

An Interoperable B2B e-Commerce Framework for e-Marketing Capabilities

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

Abstract— The growing interests of Business-To-Business e-Commerce (B2B e-Commerce) in Malaysia have led to a rapid progress towards “e” transformation especially for Small and Medium Sized Enterprises (SMEs). Literature is indicative of the growth of the B2B sectors in all industries, and B2B e-Marketplace is one of the sectors that have witnessed a rapid increase. To achieve this broad perspective, there is a need to explore the e-Marketing abilities and services derived from B2B e-Marketplace. This study provides a new systematic framework for Malaysian SMEs to compete in the dynamic “e” environment derived by empirical results obtained from various industrial sectors.

Index Terms—Interoperable, B2B e-Marketplace, e-Marketing, SMEs, Malaysia

I. INTRODUCTION

Internet technologies are increasingly recognized as a key resource for most of the firm’s business and marketing performances [1]. Explosive growth of the World Wide Web (WWW) and the internet-based trading has greatly facilitated the development of online commercial applications [2]. The development and usage of B2B e-Commerce enabling technology has caused profound changes to the e-Business environment.

The B2B e-Marketplace can significantly improve the way companies deal with their customers and suppliers [3]. Furthermore, the initial proliferation of B2B e-Marketplaces that proved to be sustainable for buyers/sellers and play an important role in B2B e-Commerce [4]. According to [5], the success of B2B e-Marketplaces heavily depend on their participants by established values and corporations based on the performance of B2B e-Marketplaces. Hence, the successful B2B e-Marketplace is determined by the important role of the participants. The majority of participants in the B2B e-Marketplace are SMEs and there is an urgent need to understand the adoption issues confronted by them especially from the e-Marketing standpoint.

SMEs are the main elements in the economy now, and in order to keep gaining competitive advantages, they should keep pace with the technologies changes [5]. According to

[6], SMEs start to respond quickly to the changes provided by the Internet technologies and are eager to adopt new business tools. Based on the findings from many academics and practitioners, B2B e-marketplace is still a popular choice for SMEs to conduct online trades.

Many existing literature has provided great valuable information and implications for researchers to study B2B e-Marketing adoption among SMEs. However, there is limited studies focus on e-Marketing adoption among SMEs especially in developing countries such as Malaysia. Though a number of recent studies have concentrated on the components of e-Marketing capabilities as well as e-marketing framework, B2B e-marketing components and framework for SMEs in Malaysia have not been critically discussed. Therefore, the study attempts to answer the following questions:

1. What are the characteristics of the firms that have adopted B2B e-Marketplace?
2. What are the e-Marketing capabilities for SMEs in Malaysia?

In satisfying the objective, the study will address a wide range of relevant issues including:

1. Identify the characteristics of firms that adopt B2B e-Marketplace (RO1);
2. Explore the dimensions of e-Marketing services of B2B e-Marketplace for SMEs (RO2); and
3. Identify CSFs associated with e-Marketing service performances derived from B2B e-Marketplace (RO3).

The primary motivation for this study is based on the exploration of e-Marketing services for SMEs conducting B2B e-Marketing. To achieve this, there is a need to explore the e-Marketing abilities and services derived from B2B e-Marketplace. It is also important to explore the potential e-Marketing practices for SME managers to capitalize on the opportunities provided by B2B e-Marketplace by integrating electronic elements with their existing marketing channels and communications to increase consumer satisfaction, retention and profitability. The study is based on a multidisciplinary approach integrating; traditional SMEs marketing, e-Marketing, Information System/Information Technology (IS/IT), Customer Relationships Management (CRM), Supply Chain Management (SCM) and B2B e-Marketplace to develop a B2B e-Commerce framework that will offer a greater insight into SMEs e-Marketing capabilities.

The reminder of the paper is organized as follows. Section II shows the B2B e-Marketplace in Malaysia. We describe the research methodology in Section III. Moreover the survey results are presented in Section IV. In Section V, we present the e-Marketing framework B2B e-Commerce in

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Malaysia. Finally, concluding remarks are made and directions for future research are discussed in Section VI.

II. THEORETICAL BACKGROUND

The development of B2B e-Commerce has brought significant changes in recent years in Malaysia. The growth and impact of Internet technology and the emergence and penetration of the digital economy are likely to lead the growth of B2B e-Commerce in the Malaysian marketplace. B2B e-Marketplace in Malaysia plays an important role for B2B trading as it is becoming the first destination for buyers and sellers from SMEs for business exposure, products/services promotion and online transactions in the region.

Malaysian SMEs are playing a significant role in the country's economic development [6; 7; 8]. A total of 600,000 SMEs are registered in Malaysia and their contribution to the manufacturing sector was 29.3 percent of their GDP or RM75.2 billion (US\$22 billion) in December, 2005 [8].

B2B e-Commerce remains a popular online business model for SMEs. While the larger organizations are taking advantages from the vast array of information/products/services, SMEs remain in the concern of how their businesses can take advantages from B2B e-Marketplace. However, similar to many countries, Malaysian SMEs are faced with resource constraints, but in relation to B2B e-Marketplace, they have to respond to specific challenges. Generally, the major barriers for B2B e-Marketplace adoption include:

- Lack of understanding of available technology [9,10],
- Lack of confidence in electronic-based marketing [11],
- Lack of technical and knowledge resources [12],
- Lack of e-Business recognition in some industry sectors [13].

SMEs may fail to overcome these barriers if the essential capabilities are not evident in the B2B firms. Hence, there are concerns that limited efforts have been diverted to the promotion of B2B e-Marketplace. Although SMEs use conventional marketing practices which have increased their online presence, the majority of them are still not being achieved even at the minimal levels of adoption [4].

Specific barriers to B2B e-Marketplace participation sometimes reflect more general barriers to e-Business adoption, what are discussed here specifically in relation to the e-Marketing perspective:

1. Generic SME Constraints - Development cost is one major issue in implementing ICT solutions for Malaysian SMEs [8]. According to [14], an SME needs to be entirely reshaped its current systems because ICT adoption projects are complex in nature. Hence, there are many issues that need to be addressed while implementing e-Marketing projects including hardware, software, Human Resources Management (HRM), training and project management. Consequently, SMEs are uncertain about whether they have sufficient resources, expertise, and experience to operate in B2B e-Marketplace for marketing activities.

2. Lack of Understanding of the 'e' Environment - Most Malaysian SMEs do not understand deeply the nature of 'e' environment [15] and how it interacts with e-Marketing. It

is crucial for SMEs to understand internet technologies and its complementary tools that can enhance their marketing capability.

3. Lack of Exploitation of e-Marketing Services – Limited exploitation of e-Marketing reflects a myriad of other barriers to the adoption of B2B initiatives and results in the loss of potential revenue streams which would assist in funding the SME to overcome (at least some of) them.

4. Identification of Critical Success Factors (CSFs) - The dynamic nature of the electronic environment hinders the progress of B2B e-Marketplace adoption. The benefits of adoption at the early stages are limited, and SMEs are perhaps, insufficiently motivated to progress with the initiative. Therefore, there has to be some realistic immediate success factor(s) to encourage SMEs to gain the benefits from the B2B e-Marketplace.

5. Absence of a Standard e-Marketing Framework - The lack of standard e-Marketing framework is a concern of SMEs. SMEs need a framework that can create, acquire, organize, distribute, and use information to implement e-Marketing strategies. Therefore, a framework responds to multiple dimensions including contextual factors for adoption, CRM, SCM, IS/IT integration, competitiveness, transparency of information, and critical success factors that is vital for SMEs to aggressively pursue the adaptation.

III. RESEARCH METHODOLOGY

This study addresses three main research objectives (ROs) which are to: identify the characteristics of firms that adopt B2B e-Marketplace (RO1); explore the dimensions of e-Marketing services of B2B e-Marketplace for SMEs (RO2), and identify CSFs associated with e-Marketing service performances derived from B2B e-Marketplace (RO3).

An online questionnaire was targeted at, proprietors, managing directors, general managers, IT managers, sales/marketing managers and export managers in selected SMEs that participated in B2B e-Marketplace. Participant details including their name, full address, email, position hold, contact number and transaction volume were drawn from the chosen B2B e-Marketplaces.

Prior to dissemination, the online questionnaire was verified by two academicians and piloted on 20 senior management members of the SMEs selected from the sample population. Minor amendments were made to the flow and phrasing of the questions. The pilot study also confirmed the relevance and clarity of the questions to ensure the findings are consistent and relevant.

The sampling frame of this study contains 200 SMEs randomly selected from the B2B e-Marketplaces, who were active members (based on their transaction volumes). All the SMEs were contacted by email together with the covering letter. A total of 91 questionnaires were returned, 84 were valid (6 were considered invalid due to incomplete nature of the response), providing a response rate of 42%. Compared with other SME survey response rates in Malaysia, (e.g. 20.2% in [7] and 40.6% in [15]), the response rate is acceptable for an empirical industry study.

IV. SURVEY RESULTS

The reliability and consistency of the data was then scrutinized. Internal consistency analysis using Cronbach’s alpha value is the standard reliability measurement for quantitative data collection. According to [16], the Cronbach’s alpha value should > 0.7 for high reliability standard. TABLE I shows the Cronbach’s Alpha Value Test Results > 0.7, indicates the existence of internal consistency or homogeneity among the variables for this study.

TABLE I
CRONBACH’S ALPHA VALUE TEST RESULTS AND DESCRIPTIVE STATISTICS

Constructs	Cronbach's Alpha Value	Mean
<i>The degree of demands to push a firm to adopt B2B e-Marketplace</i>		
Government Encouragement	0.889	3.211
Senior Management Involvement	0.809	3.649
<i>Dimensions of e-Marketing services</i>		
Customer Relationships Management	0.704	4.068
Supply Chain Management	0.822	3.857
Competitiveness in the global business environment	0.849	3.878
IS/IT Integration	0.884	4.011
Transparency of Information	0.894	3.383
<i>The degree of satisfactory results of certain areas or functions to ensure successful competitiveness for an organization</i>		
Critical Success Factors	0.746	3.962

A. The characteristics of firms that adopt B2B e-Marketplace

The section presents demographic information and the degree of demands for the adaptation of B2B e-Marketplace. The sample in Malaysia was captured with an “N” count of 84.

Referring to TABLE II, the selected sample demonstrates the following characteristics:

- all of them participated in B2B e-Marketplace;
- the majority of the firms (95.2%) employed under 150 people considered as SMEs based on the definition of Malaysian SMEs (SMIDEC, 2009);
- the majority of the firms (91.6%) benefited from an annual turnover of under US\$7 million consistent with SMIDEC (2009) definition of Malaysia and;
- a majority (53.6%) of the firms generated 0 – 10% of their total annual revenue from B2B e-Marketplace.

TABLE II
DESCRIPTIVE CHARACTERISTICS OF RESPONDENTS

		Frequency	Percentage
Number of Employees	Below 5	1	1.2%
	5 - 20	7	8.3%
	21 - 50	28	33.3%
	51 - 100	31	36.9%
	101 - 150	13	15.5%
	151 - 200	3	3.6%
	201 - 250	1	1.2%
	Group Total (N)	84	100.0%
Annual Turnover	Below US\$ 100,000	5	6.0%
	US\$ 100,000 - 500,000	4	4.8%
	US\$ 500,000 - 1 million	24	28.6%
	US\$ 1 -5 million	34	40.5%
	US\$ 5 - 10 million	17	20.2%
	Group Total (N)	84	100.0%
	Annual Revenue Derived from B2B e-Marketplace	0%-10%	45
10%-20%		16	19.0%
20%-30%		15	17.9%
30%-40%		6	7.1%
40%-50%		2	2.4%
Group Total (N)		84	100.0%

According to [17], a country’s readiness for e-Business fundamentally depends on government encouragement: promotion activities, government grants and the regulation standards that are crucial for creating an online trading environment. The means of Government Encouragement showed in TABLE I that is more than 3.0 which indicates an agreement with a particular item. Since the means score > 3.5, the respondents are likely to agree upon the importance of senior management involvement in B2B e-Marketplace adoption.

Our findings suggest that, government encouragement and senior management involvement have a significant impact on the adaptation of B2B e-Marketplace. Hence, government and senior management members play an important role to develop suitable strategies to drive SMEs to adopt B2B e-Marketplace services. Although a majority (53.6%) of the participants indicates it only generates 0 – 10% of their total annual revenue from B2B e-Marketplace, SMEs still have high expectations of the government and its senior management members to further explore the opportunities provided by B2B e-Marketplace especially in e-Marketing services.

B. The dimensions of e-Marketing services

Five variables for dimensions of e-Marketing services are shown in Table I. Except the mean from “Transparency of Information”, all others have a mean score > 3.5. This suggests that the perceptions of SMEs on the performance of e-Marketing dimensions are optimistic. The arithmetic means showing 2 variables > 4.0, which confirm that the respondents have high expectations from their B2B e-Marketplace in “Customer Relationships Management” and “IS/IT Integration” to improve and satisfy the increasing

demand of SMEs.

Our findings imply a strong link between SMEs and the e-Marketing services derived from B2B e-Marketplace. The adoption of B2B e-Marketplace may spur small businesses to focus on long-term marketing planning and business success. The results indicate willingness among SMEs for B2B e-Marketplace adoption to foster their marketing activities. The effectiveness of e-Marketing services are highly determined by several dimensions such as CRM, SCM, competitiveness, IS/IT integration and transparency of information, pointed out earlier. Generally, SMEs may be engaged in financial transactions in which market rules may be chosen to suit the features of the participants. This process of tailoring mechanisms given the features of the participating SMEs will lead us to the idea of interoperability and integration of framework development.

C. Critical success factors

The result of "Critical Success factors" indicates the high level of CSFs (mean 3.962) associated with e-Marketing services derived from B2B e-Marketplace. SMEs that have the best chance to compete in the global marketplace are those participating in the B2B e-Marketplace. B2B e-Marketplace provides a large number of buyers trading on their platform and this attracts more suppliers. By attracting large numbers of buyers and suppliers around the globe, a marketplace can become very strong and this will provide an opportunity for the participants to compete in the world marketplace. For instance, Asiep.com, Malaysia's leading B2B e-Marketplace service provider has outstanding buying value: over US\$160 billion covering 203 countries since it was established in 1996. The survey recipients also consider CRM as a critical factor for them especially in the virtual business environment that is getting more saturated and competitive.

According to [18, 19, 20, 21], the marketing model is gradually changing from product to customer centered. These interactions may lead to cooperation or competition between SMEs. Thus, a successful company in the 'e' environment will use customer information wisely to develop long-term relationships. The government and senior management members' involvement are also crucial for SMEs to be encouraged and motivated to ensure successful e-transformation [20, 22, 23]. They need to ensure SMEs which are clear with regard to the conditions of their adoption and the commitments to transform of businesses to the electronic environment. Finally, IS/IT performances, transparency of trading information and supply chain are also vital for SMEs to adopt B2B e-Marketplace successfully.

V. INTEROPERABLE E-MARKETING FRAMEWORK

Our results provide an analysis of B2B e-Marketplace efforts on B2B transactions and collaborations. The impact of the B2B e-Marketplace may cause Malaysian SMEs to radically overhaul their marketing strategy formulation [19]. The empirical results together with the literature search represent an original attempt to develop an e-Marketing framework for SMEs who are keen for "e" transformation.

Based on the survey results, the key attributes driving a

firm to adopt B2B e-Marketplace are the involvement of and support from the government and senior management within the SMEs. The key factors which are ranked most critical by the respondents are "using e-Marketplace is easier to get government grants" and "senior management allocates the required resources for B2B e-Marketplace every year". There are four main e-Marketing services from the B2B e-Marketplace identified by the respondents:

- e-CRM – using IS/IT communications technologies such as web-based e-mail, data mining/warehousing to maximise benefits for both sellers/buyers and encourage customers retention.

- e-SCM – the IS/IT services integrated in the B2B e-Marketplace can be upstream SCM activities particularly in e-Procurement. This system can support all procurement activities including purchase, request, ordering, and delivery between sellers and buyers.

- e-Competitiveness – B2B e-Marketplace provides new opportunities for SMEs to compete globally. Based on the survey results, the respondents noted that they can use the e-Marketing services offered by B2B e-marketplace to retain their customers.

- Transparency and visibility of information – transparency of information in B2B e-Marketplace offers unbiased, complete and accurate market information. The respondents require a well-developed framework that can facilitate a transparent e-Marketplace.

Finally, it is important that SMEs develop a systematic approach to identify prioritizing CSFs in the implementation process and inline with the environment in which the adaptation is located. Therefore, SMEs can establish a comprehensive approach to manipulate each factor based on the findings and interpretation of this study.

The contributions of this study are substantive for SME managers. The development of the e-Marketing framework empirically from the research is considered beneficial from a marketing perspective for SMEs. As the respondents were from different industries, this framework is not specific to a particular industry, but potentially it is a generic roadmap for facilitating B2B e-Marketing from various industries. E-Marketing via the B2B e-Marketplace not only offers a cheaper, more cost-effective way to transact business, but also brings a more efficient marketing mechanism, because it is not constrained by geographical distance or time. Furthermore, B2B e-Marketplace may allow to the creation of new markets that did not exist or were not possible previously.

VI. CONCLUSION AND FUTURE RESEARCH

This paper addresses the following three research objectives (ROs) by: identified the characteristics of firms that have adopted B2B e-Marketplace; explored the dimensions of e-Marketing services of B2B e-Marketplace for SMEs, and identified the CSFs associated with e-Marketing service performances derived from B2B e-Marketplace. The proposed framework is intended to be used as a guideline for managers and practitioners who wish to adopt a proactive approach in the use of B2B e-Marketplace for competitive advantage, and exploration of the e-Marketing service performances. The proposed

framework also provides a balanced perspective of e-Marketing and the contemporary marketing activities for sustaining effective led practice in the global marketplace.

In future, we aim to extent this work by implementing the e-Marketing framework in a popular computer language suitable for e-commerce, such as Java or C#. The implementation will be web-based and user-friendly. The market practitioners and their activities, the information flow and the transaction procedures will all be modeled in the software to create an integrated environment for business users. The traditional client-server paradigm can be adopted by the implementation of the framework. In this approach, a centralized server will be needed to host the e-mail and data-mining programs and the functionalities that manage and monitor the transactions. Business users of this framework through web browser connect to the server after proper identity authentication, and with the provided services they can collect/exchange information, send/receive orders, and make analysis on market data, etc. The implementation will consist of two modules, corresponding to each of the e-CRM and e-SCM services, respectively. Large-scale databases will be utilized to retain all the data about the transactions, user information, and market data.

Mechanisms of fault-tolerance will be added to the system as well. Because the server and their clients are located in geographically distributed places, it may happen that, while a transaction is going on, one party of the transaction is hit by the failure from the hardware side. In cases like this the system has to be able to recover the status of the transaction before the failure and then re-start it at some later time. Backup services will be in operation and will be performed regularly to minimize the chance of data loss.

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