing Hooi (2017) stated that there are many seminars informing SMEs about the potential of e-commerce, including Industry 4.0, and the potential billions of dollars in sales that can be tapped from it. Nonetheless, SMEs' confidence and attitude are still limited, and they are not aware of such a potential. One of the problems is that their companies' website and corporate image are not fully utilised (Ang, Tahar & Murat, 2017). In addition, the authors stated that many SMEs have commercial websites but at the same time, lack knowledge on e-commerce. The websites are often used only for communicating and promoting goods and services. In view of the above, this study was carried out to investigate factors affecting e-commerce adoption among SME players in the services sector. The services sectors are the most dominant sectors in Malaysia as compared to manufacturing sector. SMEs in the services sector have a higher number of registered businesses amounting to nearly one million SMEs (SME Corporation, 2017).

II. Literature Review

This study was conducted based primarily on the structure of the Technology-Organization-Environment (TOE) model (Tornatzky & Fleischer, 1990). It is consistent with Rogers' (2003) diffusion of innovation theory as it focuses on both internal and external organizational characteristics as well as technological characteristics in the study of drivers for new technology diffusion (Ahmad, 2015). This model identifies the three aspects of companies' characteristics and six independent variables that influence the adoption of new technology (Robertson, 2005; Tornatzky & Fletscher, 1990). The framework of this study consists of six independent variables that affect e-commerce adoption among SMEs.

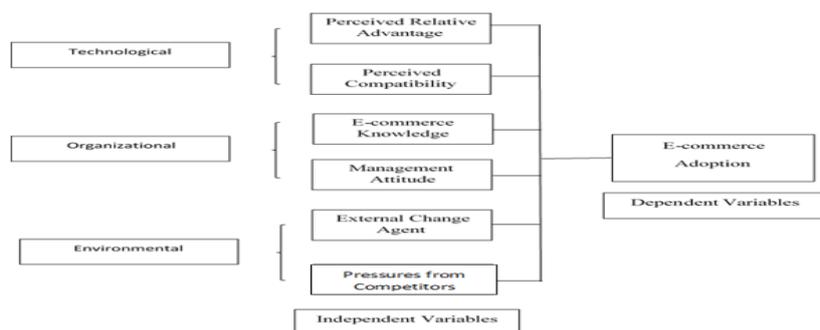


Figure 1: TOE Research Model based on Robertson (2005) and Tornatzky Fleischer's (1990)

i) Technological context

- (a) *Perceived relative advantage*: Perceived relative advantage is a belief that certain benefits will be derived from the performance of behaviour, and that it is the most frequently used characteristics in the study of e-commerce adoption (Kuan & Chau, 2001). Past studies found that perceived relative advantage or usefulness was significant towards influencing e-commerce adoption, to which managers

of SMEs see potential benefits of embracing e-commerce (e.g. Mohammed, Almsafir, Salih, & Alnaser, 2013; Ahmad, Rahim, Bakar & Mohamed, 2015). These include increasing revenues and profits, reduction in costs, improvement in customer service, development of new market segments and the stream-line of business operations (Ahmad, 2015; Ahmad, Rahim, Bakar & Mohamed, 2015).

H1: Perceived relative advantage is significantly related to adoption of e-commerce.

- (b) *Perceived compatibility*: Perceived compatibility reflects a compatibility between e-commerce and firm's culture and values as well as preferred work practices that influence e-commerce adoption (Grandon & Pearson, 2004). According to Ramdani, Chevers, & A. Williams, (2013), the factors influencing SME's adoption of ICT are environmental, organizational and technological are significant factors. Tornatzky and Klein (1990) discovered that an innovation is more likely to be adopted when it is consistent with the work and value system of an individual. It will be embraced not only when it is consistent with deeply held cultural values, but also when it is consistent with prior ideas.

H2: Perceived compatibility is significantly related to adoption of e-commerce.

ii) Organizational context

- (a) *E-commerce knowledge*: Top management's insistence of acquiring ICT skills and knowledge encourage opportunities for SMEs to adopt ICT because previous experience can influence an organizational decision to adopt ICT which is very important for an organization (Alam, Syed & Noor, 2009). Knowledge is most significant only at the early stage of adoption. It becomes less important when e-commerce moves towards a higher end of the adoption ladder (Nurul & Abdul Rahman, 2017; Roberts, Toleman, & Roberts, 2007). Past studies have found that the extent to which e-commerce knowledge has been acquired within an organization can affect its adoption. Nurul & Abdul Rahman (2017) for example, found that knowledge does influence entrepreneurial intentions of SMEs for seaweed production.

H3: E-commerce knowledge is significantly related to adoption of e-commerce.

- (b) *Management attitude*: Top management's enthusiasm on information technology influence e-commerce adoption (Saffu, Walker, & Hinson, 2008). There are three types of management leadership that can be changing agents, and these involve leaders, senior executives, and top management of any organizations. These top executives are fully conscious of the technology that can be applied and used by many employees. Such favourable management attitude will potentially influence the choice to embrace innovative technology such as e-commerce. By offering technical and human resource accessibility and reducing unnecessary bureaucratic & redundancy processes, top management goals can be achieved (Chee, Suhaimi, & Quan, 2016). Companies that have dynamic e-commerce websites such as online payment, logistics, marketing and communication with suppliers and customers, this will enable a higher level of e-commerce adoption as compared to those that only provide information about a company alone (Senarathna & Wickramasuriya, 2011).

H4: Management attitude is significantly related to adoption of e-commerce.

iii) Environmental context

- (a) *External change agent*: Availability of external skilled labour, software and or hardware suppliers are affecting e-commerce acceptance among SMEs and these factors have been widely explored in previous research (Doolin, Mcqueen, & Watton, 2003). Also, government policies were found to be one of the driving forces for SMEs to adopt e-commerce technologies (Kuan & Chau, 2001). Jaafar (2018) stated that Malaysia's SME Corporation is a key coordinating government agency for SME development, and has been proposing Master Plan 2.0 to prepare for Malaysian companies' sustainability and competitiveness growth in Industry 4.0. Ahmad (2015) further highlighted the significant role of external change agents such as consultants, government, internal consultants and suppliers of e-commerce solutions in determining the adoption of e-commerce by SMEs and strongly affected by an internal change agent.

H5: External change agent is significantly related to adoption of e-commerce.

- (b) *Pressures from competitors*: Competitors' pressure is one of the major and predicted influences of ICT acceptance among company trading partners (Alam, Syed & Noor, 2009). Competition can contribute towards an innovative way of managing a company via the usage of latest technology (Ahmad, 2015). Kuan & Chau (2001) determines the magnitude of competition and rivalry within the sector and plays a part in the implementation of e-commerce. A company or business may feel the pressure when more businesses are entering the industry and rivals are starting to embrace e-commerce. Hence, there is a need for SMEs to embrace it in order to stay competitive in the sector (Sirisuka, 2017).
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H6: Pressure from competitors is significantly related to adoption of e-commerce.

III. Methodology

In this study, a quantitative research design method was applied. Using judgmental sampling approach, an online survey was conducted by emailing to 400 SMEs in the state of Selangor, Malaysia. e adopted e-commerce activities in the business services sector Nevertheless, only 110 usable data were collected and used for further descriptive and inferential analyses. This study applied both SPSS Version 24.0 and Smart PLS 3.0 (Partial Least Square) statistical software to undertake relevant data analyses. The structural measurement model was analysed to investigate the path coefficient on the relationship of perceived relative advantage, perceived compatibility, e-commerce knowledge and expertise, management attitude, external change agent and pressure from competitors influence towards e-commerce adoption. Data was further analysed to determine the R Square (R^2), significance relationship to make a decision on the hypotheses testing. Most of the survey items were adopted from previous studies (Khairul Anwar, 2011) and adapted for this study. Using seven Likert measurement scales, a total of 30 item measurement were identified to test e-commerce adoption by focusing on predicting variables of perceived relative advantage, perceived compatibility, e-commerce knowledge and expertise, management attitude, external change agent and pressure from competitors.

IV. Result and Discussion

i. Demographic Profile

Table 1 reflects the target respondents' demographic profile based on frequency analyses and percentage ratio of 110 usable data. The survey listed gender, age, education, position, number of employees and revenues in measuring the size of company. From this analysis, male respondents constituted 52.7 percent; and 47.3 percent involved female respondents. In terms of age group, the respondents' age was segregated into four age groups, that is, 32.7 percent of the respondents were from the age group of 21 to 30 years old, 32.7 percent were from a group of 31 to 40 years old, 33.6 percent of the respondents were from the age group of 41 - 50 years old and 9 percent were a group of 50 years old and above. Additionally, majority of the respondents held various positions with bachelors' degree or professional qualification, amounting to 59.1 percent. In terms of company size, majority of the SMEs have about 50 employees or 46.4 percent; and their yearly revenues ranged between RM250,000 to RM10 million at 59.1 percent. In essence, the respondents were sufficiently well-versed with their company businesses, were able to comprehend the objectives of said survey questionnaire, and were owning small and medium sized business entities as defined by SME Corporation Malaysia.

Table 1: Demographic Profile

	Frequency (N=110)	Percentage
Gender		
Male	58	52.7
Female	52	47.3
Age		
21 – 30 years	36	32.7
31 – 40 years	36	32.7
41 – 50 years	37	33.6
50 years and above	1	0.9
Education		
Secondary or below	1	0.9
Certificate / Diploma	21	19.1
Degree / Professional	65	59.1
Post Graduate	22	20
Other	1	0.9
Position		
Non – Executive	25	22.7

Executive	34	30.9
Manager	13	11.8
Senior Manager	2	1.8
Director	35	31.8
Other	1	0.9
Employees		
1 – 4	27	24.5
5 – 50	51	46.4
51 – 150	14	12.7
Above 150	18	16.4
Revenue		
Below RM250 thousand	35	31.8
RM250 thousand – RM10 million	65	59.1
RM10 million -RM25 million	7	6.4
Above RM25 million	3	2.7

ii. Convergent Validity

Based on Table 2, convergent validity of the measurement model is evaluated by examining its extracted average variance (AVE) value. Convergent validity is sufficient when the identified constructs have an average variance (AVE) value at least 0.5 (Hair et al, 2017). Table 2 revealed (AVE) values of each constructs ranging from 0.764 to 0.868, which is more than 0.5. This result shows that the measurement model in this study has demonstrated sufficient convergent validity

Table 2 : Average Variance Extracted (AVE) Value

Constructs	Average Extracted Variance (AVE)
E-commerce adoption (EC)	0.765
Perceived relative advantage (PRA)	0.890
Perceived compatibility (PC)	0.815
E-commerce knowledge and expertise (EKE)	0.851
Management attitude (MA)	0.868
External change agent (ECM)	0.764
Pressure from competitors (PCM)	0.800

iii. Discriminant Validity

The measurement of model's discriminant validity is tested by using Fornell and Lacker's (1981) criterion. It is meant to measure the degree to which items differentiate amongst constructs would be assessed by examining the correlations between the measures of potentially overlapping constructs. Based on Table 3, all the squared correlations are lower than average variance extracted (bolded on the diagonal). Hence, the result confirmed that the Fornell and Larker's criterion is having adequate discriminant validity.

Table 3: Discriminant Validity of Constructs

	EC	EKE	ECA	MA	PC	PRA	PCM
EC	0.874						
EKE	0.834	0.923					
ECA	0.477	0.416	0.874				
MA	0.771	0.761	0.631	0.932			
PC	0.754	0.717	0.522	0.835	0.903		
PRA	0.811	0.813	0.464	0.692	0.684	0.943	
PCM	0.537	0.43	0.634	0.475	0.31	0.407	0.894

Note: Diagonals (in bold) represent the AVE while the other entries represent the squared correlations.

iv. R Square and Path Coefficient

The value of R² is 0.818, indicating that 81.8% of variation in the dependent variable (e-commerce adoption) is explained by all of the independent variables (perceived relative advantage, perceived compatibility, e-commerce knowledge and expertise, management attitude, external change agent and pressure from competitors influence towards e-commerce adoption). The model, also have positive sign of coefficients. Table 4 revealed that most of the predictive constructs have positive relationships with e-commerce adoption among SMEs, except for external change agent. The path coefficients of perceived relative advantage ($\beta=0.302$), perceived compatibility ($\beta=0.257$), e-commerce knowledge and expertise ($\beta=0.270$), management attitude ($\beta=0.109$), and pressure from competitors ($\beta=0.256$) showed there were moderate positive relationship with e-commerce adoption among SMEs. Consistent with its path coefficient, external change agent had the least significant relationship with e-commerce adoption with ($\beta=-0.140$).

Table 4: Path Coefficient Analysis

Relationship	Coefficients	Sample Mean (M)	Standard Deviation (STDEV)
Perceived relative advantage --> E-commerce adoption	0.302	0.302	0.07
Perceived compatibility --> E-commerce adoption	0.257	0.255	0.067
E-commerce knowledge and expertise --> E-commerce adoption	0.270	0.264	0.09
Management attitude --> E-commerce adoption	0.109	0.106	0.087
External change agent --> E-commerce adoption	-0.140	-0.136	0.069
Pressure from competitors --> E-commerce adoption	0.256	0.263	0.06

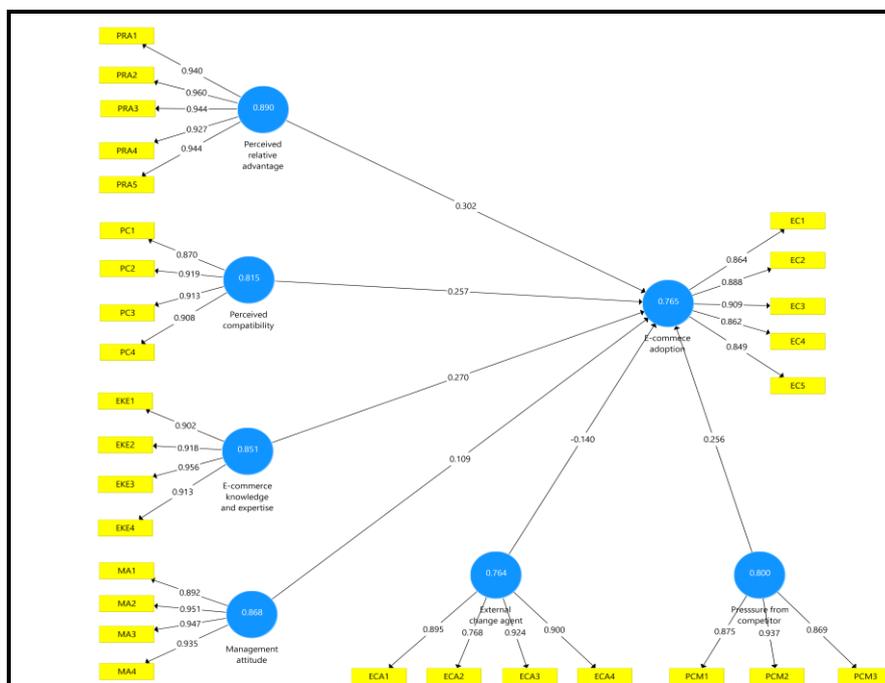


Figure 2: Structural Measurement Model

v. Structural Model Analysis

By using bootstrapping function, SmartPLS 3.0 statistical software can generate t-statistics of both the inner and outer model. T-statistics refers to the individual statistical testing where it is used to determine the relationship between the independent and dependent variable in order to know whether it is significant or not (Hair et al, 2016). Figure 2 and Table 5 illustrated the desired results; perceived relative advantage ($\beta=0.302$, $t=4.299$, $p<0.05$), perceived compatibility ($\beta=0.257$, $t=3.838$, $p<0.05$), e-commerce knowledge and expertise ($\beta=0.270$, $t=2.988$, $p<0.05$), external change agent ($\beta= -0.140$, $t=2.045$, $p<0.05$), and pressure from competitors ($\beta=0.256$, $t=4.228$, $p<0.05$). The overall results showed that most of the hypotheses (H1, H2, H3, H5 and H6) were supported in this study. Results on H4, with predicting construct of Management attitude on ecommerce adoption ($\beta=0.109$, $t=1.251$, $p>0.05$) revealed otherwise, indicating that H4 was not supported.

Table 5: Bootstrapping Results

Relationship	T-value	Significant level	Hypothesis
Perceived relative advantage --> E-commerce adoption	4.299	0.000	H1: Supported
Perceived compatibility --> E-commerce adoption	3.838	0.000	H2: Supported
E-commerce knowledge and expertise --> E-commerce adoption	2.988	0.003	H3: Supported
Management attitude --> E-commerce adoption	1.251	0.212	H4: Not supported
External change agent --> E-commerce adoption	2.045	0.041	H5: Supported
Pressure from competitors --> E-commerce adoption	4.228	0.000	H6: Supported

V. Discussion

In this study, a structural model analysis was conducted and findings revealed that perceived relative advantage, perceived compatibility, e-commerce knowledge and expertise, and pressure from competitors have positive and significant influences on e-commerce adoption. This result supports past contentions that technological and organizational context indeed have positive and significant impacts on SMEs' ecommerce adoption (Ahmad, 2015, Ramdani et al, 2013). Nevertheless, external change agent had a negative significant relationship with ecommerce adoption. This could be justified, such that government's support to SMEs were already successfully provided to implement technology adoption in terms of technological infrastructure facilities and ICT skills. The efforts would not be successful if no major support were made to improve business owners' ICT skills as studies have shown that SMEs were excessively dependent on government assistance (Ahmad et al, 2015). The study also found that the most significant factor influencing e-commerce adoption among SMEs in Selangor was perceived advantage. When managers or SMEs foresee the potential advantage of e-commerce, they will be attracted to adopt the technology that could be of great benefit to them (Chee et al, 2016; Mohammad et al, 2013; Khairul Anwar,2011; Grandon & Pearson, 2004). The managerial implication observed is that SMEs need to be further exposed on the technological benefits and intervention in an attempt to continually guide them towards embracing change from traditional business platforms to online business platforms effectively.

VI. Conclusion

In essence, this study was carried out to determine the extent to which factors such as technological, organizational and environmental context influence the adoption of e-commerce amongst SMEs, particularly in the progressive state of Selangor in Malaysia. Several limitations were observed. While empirical results provides added value to understanding respondents' adoption of technology in running their online businesses, perhaps, other qualitative aspects of research design should also be taken into consideration, to which empirical data might not be able to wholly capture the subjective influencing determinants that have not been robustly studied in the past literature. In addition, comparative study of SMEs in different business sectors could also be another potential avenue for future research.

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