EXAMINING MODERATING ROLE OF E-COMMERCE EXPERIENCE ON USAGE-PERFORMANCE RELATIONSHIP

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Abstract

As research on E-commerce usage and firms' performance has captured the interest of many Information System (IS) researchers, little attention had been given to examining the presence of moderating variable and its role in the usage-performance relationship. This was important as prior studies on firms' survivability had found that firms learned about what strategies to adopt in generating profits through a trial and error process. Firms were said to realize what worked better by exploring, experimenting, and examining the reaction of the business environment as well as gaining information from competitors' experience. Realizing this, it was believed that E-commerce experience could play an important role in determining the success of the E-commerce investment. This study was therefore intended to investigate the moderating role of E-commerce experience (measured based on number of years) on the relationship between E-commerce usage and firms' performance in the Malaysian service sector. A questionnaire survey was carried out on 165 Malaysian firms involved in the service sector (e.g. tourism, financial and transportation). The hierarchical regression analysis indicates that E-commerce experience significantly moderates the relationship between E-commerce usage and firms' performance. The results provide insights to the brick and mortar companies in the Malaysian service sector and other organizations of similar structures of how they should react on E-commerce investment, as experience in E-commerce usage (years) plays an important role towards improved firms' performance. The finding could also help firms to predict expected duration required to achieve Return on Investment (ROI) from E-commerce and properly plan their cash flow activities to avoid business disruption.

Keywords: E-commerce Experience, E-commerce Usage, Firms' Performance, Service Sector.

1. Introduction

E-commerce landscape in Malaysia is said to be user-driven. Year 2017 has shown 47.9% of user penetration in the US$1,076m of the E-commerce revenue. Lazada, Zalora, and 11street were the most famous sites that scored high followers on social media sites such as Facebook. The E-commerce revenue is expected to keep growing until reaching US$2,531m in 2022. In support of these, E-commerce has been widely viewed as a new edge of business environment. Business organizations all over the globe are attempting to move into E-commerce with the aim to successfully achieving their business objectives (Chandran, et al., 2001). However, there is consensus that many organizations, irrespective of size, have not been able to grasp the full potential of the values carried by E-commerce (Mohamed et. al., 2009). In a developing country such as Malaysia, it has been found that companies tend to be followers rather than pioneers in E-commerce investment. Many of them fear failure to invest in such an unknown space (Mohamed, 2011 & Ng, 2000). Further, lack of success stories by click and mortar companies has been identified as a reason why traditional business reluctant to embark in E-commerce investments.

As research on E-commerce usage and firms' performance has come to an attention of many Information System (IS) researchers, little attention has been given on examining the role of

moderator variable. It is important to study the influence of moderator variable as it could change the nature of the relationship either on; (1) the strength of the relationship (stronger or weaker), and (2) the direction of causality (positive or negative) between predictor and criterion variable (Frazier, et. al., 2004; Baron and Kenny 1986). For that reason, the objective of this study is to search for empirical evidence on the relationship between E-commerce usage and firm's performance, and the influence of moderator variable (E-commerce experience) on the "usage-performance" relationship with the aim to furnish a useful guide for the service industry in Malaysia.

To enable the achievement of the aforementioned objectives, the study confines itself to the E-commerce usage by click and mortar companies in Malaysia service sector that covers tourism (hotel, resort and medical centre), financial services (banking and insurance) and transportation (air, land & rail, sea). These are the leading services in the Malaysian E-commerce businesses.

2 Literature Review and Hypotheses Development
2.1 E-commerce Usage Firms' Performance

The ultimate goal of using E-commerce is to improve firms' performance (Mohamed, 2011, Zhu & Kraemer, 2005). Prior study has evidenced that e-commerce has hugely impacted the economy and society by breaking the sales limited in time and space, and playing an important role in information system development, logistics, capital flow and information flow (Chen & Zhang, 2015). The recent study was in line with a study on E-commerce innovation at the early years. Clayton and Criscuolo, (2002) for example, have found that E-commerce firms were more likely to assess their innovations as having a high positive impact on firms' performance than those without E-commerce. Khan and Motiwalla, (2002) in their study on "The influence of E-commerce on corporate performance: An empirical investigation in United States" has come up with a finding that from 44 companies under study, 64 percent found that E-commerce impact on ROI is favourable, 18 percent neutral, and 18 percent unfavourable. In prior studies related to E-commerce and value creation, E-commerce has been proven to improve customer service, better inventory control, lower marking and distribution costs, reduced cycle time, increased market reach, and reduced operation costs (Ratnasingam, 2002; Senn, 2000; Riggins & Rhee, 1998; Nath, Akmanligil, Hjelm, Sakag& Schultz, 1998).

Constructs Measurement of E-commerce Usage

In a prior study by Migiro, (2006), E-commerce usage is measured by looking at Internet access, use of Website, online marketing, use of the Web for buying and selling, sending e-mail to business partners, using World Wide Web to access information such as markets information and competitors, and the use of ICT tools for business information processing. In this study, E-commerce usage is measured by looking at online activity distributions. The measurement of online activity distribution is based on four attributes;

- the percentage of consumer sales conducted online,
- the percentage of business to business sales conducted online,
- the percentage of supplies for consumptions ordered online, and
- the percentage of equipment for business use ordered online

Construct Measurement of Firm's Performance

With the emergence of the E-commerce industry and the increasingly intense competition experienced in both local and foreign market, appropriate performance indicators are needed to enable managers to act speedily to sustain the firm's commercial viability. It measures the effective feedback on whether a firm is moving towards its ultimate goals and could assist managers to evaluate the effectiveness of their strategies (Soon Yau and Zainal Abidin, 1999).

In measuring firms' performance, the current study applies the concept of Balanced Scorecard (Kaplan & Norton, 1992) which focuses on the four dimensions; financial, customers, internal business process and learning and growth. However, the measurement elements of each dimension are modified to suit the E-commerce technology perspectives as suggested by

Mohamed (2011). The modified version of Balanced Scorecard is known as E-commerce Scorecard which emphasized on the followings:

i. Impact on Financial

Measurement of financial impact would indicate the company's financial performance. The most traditionally used financial performance indicators were operating costs and return on investment (ROI). In Donkor (2003) for example, financial impact was measured by looking at returns, financing and revenue from sales.

ii. Impact on Customer

In traditional Balanced Scorecard, customer perspectives stressed on "how do customers see us (the business)?" (Kaplan & Norton, 1992). However, E-business Scorecard emphasized on "what are the impact of E-business on customers?".

iii. Impact on Internal Business Process

Since customer-based measures were significant, it had to be translated into measures regarding what process and competencies that companies must excel in (Kaplan & Norton, 1992). In the case of how E-business usage gave an impact on business performance, this study focused on the factors that affected cycle time, quality, employee skills, and productivity as suggested by Kaplan and Norton.

iv. Impact on Learning and Growth

In facing strong global competition, there was a call for companies to continually improve the current products and processes, and introducing new products or services with extended functions (Kaplan & Norton, 1992). In looking at how E-business gave an impact on business performance through its impact on learning and growth, focus was given on looking at capability of a company innovating, improving, and learning, for instance penetration of new markets and create more value for customers.

2.2 E-commerce Experience

As companies are investing heavily to leverage the Internet and transform their traditional businesses into E-commerce, the main issue that comes up is "does this investment pay off?" For a new technology to acquire economic significance, it must be brought into the economy and gradually implemented by many people and organizations. No new technology would have an economic impact until they become widespread in the economy (Mukoyama, 2003).

In a study on firm survival using evolutionary game theory by Kauffman et. al., (2002), it was found that firms come to realize which strategies pay off and which do not through a process of trial and error. Applying the theory, the strategies that firms adopt over time to generate higher payoffs are similar to the mutation process as seen in evolutionary game theory. It shows that firms come to realize what works better and what does not by exploring, experimenting, examining market feedback and financial performance, and learning from others' experience throughout a period of time (Kauffman et. al., 2002). Realizing this, E-commerce experience is believed to have strong contingent effect on "usage-performance" relationship (figure 1).
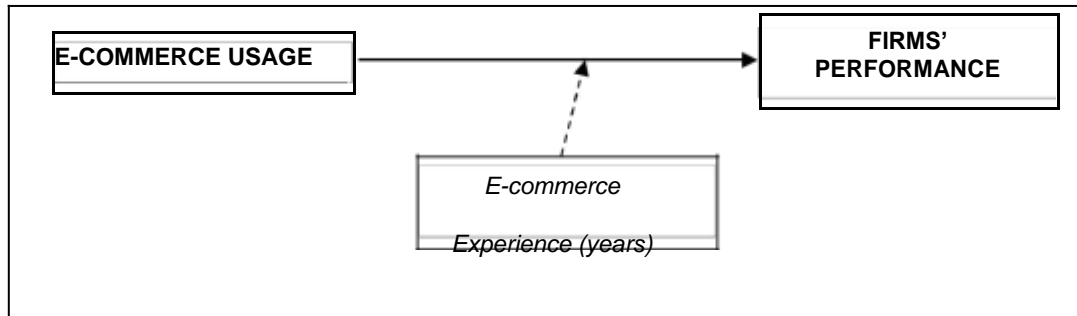
Figure 1: Schematic Diagram of E-commerce Experience as a moderator
on the "Usage-Performance" Relationship

Construct Measurement of E-commerce Experience

The moderating variable (E-commerce experience) is measured by looking at the length of time that the firm engaged in E-commerce activities. The basis used in measuring length of time is based on the number of years.

2.3 Hypothesis Development

In this study, E-commerce usage is regressed towards firm's performance. Next, moderating variable E-commerce experience is tested to identify whether its inclusions would significantly moderate the relationship between E-commerce usage and firms' performance. To test the influence of E-commerce usage on firm's performance and whether moderating variable E-commerce experience could influence "usage - performance" relationship, hypotheses were developed as follows:

H_O1: E-commerce usage has no significant influence on firms' performance
H_A1: E-commerce usage has significant influence on firms' performance
H_O2: E-commerce experience (years) has no significant influence on the relationship between E-commerce usage and firms' performance.
H_A2: The relationship between E-commerce usage and firms' performance is significantly moderated by E-commerce experience (years)

3 Methodology
3.1 Sampling Procedure

In this study, companies involved with online tourism services (hotels, resorts and hospitals involved in health tourism), online financial services (banking and insurance) and online transportation (sea, land and rail, and air) constituted the population of interest. These companies are chosen as the population of interest because of their high usage of technology equipment such as computers and their high E-commerce involvement in running their business activities. Considering these three sectors in service industry that provide online services, the number of population was found to be 731.

Based on the population, a sample is selected using stratified random sampling (figure 2). Stratified random sampling is the most efficient sampling design when differentiated information is needed regarding various strata within the population (Sekaran, 2003). In this study, stratified random sampling is chosen in order to avoid a case which some members of the population being significantly under or over represented (Hussey & Hussey, 1997). Sample size is then determined according to a table provided by Sekaran, (1992). For a population of 731, sample size should be

254. However, due to the case that samples are to be broken in to sub-samples, the rule of thumb of minimum sub-sample size of 30 is followed (Roscoe, 1975). Therefore, after performing the calculation as shown in figure 2, the final sample size of 260 is required for this study. This sample

size fulfils the rule of thumb as proposed by Roscoe (1975), for which sample sizes larger than 30 and less than 500 are appropriate for most research. If a sample size is too large (say, more than 500), it could result a problem of committing Type II errors (Sekaran, 2003). Type II error is a case that we would accept the findings of our research when in fact we should reject them. For example, if a sample size is too large, a weak relationship might reach significance level which cannot be generalized to the population. In this research, sample size of 260 is larger than 30 and less than 500, therefore it is appropriate and thus, Type II errors are avoided.
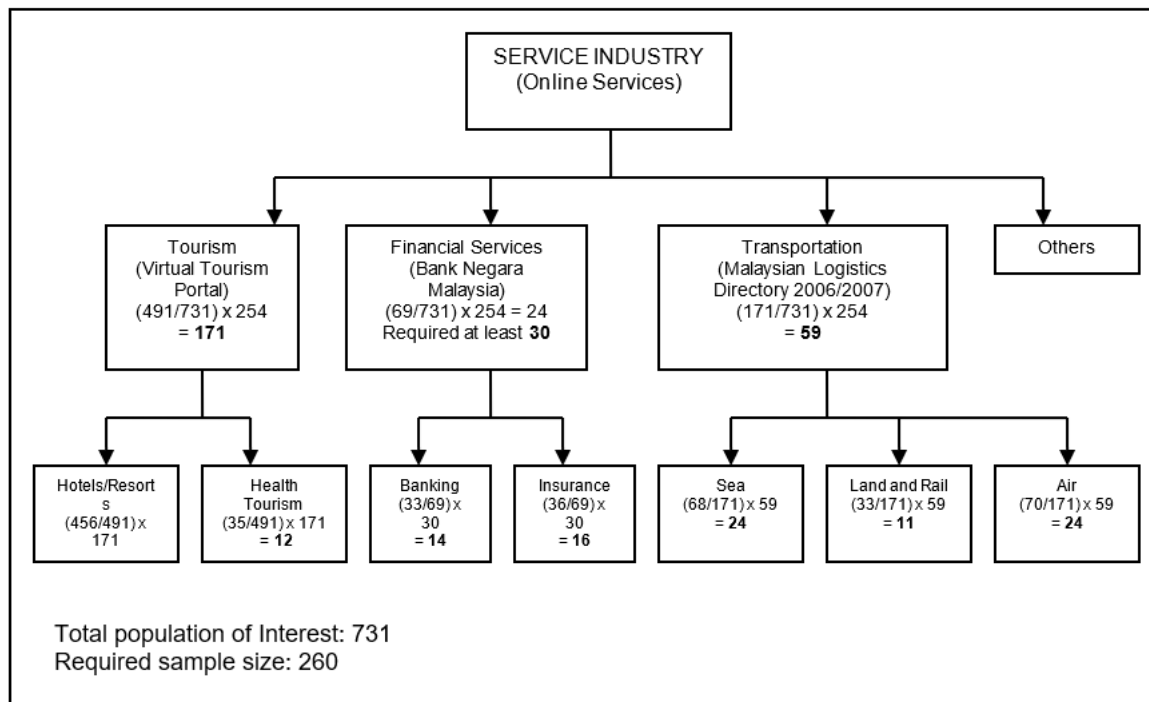

Figure 2: Stratified Random Sampling

3.2 Data Collection Procedure

Questionnaire is used as the instrument of primary data collection and is sent to Human Resource or Public Relations Manager to be distributed to higher-level personnel of selected companies under study. These personnel (CEO, President, Managing Director, CIO, CTO, Vice President of Information System, Information System Manager/Director/Planner, Other Manager in Information System Department, Business Operations Manager/COO, Administration/Finance Manager/CFO or other respective personnel related to E-commerce) are chosen because of their higher position in the company and normally involved in policy setting and know the overall aspects and performance of the companies.

3.3 Data Analysis Procedure

Data are coded and run using the Statistical Package for Social Sciences (SPSS) version 12.0.1. Hierarchical regression analysis is used to test the hypotheses. The following equations are developed to detect the moderator effects of E-commerce experience on "usage – performance" relationship (Hair, et. al., 1995; and Ping, 1996):

i.   Simple regression: $Y = \alpha + \alpha_1 X_1 + \varepsilon$
ii.   Add the third variable: $Y = \alpha + \alpha_1 X_1 + \alpha_1 X_2 + \varepsilon$
iii. Add the moderator effects: $Y = \alpha + \alpha_1 X_1 + \alpha_1 X_2 + \alpha_1 X_1 X_2 + \varepsilon$
iv.   Moderator effect can be detected by looking at:

4. Results

Sample Characteristics

The unit of analysis in this study is the click and mortar organizations in the service industry. The respondents varied concerning several demographics variables such as industry sector, and respondent position.

Table 1: Sample Characteristics (N=165)

	Frequency	Percentage %	Cumulative Percentage %
Industry Sector:			
Financial Services	38	23	23
Transportations	31	18.8	41.8
Tourism	96	58.2	100
Respondent Position:			
IT Managers (CIO/CTO/VP of IS; IS Manager, Director, Planner; Other Manager in IS Department)	50	30.3	30.3
Non-IT Managers (CEO, President, Managing Director; Business Operations Manager, COO; Administration/Finance Manager, CFO)	115	69.7	100

According to Hussey & Hussey, (1997), for mail distribution method, in order to avoid sample bias, response rate should be more than 10 percent. To be more specific, a table for determining returned sample size for a given population size for continuous and categorical data by Bartlett, Kotrlik, & Higgins, (2001) shows that the required minimum responded sample size (responses received) for a population of 700 should be 102, and for a population of 800, is 104.

In this research, although 260 is the required sample size, only 165 responses were received. To ensure that 165 of returned sample size is adequate to enable researcher to proceed with data analysis, few criteria were checked. According to Hussey and Hussey (1997), the response rate of 22.57 percent denotes that sample bias is avoided and the responses received represent the population adequately. Besides, based on Bartlett, Kotrlik, & Higgins, (2001), 165 responses fulfil the minimum requirement of returned sample size for a population of 731.

In looking at respondent's position, classification is based on category of Managers (IT Managers or Non-IT Managers). 69.7 percent of respondents are Non-IT Managers, and only 30.3 percent comes from IT Managers. To ensure that there is no bias between IT Managers and Non-IT Managers in answering the questionnaires, the data set is tested against the respondent's position (IS and non-IS managers). As suggested by Zhu et. al. (2004), one might believe that IS managers tend to have positive bias when evaluating the impacts of E-commerce on firm performance. Due to this, it is useful to carry out formal tests to examine whether answers offered by IS managers to attributes that measure E-commerce performance differ significantly from those offered by non-IS managers.

In doing so, the sample is divided into two groups; IS managers (CIO, CTO, VP of IS, IS manager, IS director, IS planner, and other manager in IS department) versus non-IS managers (CEO, president, managing director, COO, business operations manager, CFO, administration/finance manager, and other managers). Kolmogorov-Smirnov (KS) test statistic is used to test the null hypothesis that the sample distribution of the IS manager group is equal to (no significant difference) that of the non-IS manager group (Boes, Graybill and Mood, 1974; Norusis, 2002; Zhu et. al., 2004a). Basically, the KS test tries to determine if the two datasets (from IT managers and non-IT managers) differ significantly.

Table 2: KS Test Statistics*

		Firms' Performance
Most Extreme Differences	Absolute	.225
	Positive	.028
	Negative	-.225
Kolmogorov-Smirnov Z		1.330
Asymp. Sig. (2-tailed)		.058

*Grouping Variable: Respondents Position (IS Managers vs. Non-IS Managers)

In KS test, small significance values (<.05) indicate the two groups differ in either shape or location. In this research, since the significance value of 0.058 is larger than 0.05 (see Table II), it can be concluded that there is no bias between IS Managers and Non-IS Managers in answering the questionnaires. Looking at number of E-commerce experience, it is found that among the responded firms, the lowest number of E-commerce experience is 1 year and the highest is 11 years. However, majority of respondents (21.2 percent) falls under 3 years of experience. Table III shows the frequency distribution of E-commerce experience (in number of years).

Table 3: E-commerce Experience

No. of Years	Frequency	Percent	Cumulative Percent
1	7	4.2	4.2
2	18	10.9	15.2
3	35	21.2	36.4
4	19	11.5	47.9
5	20	12.1	60.0
6	22	13.3	73.3
7	12	7.3	80.6
8	10	6.1	86.7
9	13	7.9	94.5
10	6	3.6	98.2
11	3	1.8	100.0
Total	165	100.0	

Construct Reliability

Cronbach's alpha is performed on each construct to measure internal consistency reliability for the individual scales and the overall measures. As shown in Table IV, all the constructs scored above 0.70 and therefore are considered reliable in all aspects.

Table 4: Cronbach's Alpha for each Construct

Constructs	No. of Indicators	Cronbach's Alpha
E-commerce Usage	4	0.928
Firms' Performance	19	0.978

*E-commerce experience excluded due to single attribute of measurement (years)

Construct Validity

Construct validation is applied for the reason that content validity evidence alone is not adequate because it pertains to the content of the test whereas descriptions and decisions are made based on respondent's responses to the test items (Tu, 2002). Implementing the dataset of 165 useful responses, the data is examined using principal component analysis as the extraction technique and Varimax as the method of rotation. An exploratory factor analysis conducted in this study finds the scales loading with eigenvalues greater than 1.0. Items intended to measure the same construct demonstrated higher factor loadings ($\geq$.40) (Chong, 2005) on a single component.

Next, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, and anti-image matrices-anti-image correlation could be used as the indicator to determine good dimension. KMO varies from 0 to 1.0 and high values (close to 1.0) generally indicate that a factor analysis may be useful with the data. If the value is less than 0.50, the results of the factor analysis probably won't be very useful. If the overall KMO is 0.50 or higher, one can proceed with factor analysis. Also, the Kaiser-Meyer-Olkin (KMO) and Bartlett's test for Sphericity measure of sampling adequacy indicated a practical level of common variance. Table V shows those measures all factors have higher than recommended cut-off point, 0.50, which indicate the sampling adequacy for a satisfactory factor analysis to proceed and Bartlett's test shows all factors are significant that the correlation matrix is an identity matrix. Bartlett's test of sphericity tests the hypothesis that the correlation matrix is an identity matrix, which would indicate that variables are unrelated and therefore, unsuitable for structure detection. Small significance level (less than 0.05) indicates that a factor analysis may be useful with the data.

Table 5: Kaiser-Meyer-Olkin (KMO) and Bartlett's test for Sphericity Measures

Construct	KMO Test	Bartlett's test (sig.)
E-commerce usage	0.807	$\leq$ 0.001
Firms' performance	0.841	$\leq$ 0.001

*E-commerce experience excluded due to single attribute of measurement (years)

Hierarchical Regression Analysis

Data is next analyzed using hierarchical regression analysis. The steps taken to detect moderator effects are as follows (Hair, et. al., 1995; and Ping, 1996):

i. Development of simple regression: $FPER = \alpha + \alpha_1 ECU + \varepsilon$
ii. Adding the third variable: $FPER = \alpha + \alpha_1 ECU + \alpha_1 YEARS + \varepsilon$
iii. Add the moderator effects: $FPER = \alpha + \alpha_1 ECU + \alpha_1 YEARS + \alpha_1 (ECU)(YEARS) + \varepsilon$

Where:

FPER = Firms' Performance ; ECU = E-commerce Usage YEARS = E-commerce Experience

Table 6: Model Summary

Model Summary[d]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.576[a]	.332	.328	.81979368	.332	81.025	1	163	.000	
2	.694[b]	.482	.476	.72398441	.150	46.996	1	162	.000	
3	.719[c]	.517	.508	.70167261	.034	11.466	1	161	.001	1.524

a. Predictors: (Constant), ECU
b. Predictors: (Constant), ECU, YEARS
c. Predictors: (Constant), ECU, YEARS, ECU x YEARS
d. Dependent Variable: BPER

The result demonstrates that E-commerce usage significantly explained firm's performance with score of $R^2=0.328$. Thus, H_o1 is rejected in favour of H_A1. For moderating variable, E-commerce experience significantly moderates the relationship between E-commerce usage and business performance. Table VI shows that there is an increase in R^2 from 0.482 in model 2 to R^2 0.517 in model 3 (3.5 percent increase in R^2, $p<0.05$). Thus, H_o2 is rejected in favour of H_A2. It is found that E-commerce experiences (measured in number of years) significantly influence the relationship between E-commerce Usage and Business Performance. This is supported by the study on firm survival using evolutionary game theory by Kauffman et. al., (2002), which found that firms come to realize which strategies pay off and which do not through a process of trial and error. Firms would realize what works better and what does not by exploring, experimenting, examining market feedback and performance feedback; and learning from others' experience throughout a period of time. This could be the reason why E-commerce experience moderates the relationship between E-commerce Usage and Business Performance.

5. Discussion and Implications

In the literature, the significance of the link between IT usage and organizational performance has long been discussed (Keen & Scott, 1978; and Delone & McLean, 1992). Prior study on "Performance Impacts of Information Technology: Is Actual Usage the missing link?" by Devaraj and Kohli (2003) suggests that the driver of IT impact is not the investment in technology, but the actual usage of the technology. Actual usage is found to be a key variable in explaining the impact of technology on performance while omission of this variable might result a missing link in IT payoff analysis.

In short, the results suggest that E-commerce usage, E-commerce experience and business performance are closely linked. This will have implications on the firms planning to use or enhance utilization of their E-commerce technology. The results imply that the potential of E-commerce technology and usage towards improved business performance should not be overlooked. As E-commerce experience plays a significant role towards improved firm performance, younger firms cannot afford to delay their E-commerce development and utilization. In this respect, the government and industry associations can play a more pivotal role by creating awareness and rendering assistance to the firms.

In summary, this study meets the general objective, finding out the influence of E-commerce experience on the relationship between E-commerce usage and firms' performance of service industry in Malaysia. E-commerce usage has significant influence on firm's performance, whilst E-commerce experience is found to moderate the relationship between E-commerce usage and firms' performance, evidenced by an increase of R^2 of firms' performance from 48.2 percent to 51.7 percent (an increase of 3.5 percent).

Conclusion and Suggestions for Future Research

This study allows the researcher to provide empirical evidence concerning the function of E-commerce experience (in years) in moderating the relationship between E-commerce usage and business performance. Future researchers are encouraged to do advance exploratory thoughts and concepts discussed in the current study. Recommendations for potential future research include empirical investigations on the use of broad dataset from developed, developing, and newly industrialized countries to find out cross-countries differences; and the inclusion of other moderator variables such as industry sector and E-commerce implementation stage (clear understanding of strategic goals, experimentation, integration, and competitive advantage stages).

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