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Resource-based model of e-business adoption in China: an empirical investigation

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Abstract

Purpose – This paper aims to examine the effects of market orientation and organizational learning on individual e-business adoption functions and firm performance in the context of Chinese firms.

Design/methodology/approach – A cross-sectional design was adopted for the study, whereby a sample of companies was selected from the province of Sichuan, China. The questionnaire was distributed via a personally administered method to senior managers. Partial least squares was used for analysing the data.

Findings – It was found that market orientation affected e-order-taking, whereas organizational learning affected e-communication, e-procurement and internal administration through e-business technologies, and firm performance. Whilst market orientation was found only to effect e-order-taking and e-communication was found to have a positive influence on firm performance.

Research limitations/implications – A limitation of the study is the sample size and obtaining the convenience sample from one province in China. A larger size and broader representation of provinces in China will be a direction for future research.

Practical implications – The findings of this study highlight the need for creating an internal organizational culture, which facilitates the adoption of e-business technologies. Specifically, they should develop capabilities such as organizational learning and market orientation prior to the adoption of e-business technologies.

Originality/value – The contribution of the study is that the findings provide insight into e-business adoption in China from a resource-based perspective.

Keywords Market orientation, Learning organizations, Business performance, China

Paper type Research paper

Introduction

Electronic business adoption (EBA) is a critical strategic issue for firms (Rapp *et al.*, 2008). The key question is no longer whether firms should adopt e-business but how they adopt it and how its affects firm performance (Porter, 2001). Furthermore, understanding the adoption of technological innovation is a core research domain

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in marketing and a priority in practice (Hauser *et al.*, 2006). EBA has increased rapidly in recent years, as its adoption enhances competitiveness by transforming a firm's processes, products and techniques (Nguyen and Barrett, 2006; Porter, 2001; Rapp *et al.*, 2008). Crucially, understanding the adoption process is important for both the adopting and the vendor firms (Frambach and Schillewaert, 2002).

Traditionally, adoption of technology has been explained through the characteristics of technology (Rogers, 1995), external environmental influences (Frambach and Schillewaert, 2002), the technology acceptance model (Davis, 1989) and firm characteristics such as firm size (Rogers, 1995). However, in recent times, scholars have argued that certain firm capabilities influence the adoption of technologies including EBA (market orientation (Rapp *et al.*, 2008); organizational learning, (Zahay and Handfield, 2004); technological opportunism (Srinivasan *et al.*, 2002)). Essentially, this research draws on the resource-based view (RBV) to understand EBA and its effects (Tarafdar and Gordon, 2007). Applying the RBV is important because Srinivasan *et al.* (2002) argue that previous literature has de-emphasised the ability of firms to proactively adopt technologies and instead, has emphasised external pressures, that is, a reactive approach.

To date, EBA studies have been primarily investigated within developed countries. However, Steenkamp (2005) urges marketing researchers to move out of the "US silo" as conducting international research allows for cross-national generalizability and allows for understanding contingencies in marketing theory. As such, a country that has experienced tremendous growth in EBA over the past decade is China. For example, small and medium enterprises in China are predicted to spend about US$46 billion on IT infrastructure by 2010, up from US$21 billion in 2005 (The Global Forecast Model, 2008). Moreover, there are now more broadband subscribers in China than the USA with online transactions made by Chinese consumers expected to reach US$125 billion in 2006 (Economist Intelligence Unit, 2008). However, despite this growth in EBA within the Chinese economy, there is little scholarly work available, which has focused on EBA particularly from a strategic resource-based perspective. Despite this, several studies have to some extent examined EBA issues in China. For example, Tan *et al.* (2007), examine the affects of perceived organization e-readiness and perceived external e-readiness on EBA; whereas Lai *et al.* (2006) investigate network externalities, information orientation and their affects on expected benefits and EBA. In addition, Kshetri (2008) highlight the relationship between institutional processes and EBA, whilst, Zhu and Kraemer (2005) examine the affects of technology competence, organization context and environmental context on EBA.

Although these studies provide insights into EBA in China, they do not investigate the affects of firm capabilities on EBA, especially from an RBV perspective. Essentially, it is argued in this paper that examining the affects of firm capabilities on EBA provides insights into the broader Chinese business psyche and specific firm strategies. Furthermore, although some studies have examined EBA via a multidimensional approach (e.g. communication and order taking) (Wu *et al.*, 2003), most have conceptualized EBA as a unidimensional construct (Nguyen and Barrett, 2006; Rapp *et al.*, 2008; Srinivasan *et al.*, 2002). By adopting a multidimensional operationalization of e-business, this study provides further insights into EBA by identifying idiosyncratic antecedents and affects of individual e-business dimensions (e.g. antecedents and consequences of e-order-taking).

To this end, this study develops a resource-based model of EBA in China and empirically tests the model. Specifically, it examines the simultaneous effects of market orientation and organizational learning (i.e. key marketing capabilities) on EBA (i.e. e-communication, e-order-taking, e-procurement and internal administration) and firm performance, when industry pressures are controlled. This paper is structured as follows; first, the RBV is discussed and market orientation and organizational learning are argued to be firm capabilities. Second, the hypotheses are developed and the research model presented. Third, the methodology and the findings based on the partial least squares (PLS) analysis is highlighted. Finally, theoretical and practical implications are discussed along with directions for future research.

Resource-based view

The RBV has become the dominant theoretical framework in explaining competitive advantage in strategic marketing (Furrer *et al.*, 2007), overtaking the structure-conduct-performance framework (Galbreath and Galvin, 2008). The RBV argues that competitive advantage lays in the idiosyncratic firm-specific capabilities (Barney, 1991). Capabilities are an important source of an organization's success (Day, 1994b). Specifically, the intangible characteristic of a capability is critical as they are difficult to imitate (Galbreath and Galvin, 2008). Capabilities are defined as assets that are intrinsically intangible processes (i.e. heavy reliance on tacit knowledge and skills), information based and are developed over time through complex interactions among the firm's resources (Amit and Shoemaker, 1993; Makadok, 2001). Both the antecedent constructs; market orientation and organizational learning are conceptualised as capabilities, consistent with extant literature (Jiménez-Jiménez and Cegarra-Navarro, 2007). Although, there are several capabilities that can potentially affect e-business adoption including leadership capabilities, market orientation and organizational learning are emphasised in this paper. This emphasis is based on the empirical evidence that suggests a positive relationship between these capabilities and innovation adoption (Harrington and Guimaraes, 2005; Rapp *et al.*, 2008; Zahay and Handfield, 2004) and evidence linking it to firm performance (Sinkula *et al.*, 1997; Cano *et al.*, 2004).

Hypotheses development

Organizational learning

Organizational learning is viewed as a set of firm values that includes the ability to create, disseminate and utilize knowledge (Sinkula *et al.*, 1997). The importance of organizational learning is highlighted by Sinkula *et al.* (1997, p. 316) who state that "cultivating a learning culture may indeed become one of the primary means to attain and maintain a competitive advantage." Research on organizational learning has consistently shown a positive relationship with performance outcomes (Jiménez-Jiménez and Cegarra-Navarro, 2007; Jiang and Li, 2008). This is because firms that are able to learn about competitors, customers and other stakeholders have a higher likelihood of sensing and responding to changes in the market place (Day, 1994a). Furthermore, organizational learning is conceptualised as a capability, therefore, by definition, it is related to performance (denoted as *H1a* in Figure 1). Thus:

H1a. Organizational learning is positively related to firm performance.

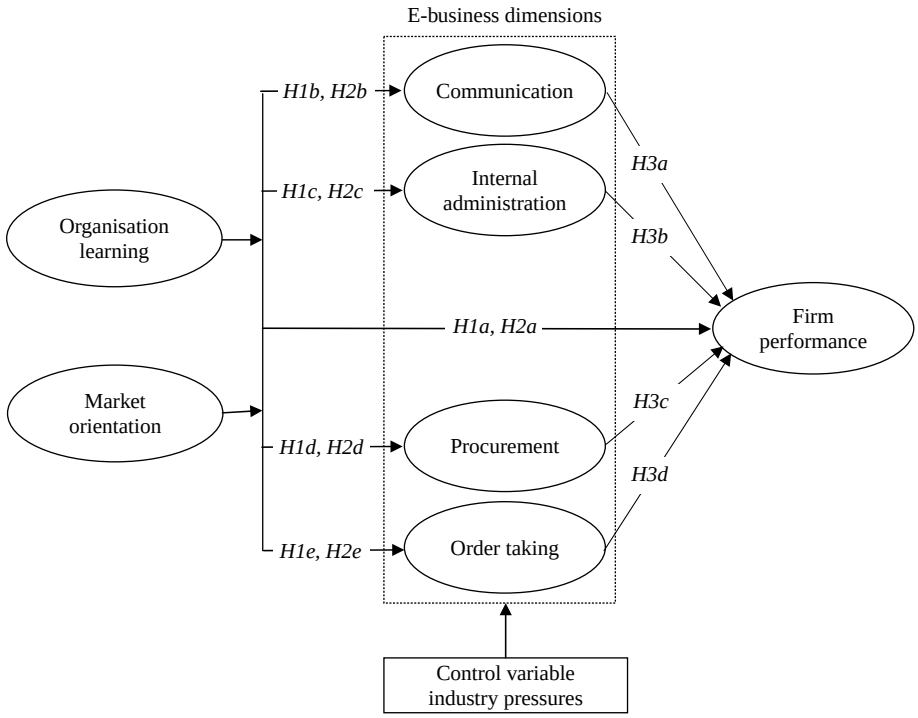

Figure 1.
Resource-based model of adoption of e-business in China

Organizational learning has been found to affect EBA (Zahay and Handfield, 2004). Firms with open minds are more likely to adopt new technology that can facilitate internal communications between employees in different departments and even in different locations. Moreover, learning organizations can facilitate discussions between employees on various business issues. Not only does organization learning affect internal communications, but also outbound communication with external shareholders. The learning organizations can make use of e-business technologies to provide their customers with important information such as solutions to particular problems, and respond to their questions or requests in an efficient and effective manner. Similarly, organizational learning can facilitate the communication between a firm and its suppliers. On this basis, it is argued that the firm's open mindedness, commitment to learning and shared vision can influence the communication between the firm and their customers, employees and suppliers e-business technologies (Wu *et al.*, 2003) (denoted as *H1b* in Figure 1). Thus:

H1b. Organization learning is positively related to e-communication.

Internal administrative system (i.e. conducting or facilitating business processing activities pertaining to financial accounting, human resource management, travel reimbursement and the like) is influenced by the extent of organizational learning. For example, absorptive capacity, or the capacity to learn, has been shown to affect information technology practice and use, and the ability to effectively implement new information technology (Harrington and Guimaraes, 2005). Therefore, it is argued that

when employees within an organization have a shared vision and are open minded, they are more open to new e-business technologies and therefore, instead of resisting change, they facilitate the establishment of key internal administrative systems which occur within the boundaries of the business unit (e.g. accounting and human resources) (denoted as *H1c* in Figure 1). Thus:

H1c. Organization learning is positively related to internal administration through e-business technologies.

Firms can make use of e-business technologies to transact with suppliers (Cegarra-Navarro *et al.*, 2007). Staff in learning organizations with a clear strategic focus know exactly what type, and how many suppliers, they need. Furthermore, staff that are open minded are more likely to adopt electronic procurement systems for various online activities, including search and locate potential suppliers and electronic placement and tracking of orders. On this basis, it is argued that organizational learning influences the adoption of electronic procurement systems (denoted as *H1d* in Figure 1). Thus:

H1d. Organization learning is positively related e-procurement.

Similar to the procurement systems that are concerned with the supply side, order-taking systems, which are concerned with customers, can be influenced by the extent of organizational learning. A key characteristic of firms that adopt e-business is that it allows customers to directly transact online (Cegarra-Navarro *et al.*, 2007). Learning organizations, characterized by a shared vision provides staff with opportunities to directly interact with their customers in terms of accepting orders and payments electronically. Furthermore, learning organizations are more open-minded in EBA, including allowing customers to track and inquire about their orders electronically. This being the case, the following hypothesis (denoted as *H1e* in Figure 1) can be proposed:

H1e. Organization learning is positively related to e-order-taking.

Market orientation

Market orientation is defined as "the set of cross functional processes and activities directed at creating and satisfying customers through continuous needs-assessment" (Deshpande and Farley, 1998, p. 226). Although there is a debate between the relationship between market orientation and firm performance (McNaughton *et al.*, 2002), a meta-analysis conducted in 23 countries in five continents suggests that the relationship between market orientation and firm performance is consistently positive (Cano *et al.*, 2004). More importantly, in the context of China, several researchers have found a positive relationship between market orientation and firm performance (Sin and Tse, 2000; Sin *et al.*, 2004; Ge and Ding, 2005). Consistent with these findings, we propose the following hypothesis (denoted as *H2a* in Figure 1):

H2a. Market orientation is positively related to firm performance.

At a macro-level, Rapp *et al.* (2008) found that when e-business adoption is operationalized as a uni-dimensional construct, market orientation positively affects e-business adoption. Market orientation represents the attainment of a firm's objective

by creating opportunities to more effectively satisfy customers' needs within the constraints of resources and skill limitations of the firm. A market-oriented firm is more likely to adopt technologies, which facilitate internal communication (i.e. product development and project coordination) as this communication allows for a unified approach in meeting customers' needs and wants. Understanding the customers' needs also dictates that strategic information (e.g. inventory planning), be communicated with suppliers in order to manage inventory levels so that customers have the product when they require it. Moreover, a market-oriented firm is likely to communicate with their customers via various avenues, including e-business technologies. Thus, we hypothesize the following (denoted as *H2b* in Figure 1):

H2b. Market orientation is positively related to e-communication.

Market-oriented firms gather information from customers and markets, which can be fed to the internal administrative systems for resources deployment. In order to serve customers better, market-oriented firms are more likely to adopt e-business technologies in internal administrative processes such as accounting and invoicing, so that they can deal with customers more effectively (Wu *et al.*, 2003). The information gathered from the market can also provide the market-oriented firm with inputs to manage employees' benefits such as sales bonuses and other incentive schemes. Based on the preceding discussion, we argue that higher levels of market orientation lead to a greater extent of adoption of e-business technologies in internal administration activities (denoted as *H2c* in Figure 1). Thus:

H2c. Market orientation is positively related to internal administration through e-business technologies.

Empirical evidence supports the view that a firm's level of market orientation has a positive influence on the firm's adoption of e-business innovations (Rapp *et al.*, 2008). Firms focusing on customers engage in more innovative processes such as procurement systems. This is because market-oriented firms would want to communicate more with suppliers in their supply chain so that they are able to obtain feedback on how to better integrate between themselves and their supply-chain partners, in order to better meet customers' needs. Therefore, this leads to the following hypothesis (denoted as *H2d* in Figure 1). Thus:

H2d. Market orientation is a positively related to e-procurement.

Market orientation can impact the extent of order taking in a number of ways. Striving to satisfy their customers and be more customer focused than their competitors, market-oriented firms are more likely to establish order-taking systems that allows their customers to track and inquire about their orders electronically. Furthermore, firms with customers' needs and wants at the core of their strategy are more open to adopt e-business technologies that enable effective transaction flows and customer relationships (i.e. e-order-taking). Lastly, market orientation facilitates the adoption of an order-taking system that can accept orders and payments electronically from customers (Wu *et al.*, 2003). This reasoning leads to the following hypothesis (denoted as *H2e* in Figure 1):

H2e. Market orientation is positively related to e-order-taking.

E-business adoption

Extant literature provides evidence for the relationship between EBA and various firm performance outcomes (Rapp *et al.*, 2008). In fact, Rapp *et al.* (2008, p. 13) state that "e-business initiatives are recognized as an important strategic activity". Furthermore, from a fine-grained perspective, each of the different e-business functions has been shown to affect firm performance. For example, Garrido *et al.* (2008) found that the intensity of e-procurement resulted in increases in efficacy and efficiency, either by reducing costs in searching for information or by facilitating the purchase of higher quality products at lower prices. Communication with customers and internal communication enhances efficiency and increases sales by allowing the firm to move fast in reaching customers with information relating to new products and increase customer satisfaction by decreasing response time to enquiries (Wu *et al.*, 2003). Adopting e-business technologies in internal administration, particularly intranets, impacts firm performance (Meroño-Cerdan *et al.*, 2008). For example, these systems allow for sharing corporate information unifying geographically dispersed work forces. Intranets reduce the costs and efforts associated with corporate information searches and affects customer satisfaction indirectly by developing a positive environment for employees (Wu *et al.*, 2003). Finally, Boyer and Olsen (2002) show that e-order-taking impacts performance as it enhances sales performance and efficiency by reducing costs (Wu *et al.*, 2003). Based on the preceding discussion, as denoted as *H3a-H3d* in Figure 1, we propose the following set of hypotheses:

H3a. E-communication is positively related to firm performance.

H3b. Internal administration through e-business technologies is positively related to firm performance.

H3c. E-procurement is positively related to firm performance.

H3d. E-order-taking is positively related to firm performance.

In the RBV-based e-business adoption model shown in Figure 1, industry pressures are controlled (denoted as control variable) which is consistent with various organizational sociologists who argue that pressures from the environment influence the adoption of innovations (Hrebiniak and Joyce, 1985), including EBA (Srinivasan *et al.*, 2002).

Methodology

Items to measure the focal constructs of the study were drawn from existing scales found in the marketing literature and adapted to the specific context of the study. Ten items were used to measure market orientation and were adapted from Deshpande and Farley (1998) which was treated as a uni-dimensional construct. A total of 23 items were used to measure the four e-business constructs of e-communication, e-order-taking, international administration and e-procurement which were drawn from Wu *et al.* (2003). Ten items were used to measure organizational learning drawn from Sinkula *et al.* (1997) and was conceptualized as a multidimensional second-order construct reflecting three first-order dimensions (i.e. commitment to learning, shared value and open mindedness) adopting reflective indicators. In a similar fashion, firm performance was conceptualized as a multidimensional second-order construct comprised of two performance dimensions; financial and market share which were measured by five items

drawn from Hooley *et al.* (2005). Finally, the control variable industry pressures were measured by four items adapted from Srinivasan *et al.* (2002). Seven-point Likert scales were used for all items. The questionnaire was translated into Chinese using back-translation to control for conceptual equivalence and to enhance quality (Neelankavil, 2000).

A cross-sectional survey design was adopted for the study, whereby a convenience sample of companies was selected from the province of Sichuan, China. The choice of convenience-based sampling is consistent with previous studies investigating management-based issues (Lin, 2010; O'Cass and Ngo, 2007). The questionnaire was distributed via a personally administered method to senior executives from various business functions of 105 firms from a cross section of industries. In this study, we adopted the key informant approach. The underlying assumption of the key informant approach is that the person, by virtue of his/her position in the firm's hierarchy, is able to provide opinions and perceptions that are valid reflections of those of other key decision makers in the firm (Li and Atuahene-Gima, 2002), and are commonly used in other similar research in strategic marketing (Deshpande *et al.*, 1993; Noble *et al.*, 2002). Since the RBV does not emphasize firm size as it is primarily focused on resource-based rather than monopoly-based advantages (Galbreath, 2005), the use of a sample with different firm sizes and industries is considered appropriate. In total, 95 of the returned questionnaires were deemed valid.

The profile of the sample indicates that the majority of the firms annual sales greater than 10,000,000 RMB (i.e. US$1,465,211) which represents 41.1 per cent of the sample. The majority of respondents operated in the services industry (65.3 per cent), such as advertising, real estate, software and structural engineering. The majority of companies had less than 50 employees (28.4 per cent) followed by 51-150 employees (28 per cent), with 20 per cent of firms had greater than 500 employees. The key informants were primarily senior managers (34 per cent), followed by presidents (16 per cent) and sales managers (11 per cent). In order to understand the validity of the respondents' knowledge of EBA, each of the survey instruments contained a self-report item on the informant's knowledge of the area. The final sample showed a mean score of 5.3 (on a scale of 1-7, where 1 – not confident and 7 – very confident), highlighting the confidence of the respondents on the information they provided.

Results

Prior to hypothesis testing, to ensure that the data were robust, analyses for both convergent and discriminant validity was conducted. We assessed convergent validity for the adequacy of outer-measurement models by calculating composite reliabilities, factor loadings and average variance explained (AVE) scores for each first-order factors as well as the second-order constructs (Hulland, 1999). The analysis shows that all of the items loaded significantly onto their respective constructs for the first-order factors, except for e-communication. Therefore, two items were deleted from this construct. In the context of the second-order factors (e.g. organizational learning and firm performance), the loadings were also significant, although one item was deleted from organizational learning. The composite reliabilities were satisfactory as they ranged from 0.86 to 0.96. It has been recommended that a construct should have an AVE larger than 0.5 in order for it to have acceptable convergent and discriminant validity (Chin, 1998). As shown in Table I, the AVEs for all of the first-order constructs are greater than 0.5 and are as

Components and manifest variables	Model Loading	*t*-value
Organizational learning	AVE: 0.51, reliability: 0.91	
Commitment to learning	AVE: 0.69, reliability: 0.90	
Organization's ability to learn is the key to our competitive advantage	0.79	15.4
The basic values of this organization include learning as a key to improvement	0.82	18.4
The sense around here is that employee learning is an investment, not an expense	0.82	17.34
Learning is seen as a key commodity necessary to guarantee survival	0.89	35.88
Shared value	AVE: 0.65, reliability: 0.89	
There is a commonality of purpose in my organization	0.73	15.54
Total agreement on our organizational vision across all levels, functions and divisions	0.86	23.92
All employees are committed to the goals of this organization	0.87	30.55
Employees view themselves as partners in charting the direction of the organization	0.75	18.09
Open mindedness	AVE: 0.74, reliability: 0.86	
We are not afraid to reflect critically on the shared assumptions we have made about our customers	0.89	37.85
Personnel in this enterprise realize that the way they perceive the market place must be continually questioned	0.82	12.79
Responsive market orientation	AVE: 0.56, reliability: 0.92	
Our business objectives are driven by customer satisfaction	0.74	15.05
We constantly monitor our level of commitment and orientation to serving customer needs	0.78	18.74
We freely communicate information about our successful and unsuccessful customer experiences across all business functions	0.68	8.49
Our strategy for competitive advantage is based on our understanding of customers' needs	0.83	26.68
We measure customer satisfaction systematically and frequently	0.79	16.08
We have routine or regular measures of customer service	0.74	12.88
We are more customer focused than our competitors	0.62	7.61
I believe this firm exists primarily to serve customers	0.61	8.60
We poll end-users at a least once a year to assess the quality of our products and services	0.74	13.30
Data on customer satisfaction are disseminated at all levels of the firm on a regular basis	0.84	29.64
Communication	AVE: 0.65, reliability: 0.96	
Regularly update employees about developments within the business	0.74	16.44
Facilitate discussions and feedback on various issues of importance to our business	0.86	17.67
Manage projects within the firm	0.79	13.76
Coordinate new product development teams	0.82	12.39
Provide customers with general information about our business	0.71	9.46

(*continued*)

Table I.
Outer measurement model

Components and manifest variables	Model Loading	*t*-value
Allow customers to locate and send information to appropriate contacts within the business	0.71	27.89
Send customers regular updates about new products and other developments within our business	0.84	20.77
Provide solutions to customer problems	0.80	21.31
Provide after-sales service to our customers	0.83	21.80
Provide information in response to customer questions or requests	0.87	27.80
Send suppliers regular updates about new products plans and other new developments within our business (e.g. via e-mail)	0.82	18.18
Provide specific online information about product specifications that our suppliers must meet	0.85	29.78
Share product and inventory planning information with our suppliers	0.77	16.95
Internal administration	AVE: 0.83, reliability: 0.94	
Perform financial and managerial accounting	0.89	34.90
Provide reimbursements and manage payrolls	0.93	41.61
Manage employee benefits (e.g. life and medical insurance)	0.92	54.69
Ordertaking	AVE: 0.88, reliability: 0.96	
Accept orders electronically from customers (e.g. online ordering)	0.94	54.43
Accept payments electronically from customers (online payment)	0.93	39.09
Allow customers to track and inquire about their orders electronically	0.95	59.55
Procurement	AVE: 0.85, reliability: 0.94	
Search and locate potential suppliers online	0.93	51.84
Place and track orders with suppliers electronically (e.g. online order) placements	0.93	43.24
Allow suppliers to submit bids online	0.91	34.12
Use online marketplaces to source suppliers	0.93	54.72
Industry pressures	AVE: 0.69, reliability: 0.90	
Having a state-of-the-art e-business confers status for our firm with our stakeholders	0.86	30.07
Our stakeholders would have perceived our business as being technologically backward if we had not implemented e-business	0.87	26.16
If we had not undertaken e-business, we would have lost our edge over competitors	0.83	16.86
Being ahead of our competitors' e-business capabilities is a key factor in our e-business initiative	0.77	18.84
Firm performance	AVE: 0.74, reliability: 0.93	
Marketplace performance	AVE: 0.88, reliability: 0.94	
Sales volume achieved compared to competitors	0.94	41.74
Market share compared to competitors	0.94	55.02
Financial performance	AVE: 0.81, reliability: 0.93	
Overall profit levels achieved compared to competitors	0.93	46.78
Profit margins compared to competitors	0.87	20.20
Return on investment compared to competitors	0.90	26.17

Table I.

follows: market orientation (0.56); e-communication (0.65); internal administration (0.83); e-procurement (0.85), e-order-taking (0.88); and the control variable, industry pressures (0.69). In addition, the AVE's for the second-order constructs met the acceptable benchmark including organizational learning (0.51) (commitment to learning (0.69); shared value (0.65), open mindedness (0.74)) and firm performance (0.74) (financial performance (0.81); marketplace performance (0.88)).

Hypothesis testing

To test the hypotheses, which focus on explaining multiple dependence relationships, PLS, a variance-based structural equation modeling was considered particularly suitable as a method of analysis and model evaluation for this study (Fornell and Bookstein, 1982). This is because, the sample size is relatively small ($n = 95$) where the minimum required for covariance-based techniques is 200, and for PLS, the sample size can be as low as 30-100 (Chin and Newsted, 1999). In addition, PLS is better suited for theory building purposes such as understanding complex relationships as shown in the Figure 1 which is not sensitive to the assumptions of normality, thus circumventing the necessity for the multivariate normal data. Furthermore, PLS is increasingly being used to understand various organizational phenomena in the strategic marketing literature (Julian and O'Cass, 2003; O'Cass and Ngo, 2007; Rodríguez-Pinto *et al.*, 2007).

PLS Graph v3 (Chin, 1998) was used to analyse the data to test the hypotheses. As PLS is founded on the soft modelling philosophy the evaluation of the model is not based on one fit index but involves different indices (Falk and Miller, 1992; Fornell and Cha, 1994). These include; R^2, AVE, average variance accounted for (AVA), regression weights and loadings. Furthermore, Falk and Miller (1992, p. 74), suggest that an appropriate criterion for evaluating the significance of the individual paths is the absolute value of the product of the path coefficient and the appropriate correlation coefficient. As paths are estimates of the standardised regression weights, this results in an index of the variance in an endogenous variable explained by that particular path, with 0.015 (1.5 per cent) being the cut-off point. In addition, since PLS makes no distributional assumptions, traditional parametric methods of significance testing (e.g. confidence intervals, χ^2) are not appropriate. Therefore, a bootstrapping procedure (i.e. sampling with replacement method) was used to ascertain the stability and test for significance of the parameter estimates with acceptable benchmarks above 1.96 (White *et al.*, 2003).

Table II summarizes the hypotheses results and illustrates the path coefficients between the exogenous and endogenous variables, AVA, R^2 and critical ratios. The AVA for the endogenous variables was 0.48 and the individual R^2 are greater than the recommended 0.10 (Falk and Miller, 1992) for the predicted variables (i.e. e-communication, internal administration, e-procurement, e-order-taking and firm performance). As the R^2-values were larger than the recommended levels (0.10), it is therefore necessary to identify if the paths associated with these variables are significant. The results suggest that some paths exceed this criterion, as well as the bootstrap critical ratios (greater than 1.96), whereas other paths were found not to be significant. For example, the following relationships were found to be significant:

- organizational learning to firm performance, e-communication, e-procurement and internal administration;
- e-communication to firm performance; and
- market orientation to e-order-taking.

Predicted variable	Predictor variable	Hypothesis	Path	Variance due to path	R^2	Critical ratio
Performance	Organizational learning	*H1a*	0.271	0.145		2.75*
	Market orientation	*H2a*	0.156	0.072		1.29
	Communication	*H3a*	0.098	0.045		0.44
	Internal administration	*H3b*	0.332	0.156		2.76*
	Procurement	*H3c*	0.396	0.181		2.50*
	Order taking	*H3d*	0.295	0.109		2.00*
					0.71	
Communication	Organizational learning	*H1b*	0.330	0.190		2.52*
	Market orientation	*H2b*	0.191	0.111		1.43
Control variable	Industry pressures	N/A	0.319	0.189		3.55*
					0.49	
Internal administration	Organizational learning	*H1c*	0.246	0.109		2.18*
	Market orientation	*H2c*	0.177	0.078		1.27
Control variable	Industry pressures	N/A	0.180	0.070		1.50
					0.26	
Procurement	Organizational learning	*H1d*	0.233	0.129		2.00*
	Market orientation	*H2d*	0.126	0.064		1.20
Control variable	Industry pressures	N/A	0.434	0.268		4.10*
					0.46	
Order taking	Organizational learning	*H1e*	0.147	0.078		1.38
	Market orientation	*H2e*	0.236	0.128		2.32*
Control variable	Industry pressures	N/A	0.402	0.281		3.94*
					0.49	
AVA					0.48	

Note: AVA, average variance accounted for $^{*}p < 0.05$

Table II.
PLS results for the hypotheses

Furthermore, the control variable, industry pressures, did not significantly affect internal administration. Therefore, *H1a-H1d*, *H2e*, *H3b-H3d* are supported, whereas *H1e*, *H2a-H2d*, *H3a* were not supported.

Discussion and implications

This study hypothesised and empirically tested a resource-based adoption of e-business model in China. In testing an integrative model of firm capabilities, individual e-business dimensions and firm performance, this paper contributes to the literature relating to adoption of EBA in several ways. First, prior adoption literature has emphasised a reactive approach by emphasising external pressures such as industry pressures (Srinivasan *et al.*, 2002) whilst this research, adopts a more proactive approach and investigated the role of market orientation and organizational learning (i.e. firm capabilities) on EBA. The theoretical framework tested in this study shows both similarities and differences to the findings in developed countries. Second, this study responds to Steenkamp's (2005) call for research in marketing to move away from a "US Silo" and conducts research in a developing economy such as a China, an increasingly important country of interest to marketing researchers and practitioners alike. Third, the study adopted a multidimensional operationalization of e-business, providing a fine-grained insight into the extent of e-business adoption by identifying the idiosyncratic individual e-business dimensions. In doing so, this study works towards Wu *et al.*'s (2003) call for future studies to employ a process perspective (i.e. dimension approach) to e-business functions as opposed to measuring a unitary construct.

From a managerial perspective, the results of the hypothesis testing (shown in Table II), suggests that when industry pressures are controlled, organizational learning influences the extent of adoption of e-business functions (except for e-order-taking), whilst market orientation only affects the extent of adoption in e-order-taking. In the context of firm performance, except for market orientation and e-communication all other factors were significant. This suggests that organizational learning has both direct and indirect affects on firm performance, whilst market orientation, has only indirect affects on firm performance through e-order-taking. This result, although contrary to our hypothesis, adheres to McNaughton *et al.*'s (2002) argument that intervening variables are important in examining the relationships between market orientation and performance and evidence that market orientation affects e-business functions which then affects firm performance (Rapp *et al.*, 2008). It is important to highlight that PLS analysis involves simultaneous understanding of affects; therefore, in the presence of organizational learning and industry pressures, market orientation only affects e-order-taking, although individually it may affect EBA dimensions and firm performance. The findings highlight the need for creating an internal organizational culture, which facilitates the adoption of e-business technologies. For example, it is suggested that Chinese firms intending to adopt e-business must develop capabilities such as organisational learning and market orientation prior to the adoption.

Some of our findings are consistent with Wu *et al.* (2003), however, as expected the results were different in some aspects due to the inherent differences in the country setting since Wu *et al.* (2003) focused on US firms, whereas this study focuses on Chinese firms. For example, Wu *et al.* (2003) showed that customer orientation affects internal administration, whilst in our study, market orientation influenced e-order-taking, suggesting that Chinese firms are responding to customer needs and wants primarily

relating to the adoption of order-taking technologies. However, it may be important for Chinese firms to base their adoption of e-business adoption in other functions (e.g. e-communication and internal administration) on understanding the needs and wants of their customers, as there is ample evidence for the link between the processes underlying market orientation and firm performance.

The importance of organizational learning as a firm capability over market orientation in the Chinese sample is consistent with scholars who argue that market orientation is developed when learning processes are understood and changed in order for the organization to "learn to learn" about markets (Day, 1994b). Dickson (1996) prioritises learning over market orientation based on the argument that organizational learning is the only capability that allows firms to sustain a higher performance by improving market-information processing. More importantly, organizational learning is much more difficult to imitate than market orientation. The findings of this study suggest that in the Chinese context, firms emphasise organizational learning over market orientation. This finding has clear implications for Chinese organizations, including encouraging a firm culture and environment that facilitate the development of key firm capabilities, in this case organizational learning. Although the development of capabilities is time consuming and requires heavy investment of financial and human capital, investment is considered critical in China since organizational learning was found to affect performance both directly, and indirectly, through EBA. Furthermore, investing in organizational learning may result in causal ambiguity, and thus facilitate sustainable competitive advantage (Reed and DeFillippi, 1990).

In the context of the broader EBA literature, Table III illustrates the relative affects of the antecedents on EBA factors. The results suggest that organizational learning and industry pressures are dominant antecedents to EBA, and that industry pressures affects order taking and procurement more strongly than organizational learning or market orientation. This would suggest that Chinese firms are adopting these e-business functions primarily to remain competitive and maintain industry legitimacy. These findings suggest that Chinese managers may need to base strategic decisions more proactively, as this is more strategic and is more likely to provide a sustainable competitive advantage. However, this paper is not advocating that industry pressures should be ignored, but rather that a balanced approach be taken with regard to these two strategic postures. Furthermore, organizational learning has a greater affect on the adoption of communication and internal administration e-business technologies, than industry pressures or market orientation. This suggests that in these functions, the firms adopted a more deliberate approach in learning about how e-business technologies are deployed.

Finally, except for e-communication, the other e-business functions were found to affect firm performance. This suggests that EBA in e-communication has become a key

Table III.
Relative effects on e-business adoption

	Relative strength of the significant effects
Communication	Organizational learning (0.330) > industry pressures (0.319)
Internal administration	Organizational learning (0.246)
Order taking	Industry pressures (0.402) > market orientation (0.236)
Procurement	Industry pressures (0.434) > organizational learning (0.233)

success factor, in that Chinese firms must have good communication technologies as a basic requirement, but by itself is not a source of competitive advantage. However, variations in order taking, internal administration and e-procurement have significant affects on firm performance, suggesting that Chinese firms must prioritise these functions in their deployment of e-business technologies.

Limitations and future research directions

Several limitations of this study are worth mentioning and provide opportunities for further research. First, although collecting data from 95 companies and their views of e-business adoption required a lot of effort, our sample size is nevertheless relatively small. Therefore, future studies should try to verify our results by obtaining responses from a larger number of organizations to increase explanatory power. Second, the nature of convenience sampling techniques might consider the study to be a relatively limited sample given our study is restricted to a specific region in China. Therefore, additional research might use cross-country comparisons to further study EBA in China. Third, our research focuses on only two important marketing capabilities as antecedents to EBA and firm performance. An interesting issue for further research would be to study other firm-related variables, such as strategic flexibility and technological opportunism which have been highlighted as impacting innovations and EBA, into the research model as tested in this study thereby providing a more holistic perspective to EBA in China. Fourth, the generalizability of the findings from this study to other countries must be made with caution. Consequently, in order to be able to generalize the results, it is suggested that a more holistic RBV-based adoption of e-business model, be tested in other countries.

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