

When Construction Material Traders Goes Electronic: Analysis of SMEs in Malaysian Construction Industry

Dzul Fahmi Nordin, and Rosmini Omar

Abstract—This paper analyzed the perception of e-commerce application services by construction material traders in Malaysia. Five attributes were tested: usability, reputation, trust, privacy and familiarity. Study methodology consists of survey questionnaire and statistical analysis that includes reliability analysis, factor analysis, ANOVA and regression analysis. The respondents were construction material traders, including hardware stores in Klang Valley, Kuala Lumpur.

Findings support that usability and familiarity with e-commerce services in Malaysia have insignificant influence on the acceptance of e-commerce application. However, reputation, trust and privacy attributes have significant influence on the choice of e-commerce acceptance by construction material traders. E-commerce applications studied included customer database, e-selling, e-marketing, e-payment, e-buying and online advertising. Assumptions are made that traders have basic knowledge and exposure to ICT services. i.e. internet service and computers. Study concludes that reputation, privacy and trust are the three website attributes that influence the acceptance of e-commerce by construction material traders.

Keywords—Electronic Commerce (e-Commerce), Information and Communications Technology (ICT), Small Medium Enterprise (SME)

I. INTRODUCTION

SIMILAR to other emerging economies that strive to become high income nations, Malaysia also promotes and facilitates the wider adoption and usage of ICT in all its critical 12 NKEA (National Key Economic Areas) growth areas. The motive of this plan is to shift from a production base economy to a competitive knowledge based economy. This paper focuses on the construction sector which is one of the 12 NKEA sectors.

Commercial activities on the internet are rapidly increasing all over the world. E-Commerce becomes a strong and easy way of rapid business. For organizations in particular, the New Economy brings infinite and exceedingly demanding competition and opportunities on a global scale.

Dzul Fahmi Nordin is a PhD graduate and is pursuing his PhD at International Business School, Universiti Teknologi Malaysia, 50300 Kuala Lumpur (e-mail: dzul1974@yahoo.co.uk).

Rosmini Omar (PhD) is an Associate Professor at International Business School, Universiti Teknologi Malaysia, 50300 Kuala Lumpur. She is also an adjunct at the College of Business, Minot State University, North Dakota, USA and Helsinki School of Business, Finland. (e-mail: rosmini.omar@minotstateu.edu).

E-Commerce, if it has been well utilized, will lead to long-term success in terms of business profitability and competitive advantage in the marketplace. Nonetheless, it is interesting to find that no solid empirical work to study the acceptance of e-commerce by SME sized construction material traders in Klang Valley has been made, so far. At first glance, we find that most of the traders still exercise manual commerce procedures and base their business marketing on traditional words of mouth and personal business relationships.

This study is carried out based on the Technology Acceptance Model (TAM) theory. TAM is an influential extension of [3] Theory of Reasoned Action (TRA). It was introduced and developed by Fred Davis in 1986. TAM is a model derived from a theory that addresses the issue of how users come to accept and use specific technology. The model suggests that when users are presented with, for instance, a new software package, a number of variables influence their decisions about how and when they will use it. There are two specific variables, perceived usefulness and perceived ease of use, which are hypothesized to be fundamental determinants of user acceptance [8].

TAM has been a viable framework for understanding the adoption of new technologies, especially those associated with information systems in the workplace [27]. TAM model suggests connections between belief constructs, attitudes and consciously intended behaviors [30].

Davis (1989) proposed two constructs in TAM: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). External variables are proposed to influence technology adoption behavior indirectly by affecting beliefs and attitudes. Although TAM has proven to be a suitable theoretical foundation for the adoption of Internet technologies [17]-[20], this model may not always explain a phenomenon of technology adoption significantly.

Several researchers have replicated Davis's original study [7] to provide empirical evidence on the relationships that exist between usefulness, ease of use and system use [1]-[7]-[23]-[25]-[26]. Much attention has focused on testing the robustness and validity of the questionnaire instrument used by Davis.

Adams et al. [1] replicated the work of Davis [7] to demonstrate the validity and reliability of his instrument and his measurement scales. They also extended it to different settings. By using two different samples, they demonstrated the internal consistency and replication reliability of the two

scales. Hendrickson et al. (1993) found high reliability and good test-retest reliability. Szajna (1994) found that the instrument had predictive validity for intent to use, self-reported usage and attitude toward use.

Against this background, this paper intends to adopt the tested framework developed earlier by such streams of empirical work via the lens of technology adoption phenomenon in the construction sector of an emerging economy, Malaysia. We focus on Klang Valley, Malaysia because this location is the hub of business and entrepreneurial activities spur. The rest of this paper is divided into three sections. The next section invokes the statement of issues. Reviews of relevant literature follows sequentially, Based on the literature review, we present the conceptual framework and methodology of the study. Finally, we discuss the findings and address the implications in the concluding section.

II. PROBLEM STATEMENT

E-commerce in the construction sector has been widely applied in Western developed countries especially in the United States of America. Examples of such companies include (URI) United Refrigeration Incorporated through its website www.uri.com and HD Supply through its www.hdsupplysolutions.com websites to name a few. Through their successful e-commerce application, business is simplified to provide better, faster services to the customers as well as suppliers. It also would lead to less corruption, increased transparency, greater convenience, revenue growth, and operational cost reduction. These are only few of the advantages that E-commerce might bring if it is implemented.

E-commerce offers such great benefits that will totally change the way business is handled. However, even though E-commerce has been known to result in wealth of benefits, the user's adoption of it is still not at a promising level due to the lack of proper knowledge, education and skilled owner-managers and employees within the enterprise or termed as "skills access" barrier [18]. This is the realistic view in some settings. What factors could eclipse this level of e-commerce adoption in some particular settings? What could have caused the gap in the acceptance of e-commerce application by these SME construction materials traders?

III. LITERATURE REVIEW

E-commerce is the buying and selling of products or services over electronic systems such as the Internet and other computer networks. E-commerce services include technologies such as electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. Modern electronic commerce typically uses the World Wide Web at least at one point in the transaction's life-cycle, although it may encompass a wider range of technologies such as e-mail, mobile devices and telephones as well. (Wikipedia, 2012)

In today's globalized market, E-Commerce offers competitive advantage due to access to global market. Increasing rate of online business transactions globally and the innovative attitude of the customers are pursuing organizations to adopt E-Commerce to entertain global business. The adoption of E-commerce requires proper business models as well as other strategies that can facilitate this technology for businesses [4]. As such, E-Commerce practices act slowly towards the maturity phase. Organizations are reluctant to invest in E-Commerce and they prefer to wait and see approach to the adaptation of E-Commerce.

Most of the studies [11]-[13]-[16] have been conducted on the issues of E-commerce in the field of information system, marketing and management science. The studies identified five factors which can be affective to boost E-Commerce practices in Malaysia. The attractive factors are global production, protecting start-up, detain business and consumers, human resource training, government policies and regulations.

In the related study, the authors pointed out some barriers like socio economic factors, cultural issues and e-readiness are the obstacles of E-Commerce in Malaysia [13]. Interestingly, E-Commerce is still in the decisive stage in developing countries. Other related E-commerce research finds that there are some differences in E-commerce practices between developing countries and developed countries [4]. Traditional business model, conventional consumer behaviors and consumer expectation are the differences between developed and developing countries [15]. The researchers have identified E-Commerce strategies, which may have a strong impact on E-Commerce profitability and competitive advantage as well as development [16].

By using E-Commerce, organizations can save costs, improve procurement efficiency, offer better customer services and enjoy global access to information [19]. Some researchers found that most companies in Malaysia are technology followers instead of pioneering technology in E-Commerce because of many barriers that includes fear to invest in such an indefinite space [12]. Traditional businesses are also hesitant to get on investment in E-Commerce. Businesses are also hindered in adopting the technologies, due to the impediments that arise as a result of the many barriers within the organizations that is the internal barriers like organizational performance, strategies and management.

External barriers are mostly due to infrastructure, technology, economical, political, legal, social and cultural factors that exist in the country [21]. E-Commerce needs a proper strategic foundation to utilize its full potential. In a study on E-Commerce stimulus and practices among the small and medium enterprises (SMEs) in Malaysia, most of the respondents cited not many exhibits success stories of E-Commerce. Some respondents also cited that low Internet access among buyers and lack of knowledge are the main barriers to the E-Commerce [2].

E-commerce experience has been found to moderate the relationship between e-commerce usage and business performance [22]. The related study coined the issues of

leadership and waste management as more critical to SMEs at the stage of the development of E-Commerce capability. Those SMEs who have developed E-Commerce capability more strategically are enjoying the benefits of E-commerce [29]. Operations-based competitiveness in E-Commerce requires the development of competencies, those competencies are supportive and there is linkage between competencies in E-Commerce operations and strategy [24].

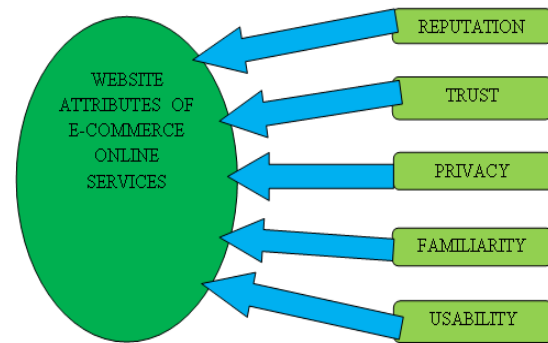
E-commerce represents opportunities to remain swift. Its evolution is forcing many nations to change their policies for the business and socio-economic development [9]. However, it is incomprehensible for any government to develop a huge and vigorous information society except only when the consumers and companies find the value of the digital economy. Companies that develop full potential of the internet and exploit E-commerce, they need to develop management strategies and integration between Business and IT plans. It may help to motivate the customers to use E-commerce applications for their needs. Country related elements have also a great impact on the implementation and development of E-commerce. E-commerce influenced by economic development, consumer behavior and traditional business inside the country [28].

IV. RESEARCH THEORETICAL FRAMEWORK

Based on the TAM model, this study aims to focus on the impact of website attributes that influence the Malaysian construction material traders' acceptance on the application of e-commerce. The objective of this study is to test the significance of the influence of the five (5) e-commerce acceptance attributes below:

- a. A1: Influence of Reputation attribute on the acceptance of e-commerce services by construction materials traders.
- b. A2: Influence of Trust attribute on the acceptance of e-commerce services by construction materials traders.
- c. A3: Influence of Privacy attribute on the acceptance of e-commerce services by construction materials traders.
- d. A4: Influence of Familiarity attribute on the acceptance of e-commerce services by construction materials traders.
- e. A5: Influence of Usability attribute on the acceptance of e-commerce services by construction materials traders.

The model framework for the studied attributes can be represented by Fig. 1 below. (adopted from Flavian and Gurrea (2007)).



Dependent Variable

Independent Variables

Fig. 1 Tested Attributes Framework

V. METHODOLOGY

The data collection for this research is carried out through a quantitative nature that is based on survey technique. The survey will be carried out through a self-administered and e-mailed questionnaire, which is meant to be answered by small and medium enterprise construction traders and construction contracting companies.

The sample collected is based on non-probability convenient sampling method. Data are collected from a total 100 construction industry players mainly from small and medium enterprise construction traders and construction contracting companies in Klang Valley and Selangor, Malaysia. The geographical location of the respondents concentrated mainly in the Klang Valley. The geographical coverage of the survey correlates with the distribution in the Klang Valley region of Malaysia since Klang Valley is the IT hub of Malaysia with a 50% share of the Internet business (Eighth Malaysia Plan, 2001). The non-probability sample has a known and equal chance of being selected as a subject. The time dimension of research would be cross-sectional due to the fact that this study can be carried out in which data are gathered just once in order to meet the research objective.

The analysis method used for this survey is based on a correlation coefficient and a multiple regression analysis. The correlation coefficient will measure the relationship between variables through degree of association. Multiple regression analysis will determine the causal relationships between more than two independent variables and one dependent variable. It is an analytical tool used to predict the variance in the dependent variable that is explained by a set of predictors. Multiple regression analysis will help to examine the simultaneous effects of the independent variables of research on the dependent variable.

Such method analysis also will help to examine the simultaneous effects of the independent variables (commercialization support structure and modal, culture barriers, researcher practices, management practices, research achievement and university-industry relationship barriers.) Multiple research methods will be utilized for this research which includes multiple regression, analysis of variance

(ANOVA), paired t-test and t-test to determine the significant levels of associations and interactions between variables tested. Multiple regressions are an analytical tool use to predict the variance in the dependent variable that is explained by a set of predictors.

VI. FINDINGS AND CONCLUSION

This study has shown that trust, reputation and privacy of e-commerce services by the construction material traders in Malaysia have a significant influence on the acceptance of the e-commerce services. This result supports the literature review and also the hypotheses. However, the results project different findings in comparison to those elucidated by Flavian and Gurrea (2007) in their setting. This can be explained by the cultural difference between Malaysia and Spain. The users in Malaysia are critical about the trust, privacy and reputation of a particular e-commerce websites in choosing the online services available.

However, through quantitative surveys, most traders agree that e-commerce will help to expand their business but they are still reluctant to invest in the technology as they feel that it is not worth the investment particularly the maintenance and upgrading aspects. They feel that the trust to the e-commerce application service provider is not there and they might be forced to further invest into the system after installation for system repairs and upgrades with uncertain payback period.

On the attribute of reputation, most traders agree that the e-commerce service will improve their reputation and prepare them to compete with the globalized market. On the attribute of privacy, most traders are still wary about system security and are afraid that their privacy to their online information and data is still unsecured from online hackers. Additionally, some traders would like to have privacy to their pricing strategies in order to avoid direct online price competition.

It is also noted that familiarity and usability does not have significant influence on the choice of E-commerce services in Malaysia. The attribute of usability and familiarity are insignificant as the acceptance factors as all of the traders are IT literate with 100% of the traders have at least some exposure to Information and Communication Technology such as internet and e-mail services.

As a conclusion, the concluded model framework from this study can be described as the Fig. 2 below:

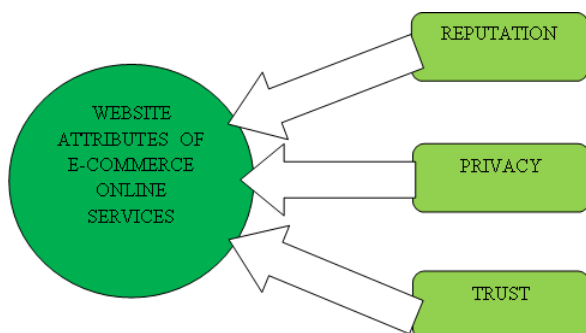


Fig. 2 Concluded Model Framework

Based on the findings, Malaysian government can help to boost the adoption of e-commerce by the construction traders through enforcement of electronic governance that offers higher security features as well as introducing a stricter enforcement arm to enforce and guard against cyber scams and crimes. Strategically, construction traders can also look into the possibilities of working with other construction industry players such as Construction Industry Development Board that can prepare a centralized data center for construction traders that offers regulated e-commerce security and enforcement. It is envisioned that within the next 5 years the next generation of construction traders such as Generation Y will catch on the strategic advantages of e-commerce as they are more techno savvy than the existing business founders. The education policy should also consider incorporating the basic knowledge of computing skills in order to entice interest amongst students on the advantages of ICT and e-commerce especially. Aside from the mentioned recommendations, Malaysian government should also provide continuous supports and incentives such as financial incentives in the form of soft loans for technology adoption as well as tax breaks for implementation of e-commerce systems. These could help to promote and improve the adoption of e-commerce among construction materials traders in Malaysia.

REFERENCES

- [1] Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use, and usage of information: A replication. *MIS Quarterly*, 16(2), 227-247.
- [2] Ainin Sulaiman, Noor Ismawati Jaafar and Parveen Kadam. Factors Affecting Online Purchasing Among Urban Internet Users in Malaysia. Special Issue of the International Journal of the Computer, the Internet and Management, Vol. 13 No.SP3, November, 2005
- [3] Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs: Prentice-Hall, Inc.
- [4] Carla Ruiz Mafé, Silvia Sanz Blas, (2006) "Explaining Internet dependency: An exploratory study of future purchase intention of Spanish Internet users", *Internet Research*, Vol. 16 Iss: 4, pp.380-397.
- [5] Carlos Flavian and Raquel Gurrea (2007), "Reading newspaper on the Internet: the influence of web sites' attributes", *Internet Research*, Vol 18 No 1, pp. 26-45.
- [6] Davis, F.D. (1986) *Technology Acceptance Model for Empirical Testing New End-User Information System: Theory and Results*. Cambridge, MA: MIT Sloan School of Management.
- [7] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-339.
- [8] Davis, F. D., & Arbor, A. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, September.
- [9] Dimitrios Xanthis and David Nicholas, (2004). Evaluating internet usage and e-commerce growth in Greece. *Aslib proceedings: New Information Perspectives Vol 56. No 6.* pp. 356-366.
- [10] E. Cristoal, C. Flavian, and M. Guinaliu, "Perceived e-service quality: Measurement validity and effects on consumer satisfaction and web site loyalty", *Managing Service Quality*, (2007), Vol. 17, No. 3, pp. 317-340.
- [11] Enrique Bigné-Alcañiz, Carla Ruiz-Mafé, Joaquín Aldás-Manzano, Silvia Sanz-Blas, (2008) "Influence of online shopping information dependency and innovativeness on internet shopping adoption", *Online Information Review*, Vol. 32 Iss: 5, pp.648-667.
- [12] Giannitsis, T., and M. Kager. 2009. Technology and specialization: dilemmas, options and risks?. Expert group "Knowledge for Growth", May 2009.

- [13] Giovani JC da Silveira, "Towards a framework for operations management in e-commerce", *International Journal of Operations & Production Management*, Vol 23, Issue 2, pp. 200-212.
- [14] Hendrickson, A.R., Massey, P.D. and Cronan, T.P. (1993) 'On the test-retest reliability of perceived usefulness and perceived ease of use scales', *MIS Quarterly*, Vol. 17, No. 2, pp. 227-230.
- [15] Intan Salwani, Marithandhan, Daud Norzaidi, Choy Chong. (2009). E-commerce usage and business performance in the Malaysian tourism Sector, Emerald group publishing limited Vol. 17 NO. 2, pp 166.185.
- [16] LE, T. Thoung, Koh. C. Anthony. "A Managerial Perspective on Electronic Commerce Development in Malaysia, Electronic commerce research, (2002)
- [17] Lederer, A., Maupin, D., Sena, M., and Zhuang, Y. (2000). The technology acceptance model and the World Wide Web. *Decision Support Systems*, 29 (3) 269-282.
- [18] Lukasz Arendt, (2008) "Barriers to ICT adoption in SMEs: how to bridge the digital divide?", *Journal of Systems and Information Technology*, Vol. 10 Iss: 2, pp.93-108.
- [19] Michael Quayle, (2002) "E-commerce: the challenge for UK SMEs in the twenty-first century", *International Journal of Operations & Production Management*, Vol. 22 Iss: 10, pp.1148 -1161.
- [20] Moon, J. and Kim, Y. "Extending the TAM for a World-Wide-Web context", *Information and Management*, 38 (4), 2001, pp. 217-230.
- [21] Philip Bough, "A taxonomy of e-business adoption and strategies in small and medium enterprises, *Journal of John Wiley & Sons* (2004).
- [22] Poong Siang yew, Talha Muhammad, Eze Cyril Uchena, A Flower Analogy of E-commerce Infrastructure, Development in Malaysia and Singapore, ACM (2007).
- [23] Segars, A.H. and Grover, V. (1993). Re-examining perceived ease of use and usefulness: A confirmatory factor analysis. *MIS Quarterly*, 17 (4), 517-525.
- [24] Sherif Kamel, Maha Hussein, (2002) "The emergence of e-commerce in a developing nation: Case of Egypt", *Benchmarking: An International Journal*, Vol. 9 Iss: 2, pp.146-153.
- [25] Subramanian, G.H. (1994). A Replication of Perceived Usefulness and Perceived Ease of Use Measurement. *Decision Sciences*, 25, (5/6), 863-873.
- [26] Szajna, B. (1994). Software evaluation and choice: Predictive validation of the technology acceptance instrument. *MIS Quarterly*, 18(3), 319-324.
- [27] Toñita Perea y Monsuwé, Benedict G.C. Dellaert, Ko de Ruyter, "What drives consumers to shop online? A literature review", *Emerald* 15, (2004).
- [28] Xiaodong Wong, David C. Yen and Xiang Fang. (2004). E-Commerce Development in China and it Implication for Business. *Asia Pacific Journal of Marketing and logistics*. Vol 16, No 3, 2004. pp. 68-82.
- [29] Yehoshua Liebermann and Shmuel, "Perceived risks as barriers to internet e-commerce usage, *Qualitative Market Research: An International Journal*, Volume 5. Number 4. 2002. pp. 291-300.
- [30] Yen-Hao Howard Chen, David Corkindale, (2008) "Towards an understanding of the behavioral intention to use online news services: An exploratory study", *Internet Research*, Vol. 18 Iss: 3, pp.286-312.