

Association for Information Systems

AIS Electronic Library (AISeL)

ICEB 2010 Proceedings

International Conference on Electronic Business
(ICEB)

Winter 12-1-2010

Does It Matter? A New Institutional Economics Perspective on B2B E-Commerce Adoption In Greater China and USA

Ling Zhu

Follow this and additional works at: <https://aisel.aisnet.org/iceb2010>

This material is brought to you by the International Conference on Electronic Business (ICEB) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ICEB 2010 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

DOES IT MATTER? A NEW INSTITUTIONAL ECONOMICS PERSPECTIVE ON B2B E-COMMERCE ADOPTION IN GREATER CHINA AND USA

**Ling Zhu, Department of Management, College of Management,
Long Island University C.W. Post Campus, Brookville, New York, USA
E-mail: ling.zhu@liu.edu**

Abstract

Grounding on new institutional economic theory, this paper studies the impact and effect of institutional environment on Business-to-Business (B2B) e-commerce adoption in the Greater China region and USA. In a two-phase study, we find that 1) industrial pressure is always the most powerful external facilitator for B2B e-commerce adoption; 2) at the beginning stage of e-commerce, supportive government policy was a prime force to encourage private sector to adopt e-commerce; and 3) as e-commerce becomes more prevalent and routine in business, e-commerce adoption is more business-driven and governmental policy loses its influence. The study is one of the first cross-country studies on the institutional environment and fills the knowledge gap of understanding the external environment of e-commerce.

Introduction

While organizational adoption of e-commerce has been studied extensively in the last two decades, whether and how the organization's external ecosystem drives the organization's e-commerce decision remains one of the topics receiving less attention but meriting more research efforts. It is an objective of this paper, therefore, to assess the impact and effect of the institutional environment (i.e., industrial pressure, governmental support, legal adequacy, and national cultural compatibility) on B2B e-commerce adoption in the Greater China region and USA. The assessment first builds the research model based on new institutional economics theory and extensive reviews of previous studies. The assessment then proceeds to test four research hypotheses using quantitative and qualitative methods and multi-time point approach (the first phase in 2001 and the second phase in 2007). The results of the assessment demonstrate the degree of association between each environmental factor and e-commerce adoption. The findings provide empirical evidence and systematic insights for researchers, managers and policy-makers to comprehend the role of institutional environment in B2B e-commerce adoption at firm level and over time. The study also helps craft the right strategies and policies with respect to e-commerce development in the Greater China region and USA.

Theoretical Foundation

"Insights from the New Institutional Economics suggest that we should look beyond those proximate indicators [i.e. physical infrastructure] to examine how the institutional environment in a country contributes to (or undermines) confidence in e-commerce and supports private investment in the new medium [of business transaction]." [1] Following this argument, we use new institutional economics (NIE) theory to conceptualize the institutional environment in e-commerce adoption.

The meaning of the term "institution" is twofold. First, NIE theory traditionally views institutions as a framework "of rules, procedures, and arrangements" [2], or "prescriptions about which actions are required, prohibited, or permitted" [3]. Second, institutions could be labeled as social organizations including legislatures, government agencies, trade unions, and firms [4]. These two definitions relate to each other. The organizations in the latter definition create and shape the normative rules in the society in the former definition. Those rules and arrangements, in turn, influence the decision and behavior of organizations in the society. Contemporary institutional economists view institutions even more widely as varied social constructs, including cultural beliefs. New institutionalism attempts to answer how social choices are shaped, mediated, and channeled by institutional arrangements, since social choices are generally not free from institutions, customs, social norms, or legal procedures [5].

Based on the "institution" definitions, new institutionalism further develops the concept of "institutional environment", recognizing organizations operate in an environment consisting of other institutions. The New Institutionalists believe that social, economic and political factors constitute an institutional structure of such an environment. Every organization is influenced by this environment. In order to survive, organizations must conform to the rules and belief systems prevailing in the environment, because institutional isomorphism, both structural and procedural, will earn organizational legitimacy [6][7]. Institutional contexts might be particularly important when systems crossed over both organizational and national boundaries [5].

As for IS research, organizational change with

respect to the adoption of information technology could be profitably analyzed drawing on socio-economic and political levels of analysis [8]. The theoretical assumption here is that organizational decision-making is based on differential perception and understanding of the institutional environment context. More specifically, Ives, Hamilton and Davis included external environment in their proposed MIS research model. They suggested this environment include industrial, political, legal, economic, social and cultural environments within which organizations were embedded [9].

King et al. later defined institutions in IS research as “any standing social entity that exerts influence and regulation over other social entities” [10]. They argued the relationship between environmental factors and e-commerce adoption could be explained using institutional theory. Correspondingly in Oxley et al.’s study of global e-commerce development, institutional environment was defined as the “set of fundamental political, social and legal ground rules that establish the basis for production, exchange and distribution” [1]. A study further showed that IT adoption decisions were not purely driven by organizations’ internal factors, but were also influenced, as much or even more, by the institutional environment in which the organization conducted business [11].

Accordingly, we construct institutional environment, in the context of e-commerce, as shown in the following figure. It consists of influences from entities such as suppliers, customers, competitors, trading partners, regulatory agencies, and society (see Figure 1).



Figure 1

The Institutional Environment for E-commerce Adoption

Research Model and Hypotheses

Applying the theoretical arguments described in the previous section, we develop the research model as

shown in Figure 2. The model conceptualizes the expected directional relationships between B2B e-commerce adoption and four major factors of institutional environment: industrial pressure, governmental support, legal adequacy, and national cultural compatibility. The posited relationships control for the effects of different countries, industries and company sizes. The causal model helps specify four hypotheses in the study.

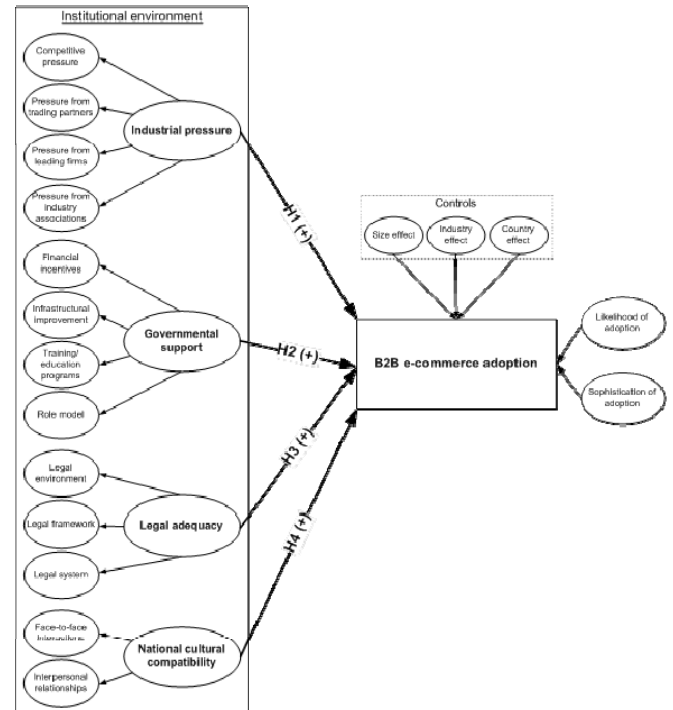


Figure 2

The Research Model

B2B E-commerce Adoption

At the early stage of e-commerce, most researchers were interested in whether companies caught up the trend and switched to the e-commerce model. Whether or not companies have adopted e-commerce in their business operations was a primary research question. We also used the likelihood of adoption as the measurement for B2B e-commerce adoption in our 2001 survey.

Since 2001, firms around the world have been increasingly adopting networked business processes and e-commerce is happening world-wide. Different types of organizations are in various stages of e-commerce [12]. Subsequently, our research should focus not on whether but on how companies are adopting e-commerce to maximize the IT benefits and values to business. The measurement for B2B e-commerce adoption in our 2007 study therefore shifted from the likelihood of adoption to the sophistication of e-commerce use.

Existed literature generally examines either the level or the degree (extensiveness) of e-commerce adoption. When measuring the level of e-commerce adoption, most researchers agree that firms usually begin with simple email communications and information-oriented websites, then advance to online transaction capabilities, and ultimately upgrade to fully integrated business processes even with external business partners [13]. When measuring the degree of e-commerce adoption, researchers either adopt Rogers's five adopter categories of innovation [14] or simple use a multi-point scale, from "intent to use" to "integrated into business", for example. We examine in our 2007 survey the sophistication of a company's e-commerce adoption; that is, a product of level by degree.

Industrial Pressure

The industry within which an organization operated might be instrumental in determining the degree to which an organization participated in B2B e-commerce [15]. A study on SMEs in Denmark, Germany, France and USA found that important drivers for e-commerce diffusion in manufacturing, retail/wholesale and financial service sectors included the use of e-commerce by major competitors, customer demand, and supplier requirements [16]. The European Commission's e-Business Survey 2006 found that four main reasons for companies to start e-commerce were: "because competitors use it," "to gain competitive advantage," "to fulfill customers' expectations," and "to fulfill suppliers' expectations," which in summary represented competition pressure and market demand [17]. Furthermore, policy-makers, industry practitioners and academic researchers, especially those in the U.S., strongly believed that e-commerce development should be guided principally by market competition, market choice and industry leadership [18][19][20]. Numerous studies have been conducted on the industrial factor in the last decade and several dimensions of the industrial factor have been successfully identified. They include the pressures from competitors, customers and/or suppliers, trend-setting firms, and industry/trade associations.

From the theoretical perspective, business organizations operate in an industrial environment consisting of other business entities. They exert influences on each other. As a result, an institutional isomorphism would be formed in that industry. In other words, competitors, customers, suppliers, peers and industry association could create a strong "bandwagon" effect that influences firms in that industry to adopt e-commerce [21][22][23]. Drawing upon previous empirical findings and theoretical arguments, we hypothesize

that industrial pressure has a positive influence on a firm's e-commerce adoption, as follows:

H1-2001. The greater a firm perceives industrial pressure to adopt e-commerce, the more likely will it adopt e-commerce.

H1-2007. The greater a firm perceives industrial pressure to adopt e-commerce, the more sophisticated will be its e-commerce adoption.

Government Support

In empirical studies, Iacovou et al. found that the use of governmental subsidies and promotional efforts could lead to faster adoption of EDI among SMEs in Canada [24]. Dasgupta et al. found that the government policy was an important determinant of IT adoption among large public companies in India [25]. After a longitudinal study over 16 years, Wang concluded that building national IT infrastructure was a primary policy choice supporting IT adoption in newly industrialized economies [26].

From the theoretical perspective, governments play a critical role in creating the institutional environment that fostered private investment [1]. Gibbs et al. argued that governmental promotions and incentives were a major enabler of e-commerce and that national policies for IT infrastructure, e.g. trade and telecommunication liberalization, were also likely to have a big impact on e-commerce by making IT more affordable to firms [27]. Government's role in supporting e-commerce adoption in the private sector has been referred to as a leader, promoter, facilitator, regulator, educator and financier [13]. Mann further posited that the slowness or failure of e-commerce adoption in some developing countries were the consequence of policy inaction or wrong action by their governments [28]. The European Commission in its e-business report suggested that governmental policies aiming at promoting e-commerce should include: 1) creating incentives and a favorable environment for enterprises; 2) supporting educational and training programs; and 3) establishing the role model of the public sector [17]. Accordingly, we hypothesize that governmental support has a positive impact on B2B e-commerce adoption, as follows:

H2-2001. The more a firm perceives governmental support in e-commerce, the more likely will it adopt e-commerce.

H2-2007. The more a firm perceives governmental support in e-commerce, the more sophisticated will be its e-commerce adoption.

Legal Adequacy

Several international studies using secondary data found that the legal environment in a country significantly affected e-commerce activities in that country [1][29][30]. A group of firm-level survey studies also showed that the regulatory environment was significantly important to determine both the breadth and depth of e-business adoption and drive the e-business value, especially in developing countries and newly industrialized economies [11][31][32][33][34]. Another study of more than 100 SMEs in the state of Kentucky showed that regulations and rules were an important factor for e-commerce adoption [35]. On the other hand, lacks of regulations and legislations and legal adequacy were a major barrier and/or serious limitation to e-commerce adoption for SMEs in the APEC region, UK and Turkey, and banks in Oman [13][36][37][38]. In the countries without new principles regulating rights and obligations in the intangible cyberspace, e-commerce adoption seemed to be slow [39]. For example, compared with firms in the U.S., fewer Chinese firms adopted e-commerce because of the less friendly legal environment. By contrast, the US legal environment was more supportive of e-commerce than in other countries. It led to a higher percentage of US firms using e-commerce. A related study confirmed that the U.S. did have a better legal environment supporting e-commerce use than other countries and that US companies expressed fewer legal concerns when doing e-commerce [40].

From the theoretical perspective, the legal consideration is the root of NIE theory. Institutions are first the legal ground rules and procedures. Institutional influences are therefore political in nature as when organizations must conform to laws and regulations to earn the organizational legitimacy [6][41]. The legal environment should be secure, stable, adaptable, and predictable for e-commerce adoption. Among those criteria, adaptability is particularly necessary because it helps ensure that the changes in social preferences, technology and other external factors can be accommodated by institutional structures [4]. An adequate legal framework supporting e-commerce is important for reducing uncertainties and building trust and confidence in electronic marketplaces; and it is particularly important for lower GDP economies [13]. Therefore, we hypothesize that a supportive legal environment, or legal adequacy for e-commerce practice, has a positive effect on e-commerce adoption, as follows:

H3-2001. The more adequate the legal system for e-commerce practice, the more likely will a firm adopt e-commerce.

H3-2007. The more adequate the legal system for e-commerce practice, the more sophisticated will be a firm's e-commerce adoption.

National Cultural Compatibility

National culture plays an important role in determining not only whether organizations in a particular country will adopt a certain technology, but also the degree to which technology innovation is accepted [42][43]. A handful of previous research focuses on the impact of corporate culture on IT adoption; however, ethnic or national culture undoubtedly had a special character [44]. With an increasing emphasis on IT diffusion in the context of globalization, there is a pressing need to discuss national cultural impact as well as empirically check for their significance [45].

At the theoretical level, institutionalists often question whether organizational choices and preferences could be properly understood outside of the cultural framework in which they were embedded [5]. One aspect of NIE theory posits that such preferences arising from cultural biases, in turn, shaped positions and preferences in social processes [46]. New institutionalism has already included social norms and cultural beliefs as a primary component of institutional environment. Based on these theoretical assertions and limited research that has been conducted to date, we incorporate a national culture dimension into our research model and its compatibility is hypothesized to have a positive influence on e-commerce adoption, as follows:

H4-2001. The more compatible the national culture with e-commerce practice, the more likely will a firm adopt e-commerce.

H4-2007. The more compatible the national culture with e-commerce practice, the more sophisticated will be a firm's e-commerce adoption.

Research Methodology

Phase I: 2001 Mail Survey

The detail of 2001 survey design can be found in our previously published work [47]. Basically, the survey was conducted among 179 firms in electronics and textiles industries across four regions: China, Taiwan, Hong Kong, and the U.S. Hard copies of the survey were mailed to all companies in the sampling framework. Respondents were primarily purchasing executives, MIS managers, CIOs or CEOs in the participating companies.

Follow-up: 2007 Online Survey/Phone Interview

Rather than being based on conventional principle of random sampling, the case selection in the follow-up phase was purposive and convenient since the study was designed to revisit the participants in the 2001 survey so as to achieve a

longitudinal purpose. As a result, the survey in 2007 consisted of a non-random small panel sample of 21 companies recruited through email invitation.

The response rate of US companies was 9% (out of 35 firms that participated in the 2001 survey and 32 newly added firms). The response rate of Chinese companies was 8% (out of 28 firms that participated in the 2001 survey and 129 newly added IT firms). The response rate of Taiwanese companies was 11% (out of 27 firms that participated in the 2001 survey). We didn't receive response from any of the 27 Hong Kong firms that participated in the 2001 survey. The overall response rate was 8%.

Out of 21 survey participants, there were six U.S. firms, twelve Chinese firms and three Taiwanese firms. Among them, seven firms participated in the 2001 survey as well. As of the type of business, seven firms were in the IT industry, five firms in the service industry, four firms in the traditional manufacturing industry, four firms in the electronics industry, and one firm in the textiles industry. As of the company size, eleven firms had more than 500 employees, two firms with fewer than 10 employees, and another eight firms between.

Since the sample size of the 2007 survey was very small, the survey itself was not suitable for rigorous causal data analysis. Qualitative data were thus required to validate and supplement the survey data [48]. Follow-up interviews were conducted after the survey. Among the 21 survey participants, one US firm and three Chinese firms agreed and took the phone interview after they completed the online survey. They turned out to be the most motivated respondents to talk about our research topics. All interviews averaged half an hour in length and were conducted using a VoIP service. The interviews discussed each company's use of B2B e-commerce and the reasons behind such adoption decisions, following an interview guideline that was emailed to the interviewee for review at least 72 hours in advance.

Data Analysis

Phase I: 2001 Mail Survey

The detail of analysis for the 2001 survey can be found in our previously published work [47]. The final logistic regression model is shown below (see Table 1).

Estimation					
Variable	Logistic Coefficient	Std. Error	Wald Statistic	p-value	Odds Ratio
Industrial encouragement	1.030***	0.337	9.391	0.002	2.802
Governmental encouragement	1.140***	0.399	8.188	0.004	3.128
Cultural compatibility	0.542*	0.233	3.425	0.064	1.719
Regulatory effect	0.313	0.301	1.084	0.298	1.368
Country dummies					
China vs. US	-3.520***	0.987	12.712	0.000	0.080
Taiwan vs. US	-1.763	1.112	2.517	0.113	0.171
Hong Kong vs. US	-0.689	0.997	0.736	0.383	0.411
Industry dummies					
Textiles vs. Electronics	-1.312**	0.633	4.294	0.038	0.288
Goodness-of-fit					
Initial -2 log likelihood:	128.976		Final -2 log likelihood:	82.013	
Model chi-square test:	Chi-square=46.885		p=0.000		
Nagelkerke test:	Chi-square=18.893		p=0.116		
Nagelkerke R ² :	0.520				
Predictive accuracy					
	Predicted		%Correct		
Observed	Non-adopter	Adopter			
Non-adopter	25	11	88.4		
Adopter	9	58	85.5		
Overall percentage			79.8		
Full model			89.2		

Table 1
The Logistic Regression Model in the 01 Survey

Follow-up: 2007 Online Survey/Phone Interview

Table 2 shows the independent variables (IVs) and the measurement items of each variable surviving after a series of validity tests.

No.	Item
Industrial pressure	
IF01	Competitors use e-commerce
IF04	Customers request using e-commerce
IF06	Suppliers request using e-commerce
IF07	Leading/trend-setting companies use e-commerce
IF08	Other companies use e-commerce
IF09	Trade association promotes e-commerce
Legal adequacy	
LF01	Existing business laws adequate for e-commerce
LF03	Current legal framework clear for e-commerce
LF04	Court systems capable for solving e-commerce cases
LF05	Legal professionals capable for handling e-commerce cases
Governmental support	
GF03	Government efforts to improve e-commerce infrastructures
GF04	Government training and advisory programs
GF05	Government role model of using e-commerce
National cultural compatibility	
CF01	Preference of face-to-face business transactions (reverse-coding)
CF02	Interpersonal relationship important for business (reverse-coding)

Table 2
The Independent Variables in the 07 Survey

The dependent variable (DV) was measured by responses to a series of questions with regard to both the level and degree of B2B e-commerce usage (see Table 3). A weighted, summed composite score of the latent construct of DV was computed using the following formula:

$$\text{B2B e-commerce adoption} = \frac{\sum_{n=1}^7 U E_n \times n}{\sum_{n=1}^7 n} \quad (U E_n \text{ is the score for the item at level } n)$$

B2B e-commerce adoption			
Item	Level/weight	Answer	Score
Website for marketing information	1	No use	0
Website with advanced information functions	2	Intend to use	1
Website with basic function of receiving orders	3	Started using	2
Website with advanced function of customizable orders	4	Used for a while	3
Web-based EDI	5	Used frequently	4
Web-based SCM	6	Integrated into business	5
Integrated e-business systems with business partners	7		

Table 3

The Dependent Variable in the 07 Survey

Table 4 reports the Cronbach's alpha of each variable in both 2001 and 2007 surveys. The reliability of the 2007 measurements has been improved greatly compared with the 2001 ones.

2001 Survey			2007 Survey		
Variable	Cronbach's Alpha	Number of Items	Variable	Cronbach's Alpha	Number of Items
Industrial encouragement	0.841	3	Industrial pressure	0.673	3
Regulatory effect	0.888	2	Legal adequacy	0.643	4
Governmental encouragement	0.588	2	Governmental support	0.687	3
Cultural compatibility	-	1	Cultural compatibility	0.682	2
B2B e-commerce adoption	(N/A)		B2B e-commerce usage	0.683	7

Table 4

Reliability Test of Variables in 01/07 Surveys

We ran a multiple regression model using the 2007 survey data, even though the sample size might be small according to conventional criteria. This was based on the assumption that as long as the final regression model could explain more than 55% of variance in the dependent variable, multiple regression run on this dataset would still be able to shed light on the causal relationships between the IVs and DV.

The result of the multiple regression model is shown in Table 5. Industrial pressure is the most powerful and significant predictor of B2B e-commerce adoption (Beta=0.717, $p < 0.01$) in the 2007 online survey sample. National cultural compatibility is a moderately strong predictor (Beta=0.396, $p < 0.1$). The positive coefficients of both IVs confirm their important roles as e-commerce facilitators. The effects of legal adequacy and governmental support are weak. The coefficient of legal adequacy was even negative when controlled for all other independents. The relative importance of four IVs in deciding the sophistication of a company's B2B e-commerce adoption in this given model is about 9.8:5.4:1:-2.5, corresponding to the ratio of unique contribution of industrial pressure, national cultural compatibility, governmental support and legal adequacy.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.400	.573		.698	.501
	China vs. US	.225	1.017	.113	.221	.830
	Taiwan vs. US	.150	.894	.054	.168	.870
	Non-IT/electronics vs. IT/electronics industry	-.149	.615	-.075	-.242	.814
	SME vs. Large Company	-1.154	.967	-.581	-1.193	.260
	(Constant)	-.105	.354		-.298	.776
	China vs. US	.975	.605	.492	1.612	.158
2	Taiwan vs. US	.787	.524	.285	1.503	.184
	Non-IT/electronics vs. IT/electronics industry	-.055	.365	-.028	-.151	.885
	SME vs. Large Company	-1.376	.568	-.693	-2.420	.052
	Zscore: Power of 2 (Industrial pressure+0.5)	.718	.171	.717	4.192	.006
	Zscore: Power of 2 (Legal adequacy+0.5)	-.184	.188	-.186	-.981	.364
	Zscore: Sqrt (Governmental support+0.5)	.074	.206	.073	.361	.730
	Zscore: Sqrt (National cultural compatibility)	.416	.201	.396	2.069	.084

a. Dependent Variable: Zscore: Sqrt (B2B e-commerce adoption-0.1)
 b. Selecting only cases for which CaseID <= 22

Table 5

The Multiple Regression Model in the 07 Survey

Furthermore, Table 6 summarizes the results from four phone interviews with respect to the importance of institutional environment factors in B2B e-commerce adoption. All interviewees were also asked to rank those institutional environment factors according to their impacts on B2B e-commerce adoption decision. The results are consistent with the previous quantitative analysis. The industrial factor received the highest rank across all interviewees; and then governmental, legal and national cultural factors in order (see Table 7).

Institutional environment factors	Impact on B2B e-commerce
Industrial pressure	
Competitive pressure	+
Customer/supplier use/request	++
Governmental support	
Tax break/reduction	++
Financial subsidy/incentive	+
Government role model	+
Government training/advisory program	+
Legal adequacy	
Adequate legal system	++
National culture compatibility	
Face-to-face preference	--
Interpersonal relationship	-

Note:
 +: positive effect on B2B e-commerce adoption;
 ++: strong positive effect on B2B e-commerce adoption;
 -: negative effect on B2B e-commerce adoption;
 --: strong negative effect on B2B e-commerce adoption.

Table 6

The Impacts of Institutional Factors in the 07 Interviews

Factor	US-H8	CN-DP	CN-OA	CN-NS	Median ranking
Industrial factor	1	1	1	1	1
Governmental factor	2	2	4	2	2
Legal factor	3	3	3	3	3
National cultural factor	4	4	2	4	4
Additional factor	No	Technical factor	Technical factor	No	-

Table 7

Rankings of Importance of Environmental Factors

Discussion and Conclusion

Phase I: 2001 Mail Survey

The findings at Phase I imply that when B2B e-commerce was still at its nascent stage, its adoption was mostly business-driven and sensitive to government enabling policies (see Table 8). Companies that perceived more encouragement from their industry and trading partners were more likely to adopt e-commerce. On the other hand, the findings show that national culture had just a mild impact on e-commerce adoption and the result does not support the hypothesis of causal-effect relationship between the legal environment and e-commerce adoption.

Hypothesis	Independent variable	Measurements for IV	Dependent variable	Measurements for DV	Supported	Effect size*
H1a	Industrial encouragement	<ul style="list-style-type: none"> Industry encouragement Customers encouragement Suppliers encouragement 	E-commerce adoption	<ul style="list-style-type: none"> Adopter (=1) Non-adopter (=0) 	Yes	1.03 ^{***}
H2a	Governmental encouragement	<ul style="list-style-type: none"> Government encouragement Government incentives 			Yes	1.14 ^{***}
H3a	Regulatory change	<ul style="list-style-type: none"> Domestic law changes International law changes 			No	0.31
H4a	Cultural compatibility	<ul style="list-style-type: none"> National cultural compatibility 			Marginally	0.64 ^{**}

Note:
 * Effect size was based on the logistic coefficient.
^{**} p<0.1;
^{***} p<0.005.

Table 8

Summary of Hypotheses & Results at Phase I

Follow-up: 2007 Online Survey

Among all coefficients of the multiple regression model, only the industry pressure demonstrates a strong relationship with e-commerce adoption. Similar to the result in the 2001 survey, the effect of cultural compatibility was found marginally important (see Table 9). The results from the qualitative interview were used to cross-validate the findings.

Hypothesis	Independent variable	Measurements for IV	Dependent variable	Measurements for DV	Supported	Effect size*
H1b	Industrial pressure	<ul style="list-style-type: none"> Computers use Customers use Suppliers use Leading companies use Other companies use Industry association promotes 	E-commerce adoption	<ul style="list-style-type: none"> Level of adoption Extent of adoption 	Yes	0.72 ^{***}
H2b	Governmental support	<ul style="list-style-type: none"> Government effort to improve infrastructure Government training program Government role model 			No	0.07
H3b	Legal adequacy	<ul style="list-style-type: none"> Clear legal framework Capable legal system Adequate laws 			No	-0.19
H4b	Cultural compatibility	<ul style="list-style-type: none"> Face-to-face transactions Interpersonal relationship 			Marginally	0.40 ^{**}

Note:
 * The results in this table were based upon the multiple regression coefficients of survey data analysis.
^{**} p<0.1;
^{***} p<0.01.

Table 9

Summary of Hypotheses & Results at Follow-up

In sum, the data analyses in this study suggest that over time the strongest facilitator of B2B e-commerce is industrial pressure, while cultural compatibility also has some impacts. Governmental support was particularly important for the fosterage in the private sector at the start of e-commerce; nevertheless, its driving force weakens when e-commerce becomes a common practice in

business. Lastly, the effect of legal adequacy is not found and/or supported in this study.

Managerial Implication

First, according to new institutionalism, business entities always “seek guidance from the experience of others in comparable situations” when facing choices [5]. The business perceptions and opinions collected and analyzed in this study could be used by companies for reference in evaluating their own environmental situations and making informed business decisions on e-commerce.

Second, Davenport in his book, *Information Ecology: Mastering the information and knowledge environment*, expounded that all companies have to be informed about the outside world: what customers need, what suppliers demand, what competitors are trying to accomplish, what regulators insist we must do, and what bias cultural values create [49]. These external environments can consequently motivate organizational decisions and actions. Consistently, this study shows managers that firms do not make e-commerce decisions independently from their external environments, nor are they powerful enough to ignore the external environment. Managers play the role of organizational architects who design an organization in a way that improves its ability to adapt to its environment [50]. They should therefore ensure that they are well-informed about the external environment, including industry situations and trends, government policies and initiatives, legal and regulatory changes, and local cultural values. Based on the information and understanding of the external environment, managers will be able to design and implement their “e-strategies” that fit the environment and the e-strategies could be more efficient and successful. Managers will expect congruence or “institutional isomorphism” of e-commerce in businesses. If this is the case, managers could also expect the maximization of benefits offered by e-commerce.

Third, according to NIE theory and the research findings in this study, firms themselves are also a part of institutions and thus play a role in creating and shaping the institutional environment. The role is significant in the industrial environment in particular. Metcalfe’s law tells us that the value of B2B e-commerce model is proportional to the square of the number of companies in the industry participating in B2B e-commerce. Therefore, managers should understand that, if they want to reap the full benefits of e-commerce, they need to get their business partners along the value chain on board as well. According to this study, this could be done effectively through requesting the firm’s customers or suppliers to use e-commerce and through the promotion of industrial associations.

Policy Implication

All sound policy prescriptions should rely on a solid theory base, valid data analysis, and rational discussion. In reality, however, policymakers generally lack adequate scientific evidence and knowledge for making crucial decisions on e-commerce development. The application of NIE theory in e-commerce adoption and its empirical findings in this study have a clear relevance to policy makers. If we understand better at the theoretical level how those institutional factors would produce an outcome of e-commerce adoption, we then have the basis for a conditional prediction in the real world on how e-commerce will develop in a certain environment. It will help policy makers to formulate appropriate policies to accelerate e-commerce adoption.

Experience and academic research have shown us that it is important to build a business-friendly climate for technology innovation and diffusion and support the entrepreneurial spirit that drives economic growth and development. The effects of institutional environment will depend to a significant extent on how policy-makers, business players and other stakeholders will act and influence together. Policies must be designed, articulated in coherent e-strategies and implemented in partnership with all relevant players to ensure that the opportunities provided by e-commerce are taken advantage of to improve the productivity of a national economy and the enterprises within it [51]. According to this study, this is particularly vital at the infant stage of e-commerce. The advancement in e-commerce adoption at Phase I could be credited to governmental support. In particular, proactive government policies were the prime mover of e-commerce in many developing countries at the beginning.

On the other hand, this study also shows that the lack of governmental supportive policies and adequate legal framework are concerns of companies engaging in e-commerce, but that the lack thereof will not deter companies from implementing their e-commerce strategies nor inhibit the sophistication of e-commerce adoption after its initial uptake. Rather, e-commerce adoption is more industry and/or market driven. The representative example here is the U.S.: e-commerce has flourished in the U.S. for many years without too much intervention of government and/or legislation. Thus, after an initial push on e-commerce adoption, government and/or legislation should not interfere directly in private investments in e-commerce until there is a clear sign of industrial failure or market uncertainty and disturbance. Government might rather take a more active role, in particular in addressing the lack of social and cultural compatibility with e-commerce

diffusion. For example, according to this study, one of the greatest concerns of Chinese firms was the lack of trust among B2B e-commerce participants. This was the main reason why they still preferred face-to-face business transactions and delayed the adoption of e-commerce. The Chinese government could put more efforts in laying out clear and solid policy, regulatory and technical foundations to ensure the trust relationship and confidence among the B2B parties involved.

References

- [1] Oxley, J.E., and Yeung, B. "E-commerce readiness: Institutional environment and international competitiveness," *Journal of International Business Studies* (32:4) 2001, pp 705-723.
- [2] Shepsle, K.A. "Institutional equilibrium and equilibrium institutions," in: *Political Science: The Science of Politics*, H. Weisburg (ed.), Agathon, New York, 1986, pp. 51-82.
- [3] Ostrom, E. "An agenda for the study of institutions," *Public Choice* (48) 1986, pp 3-25.
- [4] Ahrens, J. "The New Institutional Economics," in: *Governance and economic development*, Edward Elgar, Northampton, MA, 2002, pp. 48-68.
- [5] DiMaggio, P.J., and Powell, W.W. "Introduction," in: *The New Institutionalism in Organizational Analysis*, W.W. Powell and P.J. DiMaggio (eds.), The University of Chicago Press, Chicago, 1991a, pp. 1-38.
- [6] DiMaggio, P.J., and Powell, W.W. "The iron cage revisited: Institutional isomorphism and collective rationality in organization fields," in: *The New Institutionalism in Organizational Analysis*, W.W. Powell and P.J. DiMaggio (eds.), The University of Chicago Press, Chicago, IL, 1991b, pp. 63-82.
- [7] Scott, R.W. *Institutions and Organizations*, (2nd ed.) SAGE Publications, Thousand Oaks, 2001.
- [8] Pettigrew, A.M. "Contextualist research and the study of organizational change processes," in: *Research methods in information systems*, E. Mumford, R. Hirschheim, G. Fitzgerald and T. Wood-Harper (eds.), North-Holland, Amsterdam, 1985, pp. 53-73.
- [9] Ives, B., Hamilton, S., and Davis, G.B. "A framework for research in computer-based management information systems," *Management Science* (26:9), September 1980, p 910.
- [10] King, J.L., Gurbaxani, V., Kraemer, K.L.,

- McFarlan, F.W., Raman, K.S., and Yap, C.S. "Institutional factors in information technology innovation," *Information Systems Research* (5:2) 1994, pp 139-169.
- [11] Gibbs, J.L., and Kraemer, K.L. "A cross-country investigation of the determinants of scope of e-commerce use: An institutional approach," *Electronic Markets* (14:2), June 2004, pp 124-137.
- [12] Chambers, J. "Foreword," in: *The global information technology report 2006-2007: Connecting to the networked economy*, S. Dutta and I. Mia (eds.), Palgrave Macmillan, Hampshire, UK, 2007, p. vii.
- [13] PWC "SME Electronic Commerce Study (final report)," Asia Pacific Economic Cooperation (APEC)/PriceWaterhouse-Coopers (PWC), Lima, Peru, September 1999.
- [14] Rogers, E.M. "Innovativeness and adopter categories," in: *Diffusion of Innovations*, Free Press, New York, 2003, pp. 267-299.
- [15] Shore, B. "Information sharing in global supply chain systems," *Journal of Global Information Technology Management* (4:3) 2001, pp 27-50.
- [16] Beck, R., Wigand, R.T., and Konig, W. "The diffusion and efficient use of electronic commerce among small and medium-sized enterprises: An international three-industry survey," *Electronic Markets* (15:1), February 2005, pp 38-52.
- [17] EC "The European e-Business Report 2006/07 edition," *e-Business W@tch*, European Commission, Bonn, Germany, 2006.
- [18] Clinton, W.J., and Albert Gore, J. "A Framework for Global Electronic Commerce," The White House, Washington, D.C., 1997.
- [19] Israel, C. "Technology administration beyond the dot come bubble: Supporting global e-commerce and sharing the promise of technology," US Department of Commerce, Washington, D.C., 2002.
- [20] Samuelson, P. "Five challenges for regulating the global information society," University of California at Berkeley, Berkeley, CA, 1999.
- [21] Cho, V. "Factors in the adoption of third-party b2b portals in the textile industry," *The Journal of Computer Information Systems* (46:3), Spring 2006, pp 18-31.
- [22] Grandon, E.E., and Pearson, J.M. "Electronic commerce adoption: An empirical study of small and medium US businesses," *Information & Management* (42:1), December 2004, pp 197-216.
- [23] Tsikriktsis, N., Lanzolla, G., and Frohlich, M. "Adoption of e-processes by service firms: An empirical study of antecedents," *Production and Operations Management* (13:3), Fall 2004, pp 216-229.
- [24] Iacovou, C.L., Benbasat, I., and Dexter, A.S. "Electronic data interchange and small organizations: Adoption and impact of technology," *MIS Quarterly* (19:4), December 1995, pp 465-485.
- [25] Dasgupta, S., Agarwal, D., Ioannidis, A., and Gopalakrishnan, S. "Determinants of information technology adoption: An extension of existing models to firms in a developing country," *Journal of Global Information Management* (7:3) 1999, pp 30-45.
- [26] Wang, E.H.-h. "ICT and economic development in Taiwan: analysis of the evidence," *Telecommunications Policy* (23) 1999, pp 235-243.
- [27] Gibbs, J., Kraemer, K.L., and Dedrick, J. "Environment and policy factors shaping global e-commerce diffusion: A cross-country comparison," *The Information Society* (19) 2003, pp 5-18.
- [28] Mann, C.L. "Electronic commerce, networked readiness, and trade competitiveness," in: *The global information technology report 2001-2002: Readiness for the networked world*, G.S. Kirkman, P.K. Cornelius, J.D. Sachs and K. Schwab (eds.), Oxford University Press, New York/Oxford, 2002, pp. 90-103.
- [29] Ndubizu, G., and Arinze, B. "Legal determinants of the global spread of e-commerce," *International Journal of Information Management* (22:3), June 2002, pp 181-194.
- [30] Zhao, H., Kim, S., Suh, T., and Du, J. "Social institutional explanations of global Internet diffusion: A cross-country analysis," *Journal of Global Information Management* (15:2), April-June 2007, pp 28-55.
- [31] Xu, S., Zhu, K., and Gibbs, J. "Global technology, local adoption: A cross-country investigation of Internet adoption by companies in the United States and China," *Electronic Markets* (14:1) 2004, pp 13-24.
- [32] Zhu, K., and Kraemer, K.L. "Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry," *Information Systems Research* (16:1), March 2005, pp 61-84.
- [33] Zhu, K., Kraemer, K.L., and Xu, S. "The process of innovation assimilation by firms in different countries: A technology diffusion perspective on E-business," *Management Science* (52:10), October 2006, pp 1557-1576.
- [34] Zhu, K., Kraemer, K.L., Xu, S., and Dedrick,

- J. "Information technology payoff in e-business environments: An international perspective on value creation of e-business in the financial services industry," *Journal of Management Information Systems* (21:1), Summer 2004, pp 17-54.
- [35] Wymer, S.A., and Regan, E.A. "Factors influencing e-commerce adoption and use by small and medium businesses," *Electronic Markets* (15:4), November 2005, pp 438-453.
- [36] Kaynak, E., Tatoglu, E., and Kula, V. "An analysis of the factors affecting the adoption of electronic commerce by SMEs: Evidence from an emerging market," *International Marketing Review* (22:6) 2005, pp 623-640.
- [37] Khalfan, A.M., and Alshawaf, A. "Adoption and implementation problems of e-banking: A study of the managerial perspective of the banking industry in Oman," *Journal of Global Information Technology Management* (7:1) 2004, pp 47-64.
- [38] Simpson, M., and Docherty, A.J. "E-commerce adoption support and advice for UK SMEs," *Journal of Small Business and Enterprise Development* (11:3) 2004, pp 315-328.
- [39] Shih, C.-F., Dedrick, J., and Kraemer, K.L. "Rule of law and the international diffusion of e-commerce," *Association for Computing Machinery. Communications of the ACM* (48:11), Nov 2005, p 57.
- [40] Hsu, P.-F., Kraemer, K.L., and Dunkle, D. "Determinants of e-business use in U.S. firms," *International Journal of Electronic Commerce* (10:4), Summer 2006, pp 9-45.
- [41] North, D.C. "The New Institutional Economics," *Journal of institutional and theoretical economics* (142) 1986, pp 230-237.
- [42] Harris, R., and Davison, R. "Anxiety and involvement: Cultural dimensions of attitudes toward computers in developing societies," *Journal of Global Information Management* (7:1) 1999, pp 26-38.
- [43] Thatcher, S.M.B., Foster, W., and Zhu, L. "B2B e-commerce adoption decisions in Taiwan: The interaction of cultural and other institutional factors," *Electronic Commerce Research and Applications* (5:2) 2006, pp 92-104.
- [44] Straub, D., Keil, M., and Brenner, W. "Testing the technology acceptance model across cultures: A three country study," *Information & Management* (33) 1997, pp 1-11.
- [45] Maitland, C.F., and Bauer, J.M. "National Level Culture and Global Diffusion: The Case of the Internet," in: *Culture, Technology, Communication: Towards an Intercultural Global Village*, C. Ess (ed.), State University of New York Press, Albany, 2001, pp. 87-128.
- [46] Douglas, M. *How Institutions Think* Syracuse University Press, Syracuse, NY, 1986.
- [47] Zhu, L., and Thatcher, S. "The institutional environment for B2B e-commerce adoption: A quantitative study of electronics and textiles firms in Greater China and the U.S.," *International Journal of Networking and Virtual Organizations*, Volume 4, No. 1, 2007, pages 92-104.
- [48] King, N. "The qualitative research interview," in: *Qualitative methods in organizational research: A practical guide*, C. Cassell and G. Symon (eds.), Sage, London, 1994, pp. 14-36.
- [49] Davenport, T.H. "Information and the outside world," in: *Information ecology: Mastering the information and knowledge environment*, Oxford University Press, New York, 1997b, pp. 193-217.
- [50] Ancona, D.G., Goodman, P.S., Lawrence, B.S., and Tushman, M.L. "Time: A new research lens," *The Academy of Management Review* (26:4), October 2001, pp 645-663.
- [51] UNCTAD "E-Commerce and Development Report 2001," United Nations Conference on Trade and Development, Geneva.