The Role of Demographic Characteristics, Perceived Risk and Online Data Security on E-business Performance

W.K. Chong, Y. Sun, N. Zhang and K.L. Man

***Abstract*— Business-To-Business electronic marketplace (B2B e-Marketplace), an electronic platform for buyers and sellers, provides a new dimension in facilitating the marketers to work more effectively when making critical marketing decisions. However, small to medium sized enterprises (SMEs) who are keen to compete in the electronic environment remain concerned as how their businesses can benefit from B2B e-Marketplace. We therefore developed a conceptual framework in which multiple facet of e-Marketing services derived from B2B e-Marketplace are linked to e-Business performance. We will use an adjusted NK simulation to test how Demographic Characteristics, Perceived Risk and Online Data Security influence the relationships between B2B e-Marketplace adoption and e-Business performance. The proposed framework will provide a guideline for academics and practitioners and highlights the significant role of each factor in developing and sustaining effective B2B e-Commerce practice for SMEs. Furthermore, SME managers also can derive a better understanding and measurement of marketing activities that appropriately balance between traditional and B2B e-Commerce practice. At the same time, the developed framework can be integrated into the companies to determine the level of e-Business performance in the B2B marketplace.**

Index Terms—B2B e-Marketplace, e-Business Performance, Demographic Characteristics, Perceived Risk, Online Data Security

I. Introduction

B2B e-Commerce, as one of the major business models brought about by the Internet technologies, has made a significant contribution to the e-marketers [1, 2]. Nonetheless, there are both limitations and gaps on how to explore the opportunities for SMEs in benefiting from the emergent e-Marketing services, derived from the B2B e-Marketplace. Despite much interest from academics and business publications in e-Business, a sharper focus on the B2B e-Marketplace is timely and warranted for several reasons. First, research on B2B e-Marketplace is limited and, given the enormous populations and size of these markets (for instance, Alibaba.com has 40 million registered users), offer considerable opportunities for online marketing activities. Second, we can observe that there is a growing awareness of the contribution of e-Marketing to the global business environment, but the issue of how B2B e-Marketplace can significantly affect firms' e-Business performance remains unclear. Third, B2B e-Marketplace offers significant opportunities to lower costs though global sourcing or local production. Indeed, this knowledge gap has contributed to the occasional misinterpretation of reasons for e-Marketing successes and failures in the region.

The reminder of the paper is organized as follows. Section II shows the theoretical development of the study. We then describe the research methodology in Section III and the results are presented in Section IV. In Section V, we present the findings based on the results from NK simulation. Finally, concluding remarks are made and directions for future research are discussed in Section VI.

II. Theoretical Background

Many authors [e.g. 1, 2, 3, 4] highlighted several dimensions of the e-Marketing services, however, they do not examine the relationship between the B2B e-Marketplace adoption and e-Business performance. In addition, the relationship between B2B e-Marketplace adoption and e-Business performance can be influenced by Demographic characteristics, Perceived risk and Online data security. In the previous studies, many factors have been analyzed and tested to try to understand the slow rate of adoption. For instance, [5] studied respondents' gender, age, annual income, level of education, ownership of financial products and compared the results with national average for the UK. Besides the demographic characteristics of customers, many studies have focused on customers' attitudes to and behaviour towards the adoption of online services. [6] conducted a qualitative study that employed Roger's model [7] to analyze customers' adoption decisions and perceived risk was found to be significant, confirming the results of other studies which indicate that customers are concerned with online security, particularly of online banking [8, 9].

This study intends to develop an e-Business performance framework for SMEs who wish to adopt a proactive approach

Manuscript received December 25, 2012; revised January 30, 2013.

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ISBN: 978-988-19252-6-8
ISSN: 2078-0958 (Print); ISSN: 2078-0966 (Online)

for business efficiency and competitive advantage, and those who wish to explore the Internet technologies for marketing activities. In doing so, the study will focus on the adoption of B2B e-Marketplace and their contribution to e-Business performance. In satisfying the objective, the study will address a wide range of relevant issues including:

1. A critical assessment of the e-Marketing services adoption derived from B2B e-Marketplace and their contribution to SMEs' e-Business performances from a marketing perspective.
2. To test the moderating effects of Demographic characteristics, Perceived risk and Online data security on the relationship between e-Marketing services adoption and e-Business performance.

III. Research Methodology

This study tries to fill in the gap and develop the literature by understanding the role of Demographic characteristics, Perceived risk and Online data security as institutional factors, moderate the relationship between B2B e-Marketplace adoption and e-Business performance. We therefore developed a conceptual framework of e-Business performance (Fig. 1) that focuses on the importance of B2B e-Marketplace adoption. The proposed hypotheses (H) are as below:

H1: The more a firm adopts the B2B e-Marketplace, the higher the firm's e-Business performance.

H2: Demographic characteristics will positively moderate the relationship between e-Marketing services adoption and e-Business performance.

H3: Perceived risk will positively moderates the relationship between e-Marketing services adoption and e-Business performance.

H4: Online data security will positively moderates the relationship between e-Marketing services adoption and e-Business performance.

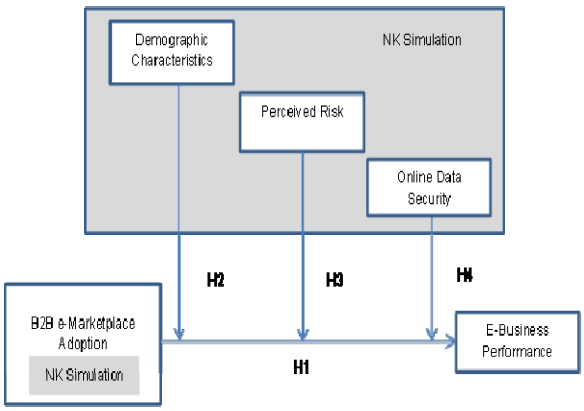

Fig. 1: E-Business performance conceptual framework

We employed an adjusted NK simulation to explain the relationships and the moderation effects between the relationships. We examined what individual e-Marketing services are significant in e-Business performance improvement by using the adjusted NK model. It is the first time in the literature that an NK model was applied in interpreting e-Marketing issues. The reason why NK model is adopted is because it can provide a flexible context with different environmental as well as organizational configurations. Thus, it would be easy for scholars to experiment and study how various combinations of organisational external and internal factors influence a firm's performance. Additionally, in reality, there are a lot of difficulties in data collection across industries and it is almost impossible to put a firm in different contexts to examine its performance differences. Consequently, simulating a firm's behaviors in various virtual environments is a realistic alternative and can contribute to theory development [10].

IV. Results

In the simulations, we set N=16 (N= total number of agents in the NK model), while K is the degree of B2B e-Marketplace adoption with three options: 1, 4 and 8, representing low, medium and high. The higher is K, the more rugged the landscape will be (Kauffman, 1993). We generated 50 landscapes with 50 firms in each landscape. We let a firm's degree of Demographic Characteristics, Perceived Risk and Online Data Security (SR) range from 1 to 15. We used two different turbulence combinations (VR=.2 and VT=1, VR=.05 and VT=5) to represent a turbulent industrial environment and a relatively stable industrial environment respectively.

A. The effect of Demographic Characteristics, Perceived Risk and Online Data Security on the relationships between e-Marketing services adoption and e-Business performance

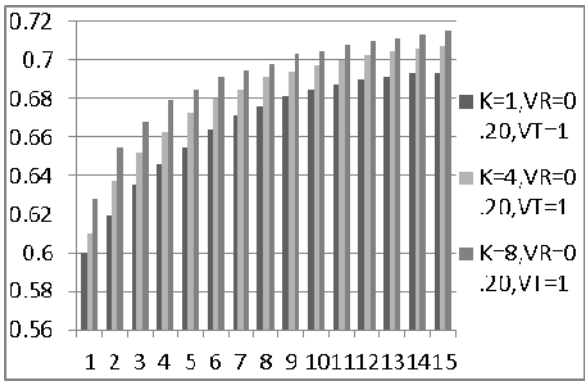

Fig 2: Turbulent business environment

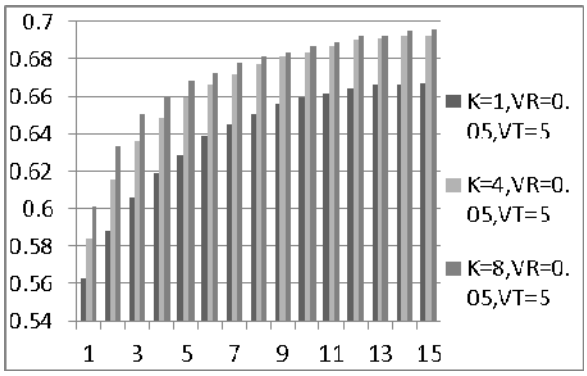

Fig 3: Stable business environment

ISBN: 978-988-19252-6-8
ISSN: 2078-0958 (Print); ISSN: 2078-0966 (Online)

We set up two kinds of business environment (VR=.2 and VT=1 vs. VR=.05 and VT=5), with three degrees of B2B e-Marketplace adoption (K=1, 4, 8). In the fast-paced (Fig. 2) as well as the relatively stable business environments (Fig. 3), we allowed firms to face different degrees of knowledge complexity and examined the resulting relationships between the adoption and firm performance. All of the curves show that, as the degree of B2B e-Marketplace adoption increases, e-Business performance also increases, no matter how turbulent the environment or complex the knowledge. However, the slope of each curve decreases as the degree of B2B e-Marketplace adoption increases. In other words, a firm can use B2B e-Marketplace to improve its e-Business performance, but the marginal effects of doing so are higher when the firm increases its degree of Demographic Characteristics, Perceived Risk and Online Data Security from a low level (e.g. SR=1 or 2) to a medium level (SR=3, 4, 5) than when it moves from a medium to a high level (SR= 8, 9, 10 … 15). Hence, our hypotheses are supported.

V. Discussions

This study focuses on the adoption of B2B e-Marketplace and e-Business performance, particularly in SMEs. Supported by the findings above, positive relationships were found between the adoption and firm performance using three factors / simulators: demographic characteristics, perceived risk and online data security.

Demographic characteristics used to be keys to business success back to old times when internet hasn't stepped into our daily life. Especially for traditional business organisations focusing only on the market in the physical world, demographic factors almost reached every aspect of business process including accessibility for customers, opening/service hours, delivery speed, transportation cost etc. Surprisingly however, the first virtual bank, the Security First National Bank was launched in America in 1995 [11] and set up specifically to provide financial services through the internet. Other virtual banking operations, like Egg, First Direct in the UK soon followed.

Many major traditional banks such as HSBC, Barclays and RBS also offer online services in addition to their branch banking activities. An argument [12] was once raised in the UK due to service quality of overseas call centre. Considering the time difference and demographic limits, overseas call centre helps business organisations provide the seamless service for customers. Studied by [13], call centre management was successfully delivered a combination of customer service and financial budgets.

Being the downsides of doing business in cyber world, perceived risk (technical aspect) and online data security have started to draw people's attention gradually. According to the survey conducted by the UK Payment Association [14], the fraud losses involving the Internet and bank cards in the UK alone reached £609.9 million pounds in 2008. However, this does not stop business organisations from shifting their businesses to e-marketplace due to significant benefits, such as cost reduction. Suggested by [15], the cost of branch banking in USA was $1.07 while the cost of online banking only reached $0.1. The significant difference of transaction cost keeps driving business organisations moving to the e-marketplace / marketspace. On the other hand, the transaction cost / delivery cost would only take a tiny percentage if business organisations actually provide service/knowledge instead of physical products/ goods.

Specific questions were designed to understand the difference of business performance at "marketplace – before" and in "marketplace - after". The simulation results of this study showed positive attitudes to e-marketplace for B2B from various aspects and they believed that e-marketplace is helpful to improve business performance. In other words, the future of B2B is quite promising in e-marketplace.

VI. Conclusion and Future Research

This study provides a distinct stream of literature incorporating a simulation analysis in order to create a rich and deep understanding of the fields of B2B Marketing, e-Marketing, and B2B e-Marketplace. In addition to the specific contributions outlined above, this study provides an example of how NK simulation model methods can be combined in a consistent and complementary fashion to provide a holistic understanding of e-Business performance.

The B2B e-Marketplace has a profound impact on the global business environment. However, it raises many unsolved questions for marketers especially in from the e-Marketing perspective. This research is related to one of the most important topics of e-Marketing, which contributes to the B2B e-Marketplace literature by further demonstrating the B2B e-Marketing activities conducted by SMEs.

The ideas presented in this study offer a complementary perspective to many existing theories advocated by practitioners. Current studies indicate that SMEs are still investigating whether or not they should implement e-Business. Based on the need for a dynamic framework for e-Business from the literature, this study is significant to SMEs, marketers, IT practitioners and other stakeholders that use the Internet and other electronic means for B2B marketing purposes.

The limitation of the study may be argued to be the validity of the simulation results of the study. Similarly, one could also reason that due to the homogeneous characteristics of SMEs, the study does provide a credible and useful source of reference. Future studies may place further emphasis in empirical perspective with a focus on large scale organisations for result comparisons. Nonetheless, this study contributed towards the systematic adoption of B2B e-Commerce on SMEs' business performances, with implementing the model being another area for future research.

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ISBN: 978-988-19252-6-8
ISSN: 2078-0958 (Print); ISSN: 2078-0966 (Online)