

Market Orientation, Electronic Supply Chain Integration, and Firm Performance in China: The Moderating Role of Ownership Type

Completed Research Paper

Hefu LIU

School of Management, University of
Science and Technology of China
96 Jinzhai Road, Hefei, Anhui, China
liuhf@ustc.edu.cn

Weiling Ke

Clarkson University School of Business
Clarkson Ave, Potsdam, NY 13699,
USA
wke@clarkson.edu

Zhongsheng Hua

School of Management, University of Science and Technology of China
96 Jinzhai Road, Hefei, Anhui, China
zshua@ustc.edu.cn

Abstract

Integrating supply chain processes over the Internet to achieve competitive advantages has generated much attention from practitioners and researchers, especially those in emerging economies. Drawing upon the institutional theory and resource based view, this study investigates how market orientation affects electronic supply chain integration (eSCI), which, in turn, influences firm performance in the emerging economy of China. We further examine how the relationships between market orientation and eSCI are moderated by ownership type. The results of a survey with 260 firms in China suggest that the dimensions of market orientation have differential impacts on the eSCI, and both dimensions of eSCI have significant effects on firm performance. In addition, the relationships between market orientation and eSCI are moderated by both ownership type in China. Implications and suggestions for future research are discussed.

Keywords: E-business, supply chain integration, market orientation, emerging economies, ownership type

Introduction

Due to the globalization of world economy and diffusion of Internet applications, firms, especially those in emerging economies, have actively developed sophisticated strategies to cope with the competitive, complex, and interconnected market. For example, firms in China are trying to follow the trend and to reform themselves with the aim of enhancing competitiveness (Chang et al. 2008; Flynn et al. 2010; Gao and Yu 2010; Zhao et al. 2007). Many of them have taken a market-oriented approach, which would affect various organizational processes (Wei and Lau 2008). One of the organizational processes is the electronic supply chain integration (eSCI), which could facilitate firms to leverage fully utilize inter-organizational systems to improve performance (Frohlich 2002; Osmonbekov et al. 2009; Rosenzweig

2009). According to the studies conducted in mature market economies, firms should design supply chain management from an e-business angle to enhance competitiveness (Lee and Whang 2004; Rosenzweig 2009). In this view, firms in China might try to enhance their competitiveness by aligning their supply chain with the e-business.

The eSCI is becoming a main theme of supply chain management. Typically, researchers and practitioners hold the view that with the typical view that a greater level of integration in e-business would lead to better firm performance (Frohlich and Westbrook 2001; Rosenzweig 2009). The literature indicates that implementing supply and demand process integration over the Internet would allow firms to overcome the tradeoffs of low-cost, rich-content, real-time, and broad channel deployment, and eventually to derive competitive advantage that they cannot achieve individually (Boyer and Hult 2005; Frohlich and Westbrook 2001; Lee and Whang 2004). However, although the benefits of eSCI have been well touted theoretically (Pagell 2004; Vaart and Donk 2008), in practice, eSCI in the industry remains insufficient (Frohlich 2002), especially in emerging economies. Given that emerging economies are playing increasingly important role in the world economy, it is of significance to understand critical factors that facilitate the development of eSCI. However, a careful literature review reveals that previous studies have primarily been conducted in the context of mature market economies and few studies have examined the effects of possible contingency factors. It is well established that there are significant differences in the political, social, and economic systems between mature market economies and emerging economies such as that of China (Zhao et al. 2007). Hence, research investigating antecedents of eSCI in emerging economies and evaluating the moderating effects of contextual factors would extend our current understanding of eSCI and provide managerial guidance for firms in emerging economies.

The objective of this study is to investigate the role of market orientation in facilitating the development of eSCI, and the effects of eSCI on firm performance in China. According to the institutional view, to compete effectively, firms in China will imitate the successful competitive strategies from their counterparts in mature market economies (Liang et al. 2007; Liu et al. 2010; Wei and Lau 2008). Given that China is still transforming from a planned economy to a market economy, firms in China would be required to become more market-oriented (Wei and Lau 2008). This new orientation could impact firm processes, and enhance their capability (Selnes and Sallis 2003; Wei and Lau 2008), which includes the eSCI, to compete in the market. As the Resource-Based View (RBV) suggested, the eSCI could be a firm's unique capabilities, which are the critical sources of superior firm performance (Barney 1991; Osmonbekov et al. 2009). Therefore, the eSCI in firms in China could be developed as a result of market orientation, and act as a unique capability that links market orientation to the firm's competitiveness.

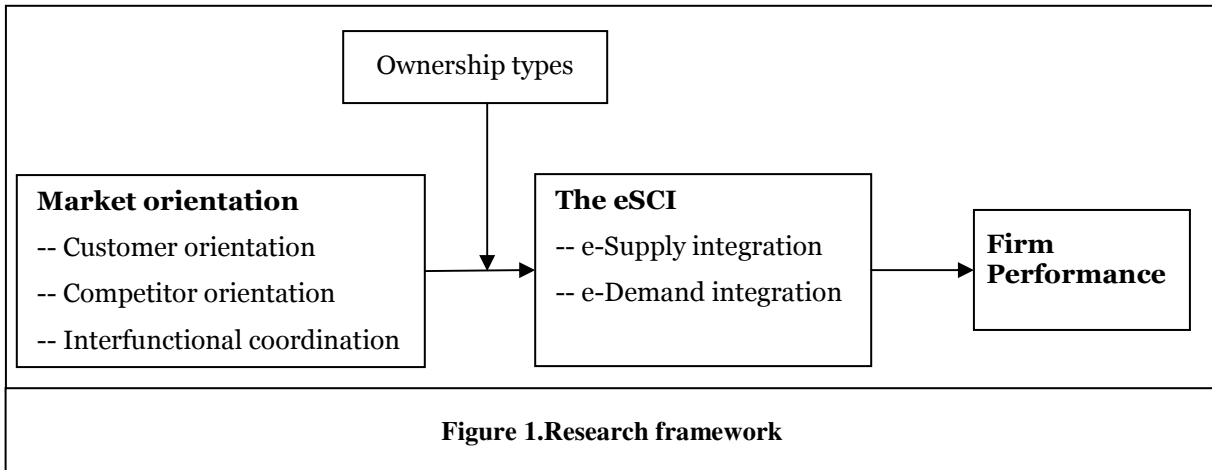
Drawing upon agency theory, we further investigate ownership type as the contingency factor in the relationship between market orientation and eSCI in China. The agency theory suggested that "professional managers with little equity in the firms they run pursue their own interests at the expense of shareholders' interests." (Chang 2003 p.239) Accordingly, the literature indicates that ownership structure may affect agency costs and consequently firm performance (Chang 2003; Zou and Adams 2008). Some scholars further suggest that firms in different ownership structures would have high variation in market orientation and the e-business strategies (Frohlich and Westbrook 2002; Li et al. 2010; Rosenzweig 2009). Specifically, it is suggested that different ownership types reflect different business objectives, interests, and institutional constraints (Sila 2010). However, since most firms in mature market economies are privately owned, researcher and practitioners in these economies do not consider ownership type significantly (Li et al. 2010; Wei and Lau 2008). Comparably, as an emerging and transitional economy, China is rich in various types of ownership. Peng et al. (2000) contented that the myriad of ownership types in emerging economy of China would have different influences on managerial outlook that shapes organizational strategies and decisions, compared to those in mature market economics. Investigating ownership type in China thus would be necessary and critical (Li et al. 2010; Zou and Adams 2008). The knowledge of the role of ownership type in the eSCI would help firms in mature market economies collaborate with firms in China. Similarly, firms in China can use the knowledge to effectively manage the eSCI in firms of different ownership type.

Conceptual framework and hypotheses development

In the view of the institutional theory, legitimacy would lead to the convergence of firm practices (DiMaggio and Powell 1983; Liu et al. 2010). It is suggested that, the institutional environment provides rule-like social expectations and norms for appropriate organizational structures, operations, behaviors, and practices (DiMaggio and Powell 1983; Liu et al. 2010). Conforming to these expectations and norms would help the firm to maintain legitimacy in the field, which, in turn, ensures its access to important and scarce resources. In this view, the convergence of firm practices thus not only incurred because of the effectiveness of the practices, but also the firm's mimetic intention to gain legitimacy in the institutional environment (Liu et al. 2010; Wei and Lau 2008).

Globalization and the diffusion of Internet are forcing firms in different country to face the similar institutional environments. The globalization requires firms to transform their business to become more international, and the diffusion of Internet facilitates the process and promotes the interconnection of various markets. Under this condition, firms need to stress the universal standards that are being applied everywhere to maintain competitiveness. Since China is transforming from a planned economy to a market economy, firms in China are required to accept market orientation toward their strategies and realign their organizational processes, including the eSCI, to remain competitive. The eSCI is becoming the international best practices. It thus would be expected that the eSCI would be adopted in Chinese firms when the firm has a market orientation to improve performance.

The core focus of this study is the eSCI (Figure 1). This study proposes that a firm with a stronger market orientation (i.e., customer, competitor, interfunctional coordination orientation) is more likely to adopt the eSCI practices, which including the dimension of e-supply process integration and e-demand process integration. Further, we suggest that the high eSCI would help the firm achieve superior firm performance. Meanwhile, the model examines the mediating relationship of eSCI between market orientation and firm performance, and the contingency effects of ownership type on the relationships between market orientation and the eSCI.



Electronic Supply Chain Integration and firm performance

The eSCI, which refers to the integration of supply and demand processes with those of trading partners over the Internet, embodies the nature of the processes that are shared in the supply chain and are integrated over the Internet (Dong et al. 2009; Harland et al. 2007; Krishnan et al. 2007; Lee and Whang 2004; Liu et al. 2010; Rai et al. 2006). The literature suggests that the processes shared between firms in the supply chain could be classified into demand side and supply side processes (Esper et al. 2010; Flynn

et al. 2010; Frohlich and Westbrook 2002). Demand processes refer to the processes conducted both inside and outside of a firm for generating and maintaining demand, such as the processes of marketing, sales, and customer relationship management. In contrast, supply processes are the processes residing inside and outside of the firm and involving the activities of supporting and supplying products and services required by demand fulfillment. Typically, supply processes consist of inbound and outbound logistics (Esper et al. 2010; Flynn et al. 2010; Frohlich and Westbrook 2002).

Recently, given the power of the Internet to provide open, real-time, and global connections, firms are increasingly infusing the e-business tools into demand and supply processes (Ke et al. 2009; Lee and Whang 2004; Liu et al. 2010; Osmonbekov et al. 2009). In contrast to traditional Electronic Data Interchange (EDI) systems, the e-business tools, such as e-procurement, e-marketplace, and Internet-enabled SCM systems, have enhanced features that make the integration of fragmented, silo-oriented supply chain processes more flexible and affordable to small business (Devaraj et al. 2007; Ke et al. 2009; Zhu et al. 2006). Infusing the Internet into supply chain management thus enables firms to conduct information exchange and channel processes coordination, such as sales, promotion, procurement, customer service, and delivery schedule, without the constraints of time and space (Lee and Whang 2004; Zhu et al. 2006). Therefore, the eSCI is becoming the new trend of supply chain management (Devaraj et al. 2007; Esper et al. 2010; Frohlich and Westbrook 2002; Lee and Whang 2004).

The literature indicates that the eSCI could act as the valuable, rare, and costly to imitate capability (Frohlich 2002; Frohlich and Westbrook 2002; Osmonbekov et al. 2009). According to the RBV, this capability is critical for firms to achieve competitive advantage (Barney 1991). Specifically, the improvement in firm performance through supply and demand process integration has been well documented in the research conducted in mature market economies (Esper et al. 2010; Frohlich and Westbrook 2002; Kim 2009; Vaart and Donk 2008). Further, infusing the Internet into the integration of channel processes is increasingly treated as the initiative strategy to enhance such improvement (Frohlich and Westbrook 2001; Lee 2000; Lee and Whang 2004). The findings on firms in China also support the positive relationship between channel integration and firm performance. For example, based on a sample of manufacturing firms in China, Flynn et al (2010) concluded that supplier, customer, and internal integration were related to the operational and business performance of firms in China significantly. In addition, according to the data collected from Chinese retailer, Huang et al. (2009) identified supply chain efficiency and customer service as the key indicators of e-commerce performance. The finding indicates that if firms in China adopt integration strategy and e-business, it is likely that they will have improved firm performance. Yet, the research does not provide strong empirical evidence for supporting the impact of eSCI on firm performance for firms in China.

In this study, we propose that the eSCI allows firms in China to provide easier access to information, develop more flexibility to respond to market changes, provide global customer service, reduce service costs, and shorten product cycles, which are critical for firm performance. Specifically, with the aid of the Internet, firms could exchange real-time information about supply processes, schedules, capabilities, and activities with upstream partners globally. This exchange leads to an improved understanding of ordering and shipping processes that, in turn, can minimize the possibility of logistical errors (Osmonbekov et al. 2009). Firms thus could effectively decrease the number of out-of-stock items, reduce expediting costs, and increase responsiveness, thereby improving performance (Frohlich 2002; Lee and Whang 2004). Further, by using the Internet to detail the timing, amount, and content of downstream partners' activities, e-demand process integration could provide firms with improved visibility of demand processes and customer needs (Osmonbekov et al. 2009; Rosenzweig 2009). This demand-related information further enables firms to better organize and align their mutually dependent activities with those of downstream partners, and then to monitor collaboration efforts with greater efficiency and effectiveness (Frohlich 2002; Lee and Whang 2004; Osmonbekov et al. 2009).

H1: A firm's e-supply process integration is positively related to its performance.

H2: A firm's e-demand process integration is positively related to its performance.

Market Orientation and the eSCI

Market orientation, which reflects a firm's orientation toward creating superior value for customers, plays a fundamental role in organizational management and strategy (Kohli and Jaworski 1990; Li et al. 2010; Wei and Lau 2008; Zhou et al. 2009). This orientation facilitates firms to create knowledge through analyzing customer and competitor, and to disseminate the knowledge by sharing within firms (Zhou et al. 2009). The literature further identifies customer orientation, competitor orientation, and interfunctional coordination as the basic dimensions of market orientation (Naver and Slater 1990). Specifically, interfunctional coordination reflects the coordination of firm resources and customer-related activities throughout the whole firm. In contrast, customer orientation represents a relative emphasis on "the sufficient understanding of one's target buyers," and competitor orientation focuses on the understanding of "the short-term strengths and weaknesses and long-term capabilities and strategies of both the key current and potential competitors" (Naver and Slater 1990 p.21-22).

Based on the RBV, scholars suggest that market orientation is a cultural emphasis that can act as a unique resource to support strategic practices directed at achieving superior performance (Green et al. 2006; Martin and Grbac 2003; Min et al. 2007; Sanzo et al. 2003; Wei and Lau 2008). That is, this orientation allows firms to pay more attentions to develop the ability to sense and respond to external information about the market (Green et al. 2006; Kirca et al. 2005). It thus could help firms create long-term thinking and incentives for establishing collaborative relationship with channel partner to meet customers' latent demand. As such, scholars increasingly realize the importance of market orientation in a firm's supply chain management (Green et al. 2006; Martin and Grbac 2003; Min et al. 2007; Sanzo et al. 2003). For example, Green et al. (2006) contend that a firm's market orientation could impact its supply chain management, and thereby help the firm improve firm performance. In similar, Min et al. (2007) suggest that market orientation is a foundation for managing a firm's supply chain and has positive impact on firm performance.

Since China is transforming from a planned economy to a market economy, market orientation is becoming very critical for firms in China to improve competitiveness (Wei and Lau 2008). The research indicates that in the market transforming process, the Chinese market is becoming more open, complex, and dynamic (Zhao et al. 2007). This change makes it is increasingly important and challenging for firms in China to adopt the advanced IT applications to strategically manage their supply chain and to improve competitiveness (Flynn et al. 2010; Liu et al. 2010). Under this condition, firms in China may have great pressures adopting market orientation in running business to improve competitiveness. That is, firms with higher market orientation may be more likely to emphasize on entrepreneurship, and hence are more inclined to adopt the eSCI than are firms that are less market oriented.

Customer orientation can facilitate firms to develop supply and demand process integration over the Internet. A customer-oriented firm emphasizes understanding and satisfying target customers' demands (Zhou et al. 2009). For example, when customers' demands change rapidly in the market, the customer-oriented firm will have great motivation to collect, analyze, and disseminate sufficient information about its customers with innovative practices. Given that the eSCI enables firms to obtain the necessary information and cooperation to serve customers better, it would help attain the objective of customer orientation. Thus, for a firm with high customer orientation, adopting the eSCI is very attractive.

H3: A firm's customer orientation can positively impact a firm's a) e-supply process integration, and b) e-demand process integration

Further, a firm's competitor orientation can facilitate it to adopt the eSCI. Specifically, a competitor-oriented firm emphasizes understanding the strengths and weaknesses of key current and potential competitors (Naver and Slater 1990). To deepen such understanding, the firm should watch competitors closely, learn about competitors actively, and match competitors' marketing initiatives quickly. Furthermore, the competitor-oriented firm is apt at internalizing competitor's strengths or advantages through imitation (Zhou et al. 2009). Thus, the competitor-oriented firm actively studies its competitors and imitates their successful actions. Given that the eSCI has been widely considered as an efficient competitive strategy, the competitor-oriented firm is more likely to adopt the eSCI to keep its competitiveness.

H4: A firm's competitor orientation can positively impact the a) e-supply process integration, and b) e-demand process integration

We finally propose that interfunctional coordination, as the third dimension of market orientation, could promote the eSCI too. Specifically, interfunctional coordination facilitates the creation and sharing of knowledge within and across different functions throughout the entire firm (Borges et al. 2009). This would help firms share information and processes with external partners accurate and timely, and is helpful for closely integrating demand and supply processes with partners in the supply chain (Zhao et al. 2011). Further, to achieve process integration over the Internet, firms need to implement and use well established internal IT management processes to integrate and share information among their internal functions. The interfunctional coordination could facilitate the sharing of knowledge about IT, and then help the firm assimilate e-business within and across different functions (Li et al. 2010). As such, the firm's eSCI would be promoted by its interfunctional coordination.

H5: A firm's interfunctional coordination can positively impact the a) e-supply -process integration, and b) e-demand process integration

Contingency Effects of Ownership Type

Although we propose the direct relationships between market orientation, eSCI, and firm performance, a literature review indicates that these relationships may be moderated by some contingent factors. Scholars have argued that investigating the moderators is especially important for a comprehensive understanding of the relationships (Li et al. 2010; Rosenzweig 2009; Wei and Lau 2008). Based on the agency theory and the research on organizational strategies and firm performance in China, we identify ownership type as the critical moderator influencing above hypothesized relationships.

According to agency theory, firms should face an agency problem, which is about how shareholders (as principals) ensure that managers act in the shareholders' interests rather than their own benefits. It is suggested that incentive alignment is a solution to this problem, which indicates that ownership would be important to affect the agency costs and consequently firm performance (Chang 2003; Zou and Adams 2008). Compared to firms in mature market which are most privately owned, firms in China are rich in various forms of ownership types (Li et al. 2010; Wei and Lau 2008). The types not only include state-owned, which are sponsored and controlled by the government, but also involve the types of collectively owned, privately owned, and foreign-invested (Li et al. 2010; Wei and Lau 2008). In this study, we follow Li et al. (2010) and focus on the distinction between state-owned and non-state-owned firms, as "the blurring boundary between collectively owned, privately owned, and foreign-invested firms in terms of the degree of privatization (Li et al. 2010 p.119). As Li et al. (2010) contend, these two "different ownership types suggest different business objectives, interests, and institutional constraints" (p.116) in emerging economy.

The literature suggests that state-owned firms are normally required to respond to public, municipal, and national interests (Li et al. 2010; White 2000). This would force them to submit to the pressures from the public and the government and can not control and deploy their resources and capabilities fully (White 2000). Under this condition, state-owned firms would be difficult to deploy their resources and capabilities to absorb advanced technologies and innovations into the existing operational processes (Li et al. 2010). Comparably, non-state-owned firms usually seek to maximize the profit from their investment, and are in full control of their resources and are driven by technological advances (Li et al. 2010). As such, non-state-owned firms would be more innovative and constantly looking for environmental opportunities than state-owned firms.

Given the above difference, scholars indicated that the role of market orientation in firm strategies would be various between state-owned and non-state-owned firms. For example, Wei and Lau (2005) proposed that the impact of a firm's market orientation on its adoption of the practice of strategic human resource managements would be moderated by its ownership type. Further, Li et al. (2010) suggest that ownership type is a clear indicator of a firm's institutional and resource constraints which would be important for the e-business assimilation. They found that ownership type could significantly impact the effects of customer orientation and competitor orientation on e-business assimilation of firms in China. In this view, we propose that the impacts of market orientation on the eSCI would be moderated by ownership types. That is, since "state-owned firms are constrained by business resources and governmental controls", the effect of market orientation on the eSCI is weaker for state-owned firms than for non-state-owned firms.

H6. Ownership type moderates the relationship between market orientation and the eSCI that the effect is weaker for state-owned firms than for non-state-owned firms.

Research Methodology

Data Collection

To test our research model, we employed the survey method to collect data in China. Specifically, senior executives, such as the vice president of information technology, chief technology officer, and chief operations officer, were chosen as the key survey informants. We contacted 1,000 firms, randomly chosen from a list provided by a Chamber of Commerce located in the Yangzi River Delta of China. Follow-up emails and telephone calls were made to improve the response rate. We finally received 260 completed questionnaires, which provided us with a response rate of approximately 26%. Through comparing the Chi-squares of the key measures of the responses from the first 25% of the respondents and those of the final 25%, we found that there were no significant differences between these two groups on the key measure items. This indicates that non-response bias was not serious in this study. Table 1 shows the demographic information of the samples.

	N	Percentage
Industry		
Manufacturing	124	47.69%
Service	136	52.31%
Ownership		
State-owned	104	40.00%
Privately-owned	64	26.62%
Foreign-controlled	92	35.38%

Number of Employees		
≤ 100	51	19.62%
100-500	62	23.85%
500-1000	34	13.08%
1000-2000	19	7.31%
More than 2000	94	36.15%
Number of IT Employees		
≤5	107	41.15%
6-10	44	16.92%
11-25	19	7.31%
More than 25	90	34.62%

An English questionnaire was developed based on previously validated measures. All items were measured with 5-point Likert scales, ranging from “strongly disagree” to “strongly agree”. In particular, the measures of the three dimensions of market orientation were adopted from Lukas and Ferrell (2000). Further, we developed measures for the e-supply and e-demand process integration based on the work of Osmonbekov et al. (2009) and Frohlich and Westbrook (2002). Specifically, four items about the e-supply process integration tested the extent to which the firm integrates supply side processes, such as sharing information about inventory status and order tracking, making joint plans with respect to inventory requirements, and coordinating order execution with channel partners over the Internet. Similarly, four items about the e-demand process integration measured the degree to which the firm has the joint development of demand forecasts, joint plans for service support as well as joint plans for the introduction of new products/services and rollover with channel partners over the Internet.

We measured firm performance through testing the executives’ perceptions of their company’s performance relative to that of key competitors. Specifically, we used six items which were adapted from Rai et al. (2006) and Ravichandran and Lertwongsatiem (2005) to assess how well the firm responded to new marketplace demands and met customer requirements in terms of the speed of delivering products/service, responding to demand changes, entering new markets, promoting new products/services, confirming customer orders, and addressing customer complaints as compared to key competitors. Given the survey was executed in China, we translated the questionnaire into Chinese firstly and then back-translated to English to ensure equivalence of meaning between the English and Chinese versions.

Data Analysis

Since all data were perceptual and collected from a single source at one point in time, we checked the possible common method bias with the Harman's one-factor test. The results showed that the test could categorize the items into five constructs with eigenvalues greater than 1.0, accounting for 63.28% of the variance. Meanwhile, the first construct did not account for the majority of the variance (16.74%), indicating that common method bias was not a serious concern in this study.

Measurement Model

We test the measurement model’s convergent validity and discriminant validity. For convergent validity, we assessed the loading of items, Cronbach alpha, composite reliability, and Average Variance Extracted (AVE). The results of Confirmatory Factor Analysis (CFA) indicated that the loadings of all items were above the benchmark level of 0.70. As shown in Table 2, the values of Cronbach alpha ranging from 0.79 to 0.91 were higher than the recommended level of 0.70. Also, the values of composite reliability ranging from 0.86 to 0.93 were above the 0.70 recommended level; and AVE scores ranged from 0.62 to 0.70 and were above the 0.50 recommended level. The results showed that our measurement model had satisfactory convergent validity. On the other hand, as shown in Table 3, the square roots of AVEs for were

greater than the correlations between related constructs, which confirmed the discriminant validity of the measurement model. Also, we employed a cross-loading test and a Chi-square test to further assess the discriminant validity. The results confirmed the discriminant validity of our measurement model.

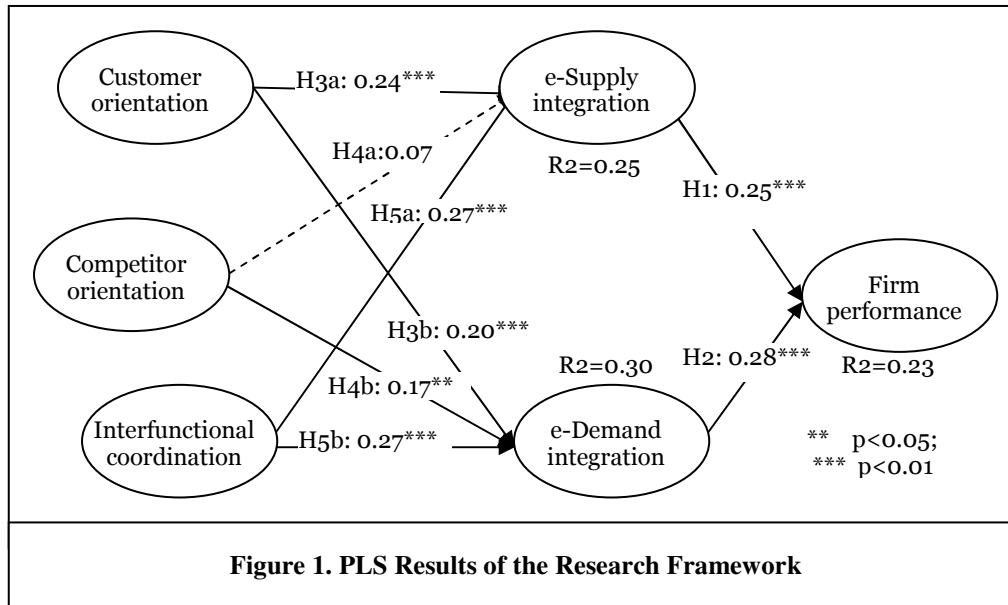
Construct	Items	Cronbach alpha	Composite Reliability	AVE
Customer orientation	4	0.83	0.89	0.68
Competitor orientation	4	0.79	0.86	0.62
Interfunctional coordination	5	0.79	0.86	0.55
Supply integration	4	0.85	0.90	0.70
Demand integration	4	0.84	0.90	0.68
Firm performance	8	0.91	0.93	0.63

	Mean	S.D.	1	2	3	4	5	6
1. Customer orientation	3.76	0.80	0.82					
2. Competitor orientation	3.58	0.73	0.59	0.79				
3. Interfunctional coordination	3.47	0.68	0.43	0.40	0.74			
4. Supply integration	3.30	1.03	0.45	0.47	0.67	0.84		
5. Demand integration	3.26	0.91	0.60	0.52	0.44	0.45	0.82	
6. Firm performance	3.80	0.73	0.56	0.69	0.45	0.50	0.58	0.79

Note: The diagonal elements are the square root of the AVE.

Structural Model

The research structural model was tested through PLS graph. Figure 2 shows the results of the structural model. The results present that the model explains 23 to 30 percent of the variances of related constructs. Most hypotheses were supported, except H4a (on the relationship between competitor orientation and e-supply integration). In particular, the results showed that both e-supply integration ($\beta=0.25$, $p<0.01$) and e-demand integration ($\beta=0.28$, $p<0.01$) were positively related to firm performance, and therefore H1 and H2 were supported. Further, customer orientation was positively related to e-supply integration ($\beta=0.24$, $p<0.01$) and e-demand integration ($\beta=0.20$, $p<0.01$) and thus H3a and H3b were supported. Meanwhile, the significant relationship between competitor orientation and e-demand integration ($\beta=0.17$, $p<0.05$) was significant and thus supported H4b. Similarly, interfunctional coordination had significant impact on e-supply integration ($\beta=0.27$, $p<0.01$) and e-demand integration ($\beta=0.27$, $p<0.01$). Thus, H5a and H5b were supported.



On the other hand, we adopted the three-step method suggested by Baron and Kenney to test the mediating effects of eSCI. As Table 4 shows, the direct links between market orientation and firm performance could be partially mediated by the eSCI, which including e-demand integration and e-supply integration.

Coefficient in regressions							
IV	M	DV	IV→DV	IV→M	IV+M→DV		Mediating
					IV→DV	M→DV	
CusOr.	eSuI	FirPer	0.60**	0.44**	0.51**	0.21**	Partial
CusOr.	eDeI	FirPer	0.60**	0.45**	0.50**	0.22**	Partial
ComOr.	eSuI	FirPer	0.53**	0.40**	0.42**	0.27**	Partial
Com Or.	eDeI	FirPer	0.53**	0.47**	0.41**	0.26**	Partial
InfOr.	eSuI	FirPer	0.60**	0.46**	0.50**	0.21**	Partial
InfOr.	eDeI	FirPer	0.60**	0.50**	0.50**	0.19**	Partial

Contingency Effects of Ownership Type

To test H6 which calls for a differential effect on the pattern of linkages in Figure 2 according to ownership type, we created a two group model by dividing the sample into state-owned (n=104) and non-state-owned (n=156). Next, we conducted multi-group and structural model test using PLS graph. Table 5 summarizes the path estimates for the linkages under state-owned firms and non-state-owned firms. Further, we used the method as Chin (2003) to test whether the differences of the path co-efficiencies between state-owned and non-state-owned firms. As shown in Table 5, customer and competitor orientation would impact the eSCI in different ways between state-owned and non-state-owned firms. Further, the value of the t-test shows that all path co-efficiencies are significantly different between state-owned and non-state-owned firms. This indicates that the relationship between market orientation, eSCI, and firm performance would be moderated by ownership type for firms in China. Further, the negative t-values indicated that the impacts of customer orientation and interfunctional coordination on e-supply integration, and the effects of competitor orientation and interfunctional coordination on e-demand integration are weaker for state-owned firms than non-state-owned firms.

Table 5 Path co-efficiencies Tests across Ownership Types			
	State (104)	Non-state (156)	t value
Customer orientation → e-Supply integration	0.20**	0.24***	-3.32***
Competitor orientation → e-Supply integration	0.31***	-0.07	26.88***
Interfunctional coordination → e-Supply integration	0.19**	0.33***	-10.14***
Customer orientation → e-Demand integration	0.33***	0.09	20.52***
Competitor orientation → e-Demand integration	0.14	0.17*	-1.89*
Interfunctional coordination → e-Demand integration	0.21***	0.34***	-10.05***
e-Supply integration → Firm performance	0.23*	0.26***	
e-Demand integration → Firm performance	0.40***	0.22**	
R2: e-Supply integration	0.35	0.22	
R2: e-Demand integration	0.34	0.29	
R2: Firm performance	0.33	0.19	
Note: * p<0.1; **p<0.05; *** p<0.01			

Discussions, Limitations, and Implications

Discussion

Our findings about the relationships between market orientation, eSCI, and firm performance are not only consistent with those of prior studies, but also offer new insights into the association between marketing, IS, and operations management literature. Specifically, by applying the RBV, we found that a firm's e-supply process and e-demand process integration can directly improve firm performance. These findings are consistent with prior operations management and IS studies (e.g., Frohlich and Westbrook 2002; Li et al. 2009; Rosenzweig 2009). Also, with the institutional view and the RBV, this study found that market orientation could impact the eSCI significantly. Specifically, the e-demand process integration could be impacted significantly by customer, competitor, and interfunctional coordination orientation, and the e-supply process integration could be affected significantly by customer and interfunctional coordination orientation. These findings are consistent with the previous research on the impacts of market orientation on e-business assimilation (e.g., Li et al. 2010) and on supply chain management (e.g., Green et al. 2006; Min et al. 2007).

However, this study did not find the positive relationship between competitor orientation and e-supply process integration. A possible explanation might be that: although the objective of competitor orientation is to maximize the value of customers (Li et al. 2010; Naver and Slater 1990), the e-supply process integration does not directly focus on maximizing customer value (Flynn et al. 2010). Meanwhile, the research on China indicates that "the fast changing nature of the Chinese market makes a competitor orientation less desirable" (Zhou and Li 2010 p.229). In the market transforming process, Chinese market is flooded with dysfunctional competitive behavior, such as opportunistic, unfair, or even unlawful behavior (Li and Atuahene-Gima 2001). Under this condition, for firms without the adequate market and legal support, such as non-state-owned firms, it would be difficult to receive reliable information about their competitors. This would make competitor orientation less relevant to e-supply process integration in China (Zhou and Li 2010).

More importantly, based on agency theory, this study shows that ownership type can moderate the relationships between market orientation and eSCI. Specifically, consistent with Li et al. (2010), the

moderating effects of ownership type in the relationship between market orientation and the eSCI were found for the dimension of customer and competitor orientation, but not for interfunctional coordination. Meanwhile, our finding provides some different and interesting ideas. For example, we found that state-owned firms can enhance e-demand process integration through customer orientation and increase e-supply process integration by competitor orientation, while non-state-owned firms cannot. This indicates that as governmental control of state-owned firms has decreased and the Chinese market becomes more open, complex, and dynamic, state-owned firms may increasingly value market orientation in the e-business strategies. Meanwhile, the finding indicates that for non-state-owned firms, without the adequate market and legal support, it is still a challenge to receive reliable information about their competitors and customers to improve the eSCI. On the other hand, we found that state-owned firms cannot improve e-demand process integration through competitor orientation as non-state-owned firms do. The literature suggests that “state-owned firms usually have stable customers assigned by governance” (Li et al. 2010 p.135). This assignment may make state-owned firms have low competitive pressures to integrate demand process. This would limit them to apply the knowledge stemmed from analyzing competitors to promote the e-demand integration.

Limitations

It is important to evaluate this study's results and contributions in light of its limitations. First, cross-sectional data is one limitation of this study. Future research can conduct a longitudinal test to better understand the dynamic nature of eSCI, and the relationships between market orientation, eSCI, and firm performance. Second, the demography of the respondents in this study may limit the generalizability of our findings. We focused our study in the context of emerging economy of China, and collected data from senior executives in the Yangzi River Delta of China. Given that most manufacturing firms are factories of OEM in this area, we suggest that future research should collect data from different settings. Another limitation is the use of perceptual measures of firm performance. Although the subjective perceptual measures have been found to strongly correlate with objective measures (Sheehan et al. 2007), collecting objective data, especially on firm performance, would provide more convincing research results.

Research Implications

This study makes the following theoretical contributions. First, this study extends supply chain integration research beyond the traditional context to the e-business domain. We bridge insight from the IS and operations management literature to predict the benefits of supply chain integration in the e-business context. Specifically, we viewed the e-business as a more advanced way of delivering communications, compared to traditional (EDI) systems (Liu et al. 2010; Rosenzweig 2009; Zhu et al. 2006). We further presented the eSCI as the new trend of supply chain management by which firms could integrate supply and demand processes with partners over the Internet, and thereby overcomes the tradeoffs of low-cost, rich-content, real-time, and broad channel deployment (Boyer and Hult 2005; Frohlich and Westbrook 2001; Lee and Whang 2004). Therefore, this study has provided new insight into the business value of supply chain initiatives in the e-business context.

Second, based on the institutional view, this study applied the concept of market orientation to the IS research in general, and the eSCI research in particular. As Li et al. (2010) contend, IS researchers have not paid much attention to the concept of market orientation, while it is well established in the strategic and marketing literature. By identifying market orientation as the important drive for the development of eSCI, this study fills the research gap pertaining to how to promote the eSCI. Our findings indicate that we have provided the empirical evidences for supporting the importance of market orientation in IS research.

Third, this research investigated the contingency effects of ownership type in the eSCI study based on agency theory. Indeed, in the existing IS literature, few researchers have considered the contingency effects of ownership type. This study extends our current understanding of the relationship between market orientation and the eSCI in different ownership settings. The findings further caution future IS and operations management researchers to pay attention to the moderating effect of ownership type when they conduct studies in emerging economies where ownership types are diverse.

Fourth, this study defined market orientation and the eSCI as multidimensional constructs and thus provides more detailed and complete understanding of the relationship between market orientation, eSCI, and firm performance. At the dimensional level, the study allows us to look into the effects of different market orientation dimensions on different dimensions of eSCI. Further, it helps us gain in-depth understanding of the complicated influencing mechanisms of market orientation which are contingent upon the contextual factors. For example, the findings suggest that the impact of customer and competitor orientation on the e-supply integration and on the e-demand integration would be different for state-owned and non-state-owned firms.

Finally, this research is conducted in a new research context: the emerging economy of China. As the world's largest emerging economy, China plays a critical role in the international supply chain. This makes the transportability of the theoretical findings from the mature market to China become important and critical (Wei and Lau 2005; Zhao et al. 2007). However, scholars have presented that generalizing the findings on mature market to emerging market is problematic, since the environment of business activities in emerging economies is different from those in mature market economies (Liu et al. 2010). This highlights the importance and necessity of research conducted in this emerging economy. Our study has theoretically explored the relationships between market orientation, eSCI, and firm performance in China. This would not only verify the applicability of research findings of prior studies conducted in mature markets to the context of emerging economy such as China, but also enrich the theoretical findings with the new context.

Practical Implications

This research also has practical implications. First, this research reveals that market orientation plays a critical role in the development of eSCI. We suggest that managers should pay attention to the imbalance of the effects of the three dimensions of market orientation on the two forms of eSCI. That is, managers should realize that competitor orientation does not help to promote the e-supply process integration directly though the type of market orientation facilitates e-demand process integration. Meanwhile, managers should be aware that the effects of market orientation on the development of eSCI are contingent upon the firm's ownership type. In particular, the effects of customer orientation and interfunctional coordination on the development of e-supply integration are stronger for non-state-owned firms. Also, the effects of competitor orientation and interfunctional coordination on e-demand integration are stronger for non-state-owned firms. Second, the research provides managers with insights into how different types of eSCI would help them improve firm performance. Given that both e-supply and e-demand integration contribute positively to firm performance, it is important for managers to promote the development of both types of integration so that they can achieve superior firm performance.

Acknowledgement

This research was supported by a grant from the General Research Fund sponsored by the Research Grants Council of Hong Kong: Project No. 9041614 (CityU_150510), the grants from the National Natural Science Foundation of China (NSFC): Grants No. 71101136, 70725001 and 71090401, and the Fundamental Research Funds for the Central Universities (WK2040350001).

References

- Barney, J.B. 1991. "Firm Resources and Sustained Competitive Advantage," *Journal of Management* (17:1), pp. 99-120.
- Borges, M., Hoppen, N., and Luce, F.B. 2009. "Information Technology Impact on Market Orientation in E-Business," *Journal of Business Research* (62:9), Sep, pp. 883-890.
- Boyer, K.K., and Hult, G.T.A. 2005. "Extending the Supply Chain: Integrating Operations and Marketing in the Online Grocery Industry," *Journal of Operations Management* (23:6), Sep, pp. 642-661.
- Chang, H.-L., Wang, K., and Chiu, I. 2008. "Business-It Fit in E-Procurement Systems: Evidence from High-Technology Firms in China," *Information Systems Journal* (18:4), pp. 381-404.
- Chang, S.J. 2003. "Ownership Structure, Expropriation, and Performance of Group-Affiliated Companies in Korea," *Academy of Management Journal* (46:2), Apr, pp. 238-253.
- Chin, W.W., Marcolin, B.L., and Newsted, P.R. 2003. "A Partial Least Squares Latent Variable Modeling Approach for Measuring Interaction Effects: Results from a Monte Carlo Simulation Study and an Electronic-Mail Emotion/Adoption Study," *Information Systems Research* (14:2), Jun, pp. 189-217.
- Devaraj, S., Krajewski, L., and Wei, J.C. 2007. "Impact of Ebusiness Technologies on Operational Performance: The Role of Production Information Integration in the Supply Chain," *Journal of Operations Management* (25:6), Nov, pp. 1199-1216.
- DiMaggio, P., and Powell, W.W. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review* (48:2), pp. 147-160.
- Dong, S.T., Xu, S.X., and Zhu, K.X.G. 2009. "Information Technology in Supply Chains: The Value of It-Enabled Resources under Competition," *Information Systems Research* (20:1), Mar, pp. 18-32.
- Esper, T.L., Ellinger, A.E., Stank, T.P., Flint, D.J., and Moon, M. 2010. "Demand and Supply Integration: A Conceptual Framework of Value Creation through Knowledge Management," *Journal of the Academy of Marketing Science* (38), pp. 5-18.
- Flynn, B.B., Huo, B., and Zhao, X. 2010. "The Impact of Supply Chain Integration on Performance: A Contingency and Configuration Approach," *Journal of Operations Management* (28:1), Jan, pp. 58-71.
- Frohlich, M.T. 2002. "E-Integration in the Supply Chain: Barriers and Performance," *Decision Sciences* (33:4), pp. 537-556.
- Frohlich, M.T., and Westbrook, R. 2001. "Arcs of Integration: An International Study of Supply Chain Strategies," *Journal of Operations Management* (19:2), Feb, pp. 185-200.
- Frohlich, M.T., and Westbrook, R. 2002. "Demand Chain Management in Manufacturing and Services: Web-Based Integration, Drivers and Performance," *Journal of Operations Management* (20:6), Nov, pp. 729-745.
- Gao, P., and Yu, J. 2010. "Has China Caught up in It?," *Communication of the ACM* (53:8), pp. 30-32.
- Green, K.W., McGaughey, R., and Casey, K.M. 2006. "Does Supply Chain Management Strategy Mediate the Association between Market Orientation and Organizational Performance?," *Supply Chain Management-an International Journal* (11:5), pp. 407-414.
- Harland, C.M., Caldwell, N.D., Powell, P., and Zheng, J. 2007. "Barriers to Supply Chain Information Integration: Smes Adrift of Elands," *Journal of Operations Management* (25:6), Nov, pp. 1234-1254.
- Huang, J., Jiang, X., and Tang, Q. 2009. "An E-Commerce Performance Assessment Model: Its Development and an Initial Test on E-Commerce Applications in the Retail Sector of China," *Information & Management* (46:2), pp. 100-108.
- Ke, W.L., Liu, H.F., Wei, K.K., Gu, J.B., and Chen, H.P. 2009. "How Do Mediated and Non-Mediated Power Affect Electronic Supply Chain Management System Adoption? The Mediating Effects of Trust and Institutional Pressures," *Decision Support Systems* (46:4), Mar, pp. 839-851.
- Kim, S.W. 2009. "An Investigation on the Direct and Indirect Effect of Supply Chain Integration on Firm Performance," *International Journal of Production Economics* (119), pp. 328-346.
- Kirca, A.H., Jayachandran, S., and Bearden, W.O. 2005. "Market Orientation: A Meta-Analytic Review and Assessment of Its Antecedents and Impact on Performance," *Journal of Marketing* (69:2), Apr, pp. 24-41.
- Kohli, A.K., and Jaworski, B.J. 1990. "Market Orientation: The Construct, Research Propositions, and Managerial Implications," *Journal of Marketing* (54:2), pp. 1-18.
- Krishnan, M.S., Rai, A., and Zmud, R. 2007. "The Digitally Enabled Extended Enterprise in a Global Economy," *Information Systems Research* (18:3), Sep, pp. 233-236.

- Lee, H.L. 2000. "Creating Value through Supply Chain Integration," *Supply Chain Management Review* (4:4), pp. 30-36.
- Lee, H.L., and Whang, S. 2004. *E-Business and Supply Chain Integration*. New York: Springer.
- Li, D.H., Chau, P.Y.K., and Lai, F.J. 2010. "Market Orientation, Ownership Type, and E-Business Assimilation: Evidence from Chinese Firms," *Decision Sciences* (41:1), Feb, pp. 115-145.
- Li, G., Yang, H., Sun, L., and Sohal, A.S. 2009. "The Impact of It Implementation on Supply Chain Integration and Performance," *International Journal of Production Economics* (120:1), pp. 125-138.
- Li, H.Y., and Atuahene-Gima, K. 2001. "Product Innovation Strategy and the Performance of New Technology Ventures in China," *Academy of Management Journal* (44:6), Dec, pp. 1123-1134.
- Liang, H.G., Saraf, N., Hu, Q., and Xue, Y.J. 2007. "Assimilation of Enterprise Systems: The Effect of Institutional Pressures and the Mediating Role of Top Management," *MIS Quarterly* (31:1), Mar, pp. 59-87.
- Liu, H.F., Ke, W.L., Wei, K.K., Gu, J.B., and Chen, H.P. 2010. "The Role of Institutional Pressures and Organizational Culture in the Firm's Intention to Adopt Internet-Enabled Supply Chain Management Systems," *Journal of Operations Management* (28:5), Sep, pp. 372-384.
- Lukas, B.A., and Ferrell, O.C. 2000. "The Effect of Market Orientation on Product Innovation," *Journal of the Academy of Marketing Science* (28:2), Spr, pp. 239-247.
- Martin, J.H., and Grbac, B. 2003. "Using Supply Chain Management to Leverage a Firm's Market Orientation," *Industrial Marketing Management* (32:1), Jan, pp. 25-38.
- Min, S., Mentzer, J.T., and Ladd, R.T. 2007. "A Market Orientation in Supply Chain Management," *Journal of the Academy of Marketing Science* (35:4), Dec, pp. 507-522.
- Naver, J.C., and Slater, S.F. 1990. "The Effect of a Market Orientation on Business Profitability," *Journal of Marketing* (54), pp. 20-35.
- Osmonbekov, T., Bello, D.C., and Gilliland, D.I. 2009. "The Impact of E-Business Infusion on Channel Coordination, Conflict and Reseller Performance," *Industrial Marketing Management* (38:7), pp. 778-784.
- Pagell, M. 2004. "Understanding the Factors That Enable and Inhibit the Integration of Operations, Purchasing and Logistics," *Journal of Operations Management* (22:5), Oct, pp. 459-487.
- Peng, M.W., and Luo, Y.D. 2000. "Managerial Ties and Firm Performance in a Transition Economy: The Nature of a Micro-Macro Link," *Academy of Management Journal* (43:3), Jun, pp. 486-501.
- Rai, A., Patnayakuni, R., and Seth, N. 2006. "Firm Performance Impacts of Digitally Enabled Supply Chain Integration Capabilities," *MIS Quarterly* (30:2), Jun, pp. 225-246.
- Ravichandran, T., and Lertwongsatien, C. 2005. "Effect of Information Systems Resources and Capabilities on Firm Performance," *Journal of Management Information Systems* (21:4), pp. 237-276.
- Rosenzweig, E.D. 2009. "A Contingent View of E-Collaboration and Performance in Manufacturing," *Journal of Operations Management* (27:6), Dec, pp. 462-478.
- Sanzo, M.J., Santos, M.L., Vazquez, R., and Alvarez, L.I. 2003. "The Effect of Market Orientation on Buyer-Seller Relationship Satisfaction," *Industrial Marketing Management* (32:4), May, pp. 327-345.
- Selnes, F., and Sallis, J. 2003. "Promoting Relationship Learning," *Journal of Marketing* (67:3), Jul, pp. 80-95.
- Sheehan, C., Cooper, B., Holland, P., and De Cieri, H. 2007. "The Relationship between Hrm Avenues of Political Influence and Perceived Organizational Performance," *Human Resource Management* (46:4), Win, pp. 611-629.
- Sila, I. 2010. "Do Organisational and Environmental Factors Moderate the Effects of Internet-Based Interorganisational Systems on Firm Performance," *European Journal of Information Systems* (19:5), pp. 581-600.
- Vaart, T.v.d., and Donk, D.P.v. 2008. "A Critical Review of Survey-Based Research in Supply Chain Integration," *International Journal of Production Economics* (111), pp. 42-55.
- Wei, L.Q., and Lau, C.M. 2005. "Market Orientation, Hrm Importance and Competency: Determinants of Strategic Hrm in Chinese Firms," *International Journal of Human Resource Management* (16:10), Oct, pp. 1901-1918.
- Wei, L.Q., and Lau, C.M. 2008. "The Impact of Market Orientation and Strategic Hrm on Firm Performance: The Case of Chinese Enterprises," *Journal of International Business Studies* (39:6), Sep, pp. 980-995.
- White, S. 2000. "Competition, Capabilities, and the Make, Buy, or Ally Decisions of Chinese State-Owned Firms," *Academy of Management Journal* (43:3), Jun, pp. 324-341.
- Zhao, X., Flynn, B.B., and Roth, A.V. 2007. "Decision Sciences Research in China: Current Status, Opportunities, and Propositions for Research in Supply Chain Management, Logistics, and Quality Management*," *Decision Sciences* (38:1), pp. 39-80.

- Zhao, X., Huo, B., Selen, W., and Yeung, J.H.Y. 2011. "The Impact of Internal Integration and Relationship Commitment on External Integration," *Journal of Operations Management* (29:1-2), pp. 17-32.
- Zhou, K.Z., Brown, J.R., and Dev, C.S. 2009. "Market Orientation, Competitive Advantage, and Performance: A Demand-Based Perspective," *Journal of Business Research* (62:11), Nov, pp. 1063-1070.
- Zhou, K.Z., and Li, C.B. 2010. "How Strategic Orientations Influence the Building of Dynamic Capability in Emerging Economies," *Journal of Business Research* (63:3), Mar, pp. 224-231.
- Zhu, K., Kraemer, K.L., Gurbaxani, V., and Xu, S.X. 2006. "Migration to Open-Standard Interorganizational Systems: Network Effects, Switching Costs, and Path Dependency," *MIS Quarterly* (30), Aug, pp. 515-539.
- Zou, H., and Adams, M.B. 2008. "Corporate Ownership, Equity Risk and Returns in the People's Republic of China," *Journal of International Business Studies* (39:7), Oct-Nov, pp. 1149-1168.