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Citation: *AIP Conference Proceedings* **2016**, 020069 (2018); doi: 10.1063/1.5055471

View online: <https://doi.org/10.1063/1.5055471>

View Table of Contents: <http://aip.scitation.org/toc/apc/2016/1>

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A Comprehensive Review on E-Commerce Research

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Abstract. Based on the review on the available literature sources, this paper comprehensively discusses the identified studies which have been done in the context of e-commerce adoption. Seventy-three (73) papers have been extracted from Elsevier's Scopus database. Those papers were analyzed based on the distribution of publication, the scope demography, the research approach and research method and the adapted theory or conceptual framework. The result of the study found that publications in e-commerce research rose to peak year in 2015. Most of the e-commerce adoption studies were carried out in Southeast Asia (26%) and determining factors of e-commerce adoption was the most popular theme across region. Despite of its popularity, the findings were inconclusive in terms of specific determinants that significantly contributed towards e-commerce adoption. However, it is found that variables from the organizational context and external environment context significantly contributed towards e-commerce adoption. Most of the studies preferred quantitative approach (71.2%), especially in employing questionnaire methods. The result of the theory analysis reveals that the most frequently used conceptual framework was TOE framework, while many studies (24.7%) did not take into account of specific conceptual framework. Only a few researchers (11%) had used self-developed conceptual framework rather than existing framework. In term of scope, majority of the studies focused on the factors that encourage e-commerce adoption. Such limited scope of studies efforts could only provide a partial understanding of the diffusion process. Future research shall go further to investigate the post-adoption stages of e-commerce. The limitation of single database and keywords might fail to give more extensive retrieved number of articles in the study.

INTRODUCTION

The Internet has changed the business environment and further created opportunities for businesses throughout the world. The worldwide development in information technologies has introduced the electronic commerce (e-commerce) phenomenon. Although the Internet was common among the public in 1994, e-commerce became a phenomenon in developed countries only by 2000. A great number of businesses in the United States and Western Europe started to represent their services online and public started to purchase goods and services over the Internet using secure connections and electronic payment services. The overwhelming public attention and rapid use of the internet over the years has contributed much in facilitating electronic commerce in global business environment [1]. Now, e-commerce is growing rapidly, affecting all industries in terms of changing the business model of organizations [2].

E-commerce has a great deal of advantages over the "brick and mortar" shopfront. Effective e-commerce adoption is beneficial to organizations in terms of substantial cost savings, revenue maximization, and improvement in product delivery and customer service [3]. Therefore, e-commerce is a significant area for research due to its potential positive impact on business performance. Prior studies have empirically confirmed the factors affecting e-commerce adoption [4], [2]. However, much is not known on the overall review on e-commerce adoption studies, as this review has not been done by previous studies. Thus, the novelty feature for this study is the fact that it is the first attempt to comprehensively review on the previous studies on the e-commerce adoption studies. Therefore, this study's approach is unique as it focuses on examining the prior studies published in Scopus databases. Hence the novelty of this work stems from the fact that it is essential to not only investigate the determinants and barrier of e-

commerce adoption but also any other relevant issues in e-commerce adoption process. Substantial understanding of activities and factors associated with existing e-commerce adoption are important to guide future e-commerce pre-adoption, during implementation and post-adoption efforts and to suggest directions for further research in the field.

The structure of this paper is as follows: section two illustrates the background of e-commerce adoption framework. Section three discusses the method. Section four analyses the findings and the last section conclude the paper and present the limitation and future direction of the study.

E-COMMERCE ADOPTION FRAMEWORK

According to [3], there are two adoption frameworks underpinning the e-commerce adoption research, namely diffusion of innovation (DOI) and technology acceptance model (TAM). The five factors of DOI (relative advantages, compatibility, complexity, trial-ability, and observability) imply that the traits of an innovation itself would determine its adoption. On the other hand, technology acceptance model (TAM) views that the extent of technology acceptance is affected by two key determinants, namely perceived usefulness (the extent of belief that application of particular system would enhance ones' job performance) and perceived ease of use (the extent of perceived difficulties and challenges in using a particular system). However, due to the limitation of these two determinants in explaining various external contextual influences, TAM has been extended (such as TAM2, TAM3 and Unified Theory of Acceptance and Use of Technology [UTAUT]) through introduction of additional external variables to further improve its predictive power [5].

Despite of well received in adoption studies, DOI and TAM share mutual limitations [5]. Similar to TAM, DOI also focuses on technology perspective and therefore unable to take into account of various external contextual influences (the organizational and environmental perspectives). Furthermore, both models examine technological determinants that may influence e-commerce adoption at an individual level. Therefore, it is difficult to explain the organization top managements' perception on IT. Furthermore, the decisions to adopt innovative technologies into organization are bureaucratic, subject the consensus of the management and board of directors of the organization rather than individual end user.

Being consistent with DOI, Technology-Organization-Environment (TOE) framework has been widely applied in business research as well [3]. TOE could explain an owner's intention to adopt e-commerce from the perspectives of technological, organizational, and environmental contexts. The technology context describes both internal technologies (the existing practice, equipment and technological infrastructure possessed by the organization) and external technologies relevant to organization. The organization context refers to the resources, scope, size, culture, and structure of the organization, employees' knowledge of e-commerce and role of management; while the environment context includes management support, organizational and national readiness, government support, and environmental pressures derived from partners, customers and competition. TOE framework has been proved to be a useful theoretical model in explaining and understanding user behavior in technology implementation through extensive empirical support [4].

METHODS

A search has been conducted in the study using Elsevier's Scopus database for E-commerce adoption studies that were carried out between the years 2011-2016. Figure 1 indicates the selection process of the articles reviewed in the study. The rationale of using Elsevier's Scopus database is due to its wider coverage of journal range, offering about 20% more coverage than Web of Science in keyword searching and citation analysis [6]. The keywords used for the search were as follows: [title (e commerce) and title (adoption)]. The selection has been limited to articles and conference papers between the years 2011-2016 by setting [doctype (ar or cp) and pubyear>2010]. The search for articles has been conducted in November 2016. Accordingly, there is a total 106 research articles which are relevant with e-commerce adoption in one way or another. These publications have been filtered to only full-text articles that can be accessed and 88 publications have been obtained eventually.

Next, the full text publication being narrowed down based on the inclusion and exclusion criteria. Inclusion criteria consists of articles that present the e-commerce adopted within business firms and articles which have proposed and tried to validate proposed research models or frameworks empirically. Meanwhile, exclusion criteria consist of articles which are only conceptual paper or review paper, articles which listed e-commerce as keyword, but were in fact discussing about m-Commerce and t-Commerce. Finally, a total of 73 relevant studies has been

obtained for literature analysis. The literature analysis is based on full text reading and uses of Microsoft Excel for documentation and summary purpose.

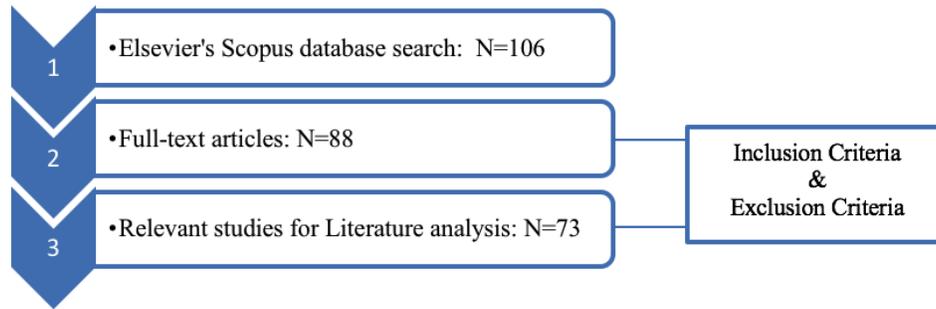


FIGURE 1. Selection Process of the Articles

RESULTS

The data collected is presented according to the distribution of publication between year 2011 to 2016, the demography of the studies; the research approach and research method and the adapted theory or conceptual framework. The analysis is conducted to identify literature gap that will provide direction for future research.

The Distribution of the Year of Publication

The distribution of journal articles and conference papers between year 2011 and 2016 in the area of e-commerce adoption is shown in Table 1. The number of publication has been stable from 2011 to 2016 except for a significant fall to the extent of below a total 10 articles in 2013 and 2014. It started to increase and peak for the following year in 2015 with 16 publications. It is expected that the number of publication indexed in Elsevier's Scopus database for 2016 is subject to further moderate increase as there will be articles which are not in full text access yet in November 2016 or in coming publication issues.

TABLE 1. Distribution of Publication by Year

Year	Number of Publication	Percentage (%)
2011	14	19.2
2012	14	19.2
2013	8	11.0
2014	9	12.3
2015	16	21.9
2016	12	16.4
Total	73	100.0

The Scope Demography of Studies

Researches on e-commerce adoption have been studied worldwide both in developed and the developing countries. The analysis of the literature from the perspective of geographical context provides would provide further understanding on the focus or theme of studies being conducted in different region. Therefore, differences of between the research themes of regional areas could be highlighted.

Comparative study across geographical region received the least focus (merely 4.1%) [7], [8], [9]. The themes of comparative studies were not similar with the themes that were popular in other geographical region. For instance, [7] investigates common critical success factors for e-commerce system in SMEs in Australia and China within the setting of service industry. Instead of studying various variables that render to e-Commerce adoption, [8] employs social network classifiers to predict e-commerce adoption. [9] compares the B2B e-commerce adoption process of the grocery industry in Indonesia and Bahrain, which are relatively different in social, economic, cultural, political, legal and technological context.

TABLE 2. Distribution of Geographical Context of Studies

Geographical Region	Number of Publication	Composition (%)
Africa	8	11.0
America (5 from the US, 1 from Canada and 1 from Chile)	7	9.6
Australia	1	1.4
Comparison/Combination Across Region	3	4.1
Middle East	18	24.7
Other Asian	8	11.0
Southeast Asia	19	26.0
United Kingdom and Europe	9	12.3
Total	73	100

As shown in Table 2, most of the e-commerce adoption studies were carried out in Southeast Asia, contributing 26% of the selected articles for this literature analysis. Most of these researches [10], [11], [12], [13], [14], [15], [16], [17], [18], [19], [20], [21], [22] in the Southeast Asia focused on driving factor of e-commerce adoption, except for minority that respectively investigated readiness for e-commerce adoption [23], [24], [25], e-commerce adoption level [26], barrier of e-commerce adoption [18], and post-adoption performance and business impact [27]. The popularity in studying the determinants that contribute to the implementation of e-commerce implies that the firms in developing countries are in demand for e-commerce to fulfil their business need [10]. Furthermore, this phenomenon suggests that not only academicians but business owners and management in Southeast Asia are well aware of the strategic value of e-commerce, being willing to engage in adoption as well as investigation of e-commerce.

TABLE 3. Scope of the E-Commerce Adoption Studies in Southeast Asia, Middle East, Africa and Other Asian Countries

Theme	Southeast Asia	Middle East	Africa	Other Asian Countries
Assessment of e-commerce adoption	1	2	1	0
Barrier of e-commerce adoption	2	4	3	1
Driving factor of e-commerce adoption	13	13	4	4
Performance and business impact	2	0	0	1
Readiness for e-commerce adoption	3	0	0	0
Required organization capabilities	0	0	0	2
Total	21	19	8	8

It is found that variables from the organisational context and external environment context significantly contributed towards e-commerce adoption. This is the mutual findings of the studies conducted in Southeast Asia. Nevertheless, it is not conclusive in terms of which specific factors from these contexts are the determinants for e-commerce adoption. This is because despite of the similarity of underlying theoretical framework (majority adapted TOE framework) of the studies, academicians have adapted different variables, varying from the range of minimum 5 item of variables [21] to the extent of 20 item of variables [12]. An only common factor from the organisational context that can be recognised is the role of management.

Also, the number of studies in Middle East was close to that of Southeast Asia. E-commerce adoption studies in this part of the world had the same trend with Southeast Asia. Driving factor of e-commerce adoption has received much attention in the pre-implementation stage (refer to [28], [29], [30], [31], [32], [33], [34], [35], [36], [37], [38], [5]). However, it is interesting to note that none has been studied under the theme of evaluation of performance and business impact.

Number of studies from other Asian countries and African countries were almost equivalent. The scope of studies conducted in Africa focused on driving factor of e-commerce adoption [39], [40], [41], [42]. Besides, it seems that the scope on the barrier of e-commerce adoption [43], [44], [45] was also fairly attractive for researchers in Africa. Likewise, to Africa and Southeast Asia, studies in other Asian countries, such as Sri Lanka, Taiwan and China, focused on driving factor of e-commerce adoption [46], [47], [48]. In contrast to other developing countries, some of the Asian countries have already initiated to evaluate e-commerce from the resource-based perspective, focusing at the required organizational capabilities at the stages of pre and post-implementation. For examples, Cui and Pan's process model [49] demonstrated that the predominant competitive environment at each phase of e-commerce adoption requires a particular focal capability. From the investigation of the importance improvisational capabilities (the alignment between the environment and the capability) on the outcome of e-commerce adoption,

[50] found that Taiwanese companies learn to use e-commerce more creatively through improvisation, and in turn contribute to higher performance.

On the other hand, as shown in Table 4, developed countries such as Australia, European countries, and North America had relatively lower percentage of studies which focused on the determinants of e-commerce adoption [51], [52], [53], [54], [55], compared to 57.9% of that conducted in Southeast Asia. The themes of research were much more diversified. Explicit differences include the extension of study towards the driving factors of non-adoption [56], [57], development and validation of novice theoretical model (eCAM, the e-commerce attraction model) [58], and the potential interdependency between m-Commerce and e-commerce [59]. Furthermore, contrasting to studies in Southeast Asia which only assessed the adoption level of e-commerce, the studies of that in developed countries were much more advanced as they have extended into the scope of adoption level improvement [60].

TABLE 4. Scope of the E-Commerce Adoption Studies in Developed Countries

Theme	America	Australia	UK and Europe	Percentage (%)
Driving factor of e-commerce adoption	1	0	4	27.8
Comparison of theoretical model	1*	0	0	5.6
Development of e-commerce theoretical model	1	0	0	5.6
Interdependency between m-commerce and e-commerce	1	0	0	5.6
Driving factor of e-commerce adoption	1	0	2	16.7
Improvement of e-commerce adoption	0	0	1	5.6
Assessment of e-commerce adoption	0	1	1	11.1
Performance and business impact	3	0	1	22.2
Total	8	1	9	100

*Including a study from Chile (developing country)

The Research Approach and Research Method

Table 5 presents the distribution of research approach and research method applied in e-commerce adoption studies. It indicates that the studies preferred quantitative approach (71.2%), especially in employing questionnaire methods (51 out of 52 quantitative studies). There were various means to deliver questionnaire to targeted sample, such as via in person, fax, mail, e-mail, social media and delivered hardcopy. Online survey was the most common method than hardcopy survey as it could ensure quick response from the respondents and efficiency in data collection.

On the other hand, qualitative approach covers 17.8% of selected review. Most of the selected studies investigated respective research questions through multiple case studies [61], [62], [19], [21], [63], [38], [64]. Due to the limited number of qualitative studies in e-commerce adoption, future research in this area would be recommended to adopt qualitative approach of data collection. This is because further qualitative studies would enhance the understanding of the view of stakeholders regarding adoption, during implementation and post-implementation issues of e-commerce. For instance, case study method would be particularly useful when the investigated phenomena are within the context of the participants' perspectives and experiences are complex and social in nature [62].

TABLE 5. Research approach and research method of the studies analyzed

Research Method/Research Approach	Mixed	Qualitative	Quantitative
Case study		7	
Focus group		1	
Interview		2	
Secondary data		1	1
Secondary data and interview	1	2	
Questionnaire			51
Questionnaire and focus group	2		
Questionnaire and interview	4		
Questionnaire; interview; secondary data	1		
Total	8	13	52

The least used approach in the selected studies (11%) was the mixed approach. Similar with quantitative approach, the questionnaire method was the dominant instrument employed. This is evident from Table 5 as 7 out of

8 mixed approach studies combined the instrument of questionnaire with another method [65], [30], [43], [54], [7] [5]. Furthermore, [31] even combined the use of the questionnaire, interview and secondary source of data.

The Adapted Theory/Conceptual Framework

There are many theories that are widely used in e-commerce adoption. They could be classified into 4 categories: technological frameworks, organizational and managerial frameworks, environmental and cultural frameworks, and interactionism frameworks [5]. The result of the analysis presented in Table 6 reveals that the most frequently used conceptual framework was TOE framework. This model is originally constructed by Tornatzky and Fleischer in 1990 to examine contextual factors and it has been widely used in Internet-based innovation adoption studies [5]. Table 6 also indicates the minority of past researchers (11%) had used self-developed conceptual framework rather than existing framework. On the other hand, many studies (24.7%) did not take into account of specific conceptual framework.

TABLE 6. Analysis of adapted theory/conceptual framework

Theory/Conceptual Framework	Frequency	Percentage (%)
No model	18	24.7
TOE	16	21.9
Self-developed model	8	11.0
DOI	3	4.1
Stage model of e-commerce adoption	3	4.1
TAM	2	2.7
TAM and TOE	2	2.7
Theory of planned behavior (TPB)	2	2.7
Business Environment framework	1	1.4
Combination of various models	1	1.4
DOI and National Institutional Perspective (NIP) theory	1	1.4
DOI and TAM	1	1.4
E-commerce Business Satisfaction model	1	1.4
EDI and TOE	1	1.4
Inter-organizational Systems adoption process model	1	1.4
Network based classification techniques	1	1.4
Organization Information Processing Theory	1	1.4
Resource-based theory	1	1.4
SOG and TOE	1	1.4
Stakeholder Theory	1	1.4
Structuration theory (3 dimensions of interactions)	1	1.4
TAM (subset)	1	1.4
The European Union e-commerce impediments framework	1	1.4
TPB and TOE	1	1.4
TPB and TRA	1	1.4
Treatment effects model	1	1.4
UTAUT and PERM	1	1.4
Total	73	100

CONCLUSION

Despite of the claim regarding the uneven diffusion of the Internet and e-commerce between developed world and poor developing countries [5], most of the e-commerce adoption studies (26% of the selected articles) were actually carried out in Southeast Asia (developing countries). Therefore, it seems that digital divide concerns no longer relevant in recent years as businesses in developing countries have taken the opportunity offered by e-commerce. Nevertheless, contrasting to studies in Southeast Asia, the studies in developed countries were much more advanced as they have started to seek for adoption level improvement. Post-implementation stage of e-commerce has begun to receive attention in developed countries while studies in developing countries still focused on pre-implementation stage of that.

Despite of the popularity of the research theme of determinants of e-commerce adoption across regions, the findings are inconclusive due to the difference of variables being studied in researches (even though the same

conceptual framework was employed) and the difference of context of studies. However, it is found that variables from the organizational context and external environment context significantly contributed towards e-commerce adoption.

It is found that the majority of the selected studies in this literature analysis has been based on a single perspective (at the adoption stage), particularly focused on the factors that encourage e-commerce adoption. Albeit the importance of the understanding towards the behavior or decision regarding 'intend to adopt or not' and 'adoption versus non-adoption', such efforts can only provide a partial understanding of the diffusion process and therefore suggesting a need for a further exploration of the post-adoption stages [5]. Future research shall go further by moving beyond the classical intention and adoption decision that looks at determinants of extent of use to take into account for various stages in the adoption process from the initial adoption to post-implementation of e-commerce system.

There are some limitations in this literature analysis. Since the study has used "e commerce" and "adoption" in the search for articles and conference papers from the Elsevier's Scopus database, studies which use the other interchangeable keyword such as "implementation" are therefore excluded from this literature analysis. This limitation possibly has minimized the retrieved number of articles in the study. Besides, the limitation of single database might not give more extensive number of related papers.

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