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The Institutional Environment for Global E-commerce Diffusion: A Cross-country Investigation

Ling Zhu, Long Island University C.W. Post Campus, USA, ling.zhu@liu.edu

Abstract

Grounding on institutional theory and e-commerce adoption literatures, the study conducts a cross-country analysis assessing the effects of industrial, governmental and legal factors on global B2B e-commerce diffusion in the years of 2001-02 and 2006-07. The analysis is based on a secondary dataset from the Global Information Technology Report published by the World Economic Forum (WEF). The secondary data analyses cover 75 countries in 2001-02 and 122 countries in 2006-07, reflecting business perceptions of the institutional environments and e-commerce diffusions in those countries. The results of the study indicate that at the infant stage of e-commerce, the supportive government policy was a powerful facilitator for e-commerce diffusion around the world. As e-commerce becomes more prevalent, e-commerce diffusion is more business-driven and the government policy loses its significance. Meanwhile, as companies engage more in e-commerce, the legal environment becomes an important factor in e-commerce diffusion. The study confirms various institutional environments exert influences on countries' e-commerce diffusion at various stages of e-commerce development. It is one of the first cross-country studies on the institutional environments and the research results have managerial and policy implications for global e-commerce diffusion.

Keywords: Institutional environment, B2B e-commerce diffusion, industrial factor, governmental factor, legal factor

1. Introduction

E-commerce has become a pervasive business phenomenon in the information society. By making business more competitive and productive, e-commerce is momentous for both developed and developing countries in strengthening the economy and supporting the development. The reality is that, however, after a decade of development, e-commerce diffusion among different countries is still uneven due partially to different external environment. The challenge is thereby for researchers, industry practitioners and policy-makers to better understand the e-commerce phenomenon and to ensure that the opportunity and potential offered by e-commerce is taken and realized in all economies. In particular, e-commerce should be facilitated, not inhibited, by its external environment.

While IS (information systems) researchers have given much attention to IT diffusion in general, many research questions were left still unanswered. In particular, the topic of whether and how the external environment could significantly define the information ecosystems of organizations has been identified in the last two decades as an area with the scarcest study but meriting research attention [1] [25] [30] [32] [40]. It is an object of this study to provide a comprehensive and institutional lens for understanding the external environment of e-commerce diffusion in different countries. Accordingly, the study concerns the relationship between institutional environment and global e-commerce diffusion and investigates the impact and effect of those institutional factors. The study aims to answer two specific research questions as follows.

- 1) What are the primary components of the institutional environment required for e-commerce diffusion? and
- 2) Whether and to what extent do those institutional factors influence e-commerce diffusion in different countries?

2. Research Background

2.1 Definition of E-commerce

While several definitions of e-commerce have been developed and used in different contexts and for varying purposes, e-commerce is defined in this study as any commercial process that is conducted over Internet-based computer networks. In this definition, the term "commercial process" means all activities that generate value from inbound logistics to outbound logistics and marketing/sales, with external business partners, such as suppliers and customers. It ranges from providing and obtaining product or service information using email and website to receiving and placing orders over the Internet. From this perspective, e-commerce is synonymous with e-business, but focuses more

on external business processes. An assumption here is that companies' external business processes would be influenced by the external environment more than its internal business processes would be.

Furthermore, this study narrows down the scope of e-commerce in question to business-to-business (B2B), which is between trading partners rather than between business entity and individual consumer (B2C). B2B e-commerce constitutes from 75% to more than 90% of all e-commerce activities in different countries [46] [59] [60]. It plays undoubtedly a pivotal role in e-commerce.

2.2 Uneven Diffusion of E-commerce

Even with considerable opportunities offered by e-commerce, the diffusion of e-commerce is varied largely among different countries and economies. There has been a concern that uneven diffusion of e-commerce would create unfair competitive advantages for multinational oligarchs against local SMEs and create a "digital divide" between developed and developing countries. Countries that lag behind in e-commerce and other technological innovations will risk being bypassed by the competitive edge of those using the new technologies [58]. In a worse scenario, existing socio-economic divisions between developed and developing countries would be reinforced by the "digital divide", rather than be narrowed or changed by e-commerce.

2.3 Policy of E-commerce

For the facts shown above, e-commerce has been both a strategic initiative of private sectors and a key policy issue of public institutions. Many disparate guidelines, directives, laws, and treaties have emerged and governments around the world have developed bold plans for boosting e-commerce. These institutional activities, in turn, created and shaped the external environment for firms' e-commerce adoption decision, although the degree of their effects might be varied across countries.

Despite the numerous endeavors, governments should proceed carefully to construct policies to enable and promote e-commerce, with consideration of the institutional capacities of a country. How to create a supportive environment for e-commerce diffusion has driven much of the debate on policy making since the end of 1990s. One of the responses was a Framework for Global Electronic Commerce proposed by the U.S. government in 1997. The Framework recognized that governments could have a profound effect on e-commerce, either facilitating or inhibiting it. Knowing when and how the government should act is crucial to the development of e-commerce.

It is commonly believed that the private sector makes its business and management decisions in an integrated institutional context covering laws, regulations, standards, norms, funding and promotions. It is also believed that policy-making has an original motivation to promote e-commerce adoption. However, how the policy plays and how it should play the role as a promoter in the private sector's decision on e-commerce is still unclear. One of the reasons is that, in an increasingly complex information economy, it is difficult to identify and measure the effect of policy outcomes. To conclude, both the significance and challenge of e-commerce are so obvious that there is an imminent need to evaluate scientifically the effects of institutional factors on e-commerce diffusion for reference in appropriate policy-making and business decision.

3. Theoretical Foundation

Adoption and diffusion of e-commerce has been a growing topic of academic research as well. One of the research approaches is employing institutional theory to study the external environment for e-commerce diffusion. "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]." [42] This study follows this theoretical suggestion to conduct a series of empirical studies on the institutional environment factors for global e-commerce diffusion. The theoretical underpinnings in this section provide the rationale and relevance of using institutional theory in the study.

The meaning of the term "institution" is twofold. First, institutional theory traditionally views institutions as a framework "of rules, procedures, and arrangements" [51], or "prescriptions about which actions are required, prohibited, or permitted" [41]. Second, institution could be labeled as social organizations including legislatures, government agencies, trade unions, and firms [2]. These two definitions are related to each other. The latter formal

organizations create and shape the former normative rules in the society and those rules and arrangements influence the decision and behavior of organizations in the society. 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, social norms, or legal procedures [13].

Within IS research, scholars suggested that organizational change with respect to the use of information technology could be profitably analyzed drawing on socio-economic and political (i.e., external contextual) levels of analysis [44]. The theoretical assumption here is that organizational decision is based on differential perception and understanding of the institutional environment context. Furthermore, pioneer researchers Ives, Hamilton and Davis included external environment in their proposed MIS research model. This environment included industrial, political, legal, economic and social environments within which organizations were embedded [25]. Applied specifically to e-commerce diffusion, the institutionalism lays an important theoretical foundation for conducting study on external environments for organizations to make e-commerce adoption decisions. Institutional theory guides the reasoning through the research question to a number of more specific variables and hypotheses in the study.

4. Institutional Approach and Research Model

Since the publication of DiMaggio and Powell’s book “The New Institutionalism in Organizational Analysis” in 1991, the institutional approach has attracted more and more attention of IS researchers. King et al. in their profound paper in the journal of ISR (Information Systems Research) defined institutions as “any standing social entity that exerts influence and regulation over other social entities” [30]. They further argued that the relationship between environmental factors and e-commerce diffusion could be explained using institutional theory. Later in a cross-country study of e-commerce, the industrial, governmental and legal factors were analyzed as the institutional environment for e-commerce [42]. In that study, the institutional environment was defined as the “set of fundamental political, social and legal ground rules that establish the basis for production, exchange and distribution” [42]. In the context of e-commerce, this institutional environment consisted of suppliers, customers, competitors, trading partners, society, and regulatory agencies such as government [20].

Applying the above conceptual arguments, together with the theoretical foundations described in the previous section, the research model of this study is constructed and shown in Figure 1. The model conceptualizes the expected directional relationships between B2B e-commerce diffusion and three major factors of the institutional environment—industrial environment, government policy, and legal environment. The posited relationships controlled for the effect of GDP per capita in each country. The research model did not mean to capture exhaustively all possible factors in e-commerce diffusion, but to illustrate how some of the important environmental factors affected global e-commerce diffusion.

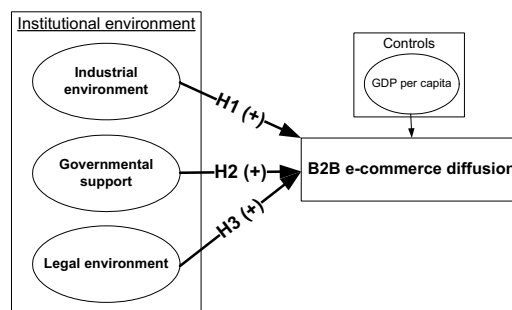


Figure 1. Research model of the institutional environment for B2B e-commerce diffusion

This research model visualized the predictive variables of e-commerce diffusion and underlying logic inferred from the institutional theory. The later data collection and analyses would focus on the industrial, governmental and legal factors as a major source of “institutional environment” [54]. The causal model also helped specify three research hypotheses in the study. As discussed in the next section, each construct in my research model was tested by previous empirical studies more or less. Yet no research has ever investigated the three external factors collectively in a single research model.

5. Literature Review and Research Hypotheses

5.1 Industrial environment

The industry within which an organization operated might be instrumental in determining the degree to which an organization participated in B2B e-commerce [54]. A recent study of SMEs in Denmark, Germany, France and the U.S. found that important drivers for e-commerce diffusion in those countries were the use of e-commerce by major competitors, customer's demand, and supplier's requirement [4]. 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 the competition pressure and market demand [17]. There were numerous studies on the industrial factor in the last decade. Several dimensions of industrial environment identified in my literature review are discussed as follows.

5.1.1 Competitive Intensity

Competitive intensity has been investigated more than any other external factors in e-commerce adoption literature. In early studies on inter-organizational information systems, competitive intensity was found as the most important external factor in EDI adoption in the U.S. [45] [47], SMEs in Canada [8], and firms in Taiwan [61]. After almost a decade, competitive intensity was still a significant factor affecting the decision to adopt e-commerce in the U.S. [56] [62] and Taiwan [35]. A research stream initiated by Gibbs et al. in 2003 first used case study to show that competitive intensity would be the greatest driver of global e-commerce diffusion [19]. They then showed that competitive intensity significantly affected the intent to adopt e-business, using a large-scale survey of 3,100 businesses in eight European countries [65]. A follow-up survey with firms in ten countries further confirmed that competition intensity was an important factor affecting the sophistication of e-business adoption [67]. In studies within several specific countries, competitive intensity was found as one of the primary reasons to adopt e-commerce. Those countries included developed countries such as UK [10] [55] and South Korea [26], and developing countries such as Thailand [34], Chile [21] and Brunei [36].

5.1.2 Impacts of Customers/suppliers

In their widely-cited case study, Iacovou et al. posited that the trading partner's imposition was one of the most critical factors for SMEs' adoption of EDI [24]. In a recent case study, Ng also found the influence from trading partners in the choice of B2B e-commerce model [18]. Those trading partners could be a dominant customer (or supplier) pushing its suppliers (or customers) to implement relationship-specific information systems such as EDI and SCM [16] [53]. SMEs participated in an APEC's (Asia Pacific Economic Cooperation) e-commerce survey ranked "low use of e-commerce by customers and suppliers" as No.1 perceived barriers to e-commerce adoption [46]. Until sufficient numbers of their main customers and suppliers participated in e-commerce activities, there was little incentive for those SMEs to become engaged in e-commerce themselves.

5.1.3 E-commerce Diffusion in the Industry

At theoretical level, Rogers indicated that potential adopters of innovation would look to early adopters for experience, advice and support [48]. Leading and innovative companies have recognized that they need to get other firms that haven't adopted e-commerce "on board" in order to reap the full benefits of e-commerce [17]. A case study on Taiwan's IT industry found similar industrial forces as well as rules and standards established by local industry drove B2B e-commerce diffusion [6].

From the theoretical perspective, business organizations operate in an industrial environment consisting of other business entities. They exert influences on each other. In order to survive, organizations must conform to the rules, standards, requests and trends prevailing in this industrial environment. As a result, an institutional isomorphism would be formed in that industry. In other words, competitors, customers, suppliers and peers could create a strong "bandwagon" effect that influences firms in that industry to adopt e-commerce [7] [22] [57]. Drawing on the theoretical arguments and the findings from previous research, this study hypothesized that the industrial environment had a positive influence on e-commerce diffusion, as follows:

H1. The more supportive is the industrial environment for e-commerce in that country, the more extensive is the e-commerce diffusion in that country.

5.2 Government Policy

In early empirical studies, Iacovou et al. found that the promotional efforts of government could lead to faster adoption of EDI in Canada [24]. Dasgupta et al. found that government policy was an important determinant of IT adoption in India [11]. After a longitudinal study over 16 years, Wang concluded that building national IT infrastructure was a primary government policy choice supporting IT adoption in newly industrialized economies [61].

When asked to identify measures to encourage wider adoption and use of e-commerce, SMEs in the APEC region ranked highly the government actions in improving telecom infrastructure, imposing fair tax policy for online transactions, developing national e-commerce strategy, enhancing government e-commerce use, providing e-commerce training, and promoting e-commerce use [46]. Similarly in a qualitative interview with SMEs in southern Italy, interviewees indicated that governmental campaign, financial incentives and tax breaks were important external factors affecting their adoption of B2B e-commerce [49].

Government policy positively affected the likelihood of EDI adoption in Hong Kong [5] [33]. Governmental promotions and supportive policies were significantly related to e-commerce decision in China [9] and the extent of e-commerce adoption in Pakistan [50]. On the other hand, lack of governmental support was an important barrier of e-commerce adoption in Oman [29].

Governmental support could also be realized through its own adoption of e-commerce and thus being the role model for the private sectors. Although there were fewer governmental incentives in the U.S. than in other countries, government procurement using e-commerce model was a relatively important driver for US firms to adopt e-commerce [18]. Fifty interviewed companies in less technologically advanced countries in southeastern Europe perceived e-government application as a form of e-commerce promotion from the government [43].

Oxley et al. indicated that governments played a critical role in creating the institutional environment that fostered private investment [42]. Governmental context thus became essential when B2B e-commerce adoption was considered as a company's investment in IT. Government policies should leverage and facilitate but not stifle e-commerce adoption in private sector. Gibbs et al. argued that governmental promotions and incentives were a major enabler of e-commerce and that national policies for IT infrastructure, such as trade and telecommunication liberalization, were also likely to have big impact on e-commerce diffusion by making IT more affordable to firms [19]. Government's important role in supporting e-commerce adoption in private sectors has been referred to as leader, promoter, facilitator, regulator, educator and financier [46]. 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 [37]. Drawing on the theoretical arguments and previous research findings, this study hypothesized that the government policy would have a positive impact on B2B e-commerce diffusion, as follows:

H2. The more supportive is the government policy for e-commerce in that country, the more extensive is the e-commerce diffusion in that country.

5.3 Legal Environment

Several international studies using secondary data found that the legal environment in a country affected e-commerce activities and revenues in that country significantly [38] [42] [64]. A group of cross-country survey studies also showed that legal 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 [20] [63] [66] [67] [68]. An earlier study of e-commerce diffusion in the APEC region further specified that a legal framework supporting e-commerce was important for reducing uncertainties and building trust and confidence in the electronic marketplace [46].

Lack of regulations and legislations and legal inadequacy for e-commerce practice were a major barrier and/or serious limitation to e-commerce diffusion in the APEC region, UK, Turkey, and Oman [28] [29] [46] [55]. In the countries without new principles regulating rights and obligations in the intangible cyberspace, e-commerce diffusion seemed to be slow [52]. 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 to e-commerce than in other countries; it led to a higher percentage of US firms used 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 less legal concerns when doing e-commerce [23]. On the other hand, APEC's study on e-commerce diffusion found that

firms in lower GDP countries appeared to be more concerned about legal issues than similar firms in higher GDP countries [46]. This concern might be due, in part, to a relative lack of adequate legal infrastructure for e-commerce in those lower GDP countries.

The legal consideration was the root of traditional institutional theory. Institutions were first the legal ground rules and procedures. Institutional influences were hence political in nature as when organizations must conform to laws and regulations to earn the organizational legitimacy [14] [39]. On the other hand, the legal institution should provide predictable, credible, coherent and adaptable rules for economic transactions. Accordingly, new institutionalism believed that the legal environment could reduce organizational uncertainty by providing adequate, clear and efficient frameworks for economic change [39]. Drawing on both empirical and theoretical assertions, this study hypothesized that a supportive legal environment could have a positive impact on e-commerce diffusion, as follows:

H3. The more supportive is the legal environment for e-commerce in that country, the more extensive is the e-commerce diffusion in that country.

6. Research Methodology

6.1 Use of Secondary Data

This study used secondary data collected by an international institution to study e-commerce diffusion across a large number of countries and at two time points. Based on a series of secondary data analyses, the institutional theory in e-commerce diffusion and its related hypotheses were tested. The results served as an empirical evidence basis for policy and managerial implications.

6.2 Multi-time Points Approach

Unlike most cross-sectional analyses that took place at a single point in time, this study involved a series of data collections and analyses at multiple points in time, which could be categorized as a time series design [27]. Phase-1 of the data collection was in the year of 2001-2002. It represented the early stage of B2B e-commerce diffusion—private sectors began to use the new business model and governments around the world began to take e-commerce into account in formulating economic policies. Phase-2 of the data collection was in the year of 2006-2007. The data represented a snapshot of the latest development of B2B e-commerce. The investigation repeated the secondary analysis to test the same hypotheses as in Phase-1. It was particularly important and interesting to see whether there were different effects of external environment on e-commerce diffusion at its infant stage and when e-commerce model was becoming prevalent. From a longitudinal perspective, this temporal approach to observe change of those institutional influences over time provided a better basis for causal inference than a single cross-sectional study did [27]. It also enhanced the comprehension and explanation of the institutional circumstances that affected B2B e-commerce diffusion.

6.3 Sample

6.3.1 Phase-1 (2001-2002)

Samples in this study consisted of countries of which secondary data were available from a well-respected international institution—Switzerland-based World Economic Forum (WEF). The WEF launched its first Global Information Technology Report (GITR) in 2001. Since then, the GITR has been published annually and provides a yearly snapshot of networked readiness in countries [15]. The GITR collects and compiles country networked readiness indices that assess both the environment for IT offered by a country and usage of IT among the country's business. It enables comparisons of network environments among states on a quantitative basis. To conduct the secondary data analysis in Phase-1, this study used the GITR 2001-2002 and there were 75 countries in the sample. These 75 countries accounted for more than 80% of the world's population and more than 90% of its economic output [31].

6.3.2 Phase-2 (2006-2007)

In Phase-2, this study looked into the latest available secondary data from the WEF—the GITR 2006-07. For the secondary data analysis in Phase-2, the sample size was 122—75 countries from Phase-1 and 47 additional countries. The samples in both phases represented exhaustive sets of countries for which reliable institutional environment data

and e-commerce data were available at the time of data collection.

6.4 Variable List

6.4.1 Phase-1 (2001-2002)

Measurements for two independent variables (IVs) associated with the research model were available in the WEF's GITR 2001-2002. First, the IV of legal environment was measured by one item of "legal framework supporting IT business" in the GITR. The item represented an assessment of how supportive of the legal framework in each country for the development of online businesses. Second, the IV of government policy was drawn upon three items in the GITR. It was an arithmetic mean of the underlying three items shown below. The Cronbach's alpha for the three items measuring the government construct was 0.812.

$$\text{Government policy} = \frac{1}{3} \text{Government priority} + \frac{1}{3} \text{Government promotion} + \frac{1}{3} \text{Government-business transaction}$$

As for the dependent variable (DV) of e-commerce diffusion, two items of e-commerce index in the GITR were employed. "B2B e-commerce transactions" represented an assessment of how the companies in a country interacted with their suppliers over the Internet; "Sophistication of online marketing" measured the advancement of online marketing used by the companies in that country. The DV was an aggregation of these two items based on the following weighted combination. The Cronbach's alpha for these two items was 0.946.

$$\text{B2B e-commerce diffusion} = \frac{2}{3} \text{B2B e-commerce transactions} + \frac{1}{3} \text{Sophistication of online marketing}$$

E-commerce adoption, as well as legal and policy environments, are commonly believed to correlate significantly with the level of economic development in a country [42]. It is important to control for this aspect of country difference. Therefore, the GDP per capita in each country was used as the control variable.

6.4.2 Phase-2 (2006-2007)

In the WEF's GITR 2006-2007, three new items were available to measure the IV of industrial environment in the research model—local competition intensity, local supplier quality related to technology, and firm-level technology absorption. The IV was an aggregation of these three items using the following formula. The Cronbach's alpha for the three items measuring the industrial construct was 0.924.

$$\text{Industrial environment} = \frac{1}{3} \text{Competition intensity} + \frac{1}{3} \text{Local supplier quality} + \frac{1}{3} \text{Firm-level technology absorption}$$

Three items to measure the IV of government policy had been revised in the GITR 2006-07 as shown in the following formula (Cronbach's alpha = 0.958).

$$\text{Government policy} = \frac{1}{3} \text{Government priority} + \frac{1}{3} \text{Government vision} + \frac{1}{3} \text{Government promotion}$$

Another IV of legal environment was still measured by one item of "laws relating to ICT", which assessed how developed and enforced was laws relating to the use of IT in a country. The DV of e-commerce diffusion was represented by a single item in the GITR 2006-07, "extent of business Internet uses". It measured in each country the companies' use of the Internet for buying/selling goods and services and for interaction with customers. The relationship between three IVs and the DV was again controlled for the GDP per capita in each country.

7. Data Analyses and Results

7.1 Phase-1 (2001-2002)

Multiple regression was used to test the research model. The regression equation was specified as follows.

$$\text{E-commerce diffusion} = b_1 * \text{Legal environment} + b_2 * \text{Government policy} + b_3 * \text{GDP per capita} + c + e \quad (1)$$

A multiple regression was run on SPSS 16.0 to first test the additional regression assumptions, such as no multivariate outliers, no nonlinearity or heteroscedasticity, normality of the residuals, no multicollinearity, normal distribution of residuals, and independent observations. After all assumptions were met, a multiple regression was run again and the

regression model is shown in Table 1. The result showed that the significant predictor of e-commerce diffusion was government policy ($p < 0.01$) in 75 countries from the WEF sample in 2001. The positive coefficient of this IV confirmed its role as e-commerce facilitator. Whenever the support from government policies increased 1 standard deviation and other independents were held constant, the average amount of Log (E-commerce diffusion-0.5) would increase 0.52 standard deviation. The effect of legal environment on e-commerce diffusion in the WEF sample was not found significant when other independents were held constant, even though its coefficient was positive. The relative importance of two IVs in predicting a country's e-commerce diffusion in this given model was 5.7:1, corresponding to the ratio of unique contributions of government policy and legal environment. Supportive government policy was almost six times more important than legal environment in the prediction.

Table 1. The multiple regression model for e-commerce diffusion in the WEF 2001-2002 sample

	Standardized Coefficients (Beta)	t	Significance
Government policy	0.522	3.521	0.001
Legal environment	0.091	0.665	0.508
GDP per capita	0.238	2.105	0.039

7.2 Phase-2 (2006-2007)

Based on the research model and its relevant hypotheses, the multiple regression equation using the WEF 2006-07 data was specified as follows.

$$\text{E-commerce diffusion} = b_1 * \text{Industrial environment} + b_2 * \text{Government policy} + b_3 * \text{Legal environment} + b_4 * \text{GDP per capita} + c + e \quad (2)$$

After dropping three outliers, the final multiple regression model is shown in Table 2. Both industrial environment and legal environment were the significant predictor of e-commerce diffusion ($p < 0.05$) in 119 countries of the WEF 2006-07 sample. The positive coefficients of both IVs confirmed their roles as e-commerce facilitators. The effect of government policy on e-commerce diffusion was not significant and its coefficient was even negative. The relative importance of three IVs in predicting a country's e-commerce diffusion in this given model was about 22:8:-1, corresponding to the ratio of unique contributions of industrial environment, legal environment and government policy. Industrial environment was almost three times more important than legal environment and more than 20 times more important than government policy in predicting a country's e-commerce diffusion in 2006-07.

Table 2. The multiple regression model for e-commerce diffusion in the WEF 2006-2007 sample

	Standardized Coefficients (Beta)	t	Significance
Industrial environment	0.662	7.355	0.000
Government policy	-0.030	-0.565	0.573
Legal environment	0.235	2.442	0.016
GDP per capita	0.071	1.181	0.240

7.3 Analysis of Variables across Two Phases

For each pair of corresponding variables in two phases (e.g., the IVs of government policy in the WEF 2001-02 dataset and the WEF 2006-07 dataset), the reliability (or consistency), Pearson's correlation and the mean difference of the measurement across two phases were evaluated and the results are shown in the following table. The results indicated that the measurements used in the WEF secondary analyses for governmental and legal factors and e-commerce diffusion were consistent and accurate across different points of time. The results also revealed that global e-commerce diffusion had improved significantly in the last five years. The government policy for e-commerce diffusion among the major countries in the world had also been more successful in the past five years. On the other hand, the legal environment had become less supportive for e-commerce diffusion over time.

Table 3. The paired variables statistics of the WEF sample (2001/02—2006/07) (N=75)

	Variables	Cronbach's alpha	Pearson's correlation	Mean difference	t
Pair 1	Government policy	0.813	0.684*	-0.517	-7.266*
Pair 2	Legal environment	0.906	0.828*	0.275	4.413*
Pair 3	E-commerce diffusion	0.825	0.701*	-1.017	-13.536*

* $p < 0.01$

After evaluating the variables across two periods, the multiple regression coefficients of these variables for

e-commerce diffusion in two samples are summarized in Table 4. The result shows that the government policy was an important facilitator of global e-commerce diffusion in the year of 2001-02; however, its impact was reduced and became insignificant in 2006-2007. The change of the effect of legal environment was in the opposite direction—it did not affect e-commerce diffusion across countries in 2001-02, but its importance increased recently.

Table 4. The multiple regression coefficients of the institutional variables for e-commerce diffusion in two phases

Independent variable	Phase-1 (2001/02) (N=75)	Phase-2 (2006/07) (N=119)
Industrial environment	(n/a)	0.662**
Government policy	0.522**	Insignificant
Legal environment	Insignificant	0.235*

8. Discussion and Conclusion

8.1 Discussion of Findings

8.1.1 Phase-1 (2001-2002)

The secondary analysis at this phase confirmed strongly the research hypothesis with respect to government policy, but was unable to demonstrate the causal-effect relationship between legal environment and e-commerce diffusion (see Table 5). In other words, the supportive government policy did exert a substantial positive impact on e-commerce diffusion in businesses around the world at the startup stage of e-commerce (the worldwide average score for e-commerce was only 2.37 out of 5 in the WEF 2001-02 dataset). Government promotions, financial incentives and encouraging policies fostered companies in many countries to engage in e-commerce around 2001/02. This finding proved the institutional perspective about the critical role of government in driving companies' investment in e-commerce. On the other hand, the legal environment was commonly believed to lag behind the developments of technology, and in turn have a lagging effect on private sector. The issue of whether the legal environment in a country was supportive for e-commerce might be negligible until e-commerce became more pervasive in business operations. The lack of significance of legal environment seemed thus reasonable in the result.

Table 5. Summary of hypotheses and results at Phase-1

Hypothesis	Independent variable	Measurements for IV	Dependent variable	Measurements for DV	Supported	Effect size
H1	Industrial environment	(n/a)	E-commerce diffusion	<ul style="list-style-type: none"> E-commerce transaction Online marketing 	(n/a)	(n/a)
H2	Government policy	<ul style="list-style-type: none"> Government priority/ vision Government promotion Government role model 			Yes	0.52
H3	Legal environment	<ul style="list-style-type: none"> Supportive/effective legal framework E-commerce laws 			No	0.09

8.1.2 Phase-2 (2006-2007)

First, the worldwide average score for e-commerce diffusion had improved in the WEF 2006-07 dataset (3.90 out of 7). Second, comparing the latest WEF dataset with its 2001 version, the worldwide average score for government policy improved from 3.81 to 4.25 out of 7, but the score for legal environment decreased from 4.48 to 3.73 out of 7. The research finding at this phase show that industrial environment influenced countries' e-commerce diffusion significantly (see Table 6). In the country with higher levels of market competition, supplier quality and technology absorption, the e-commerce diffusion was more extensive.

Table 6. Summary of hypotheses and results at Phase-2

Hypothesis	Independent variable	Measurements for IV	Dependent variable	Measurements for DV	Supported	Effect size
H1	Industrial environment	<ul style="list-style-type: none"> Market competition Supplier quality Firm-level technology absorption 	E-commerce diffusion	Extent of business use of Internet	Yes	0.66
H2	Government policy	<ul style="list-style-type: none"> Government priority Government vision Government promotion 			No	-0.03
H3	Legal environment	<ul style="list-style-type: none"> Effective legal framework E-commerce laws 			Yes	0.24

The finding also supported the impact of legal environment on e-commerce diffusion. If a national legal system was

adequate and effective for e-commerce practice, companies in that country might engage more in e-commerce operations. The effect of government policy on e-commerce has reduced since Phase-1. The changes of effects of legal and governmental factors in different directions implied that, as e-commerce developed and became a common practice in private sector, companies might face more legal issues and demanded legal certainty and protection. On the other hand, when e-commerce became more business-driven and integrated into regular business operations, the government policies were no longer vital for businesses and its influence became blurry.

8.2 Managerial Implication

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, and what regulators insist they must do [12]. These external environments can consequently motivate organizational decisions and actions. Consistently, this study shows managers that firms do not make their 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 [3]. They should therefore ensure that they are well-informed of the external environment, including industry situation, government policies and initiatives, and legal and regulatory changes. Based on the information and understanding of the external environment, managers should 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.

According to institutional theory and the research finding 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 more significant in the industrial environment in particular. Metcalfe's law tells us that the value of e-commerce is proportional to the square of the number of companies in the industry participating in e-commerce. Therefore, managers should realize 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.

8.3 Policy Implication

Experience has taught 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 the institutional environment will depend to a significant extent on how policy-makers, business players and other stakeholders will act and influence. 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 national economy and the enterprises within it [58]. According to this study, this is particularly vital at the infant stage of e-commerce. The advancement in e-commerce diffusion at Phase-1 (2001-2002) could be credited to supportive government policy. In particular, proactive government policies were the prime mover of e-commerce at the beginning in many developing countries.

On the other hand, although the lack of governmental supportive policies could be concerns of companies wanting to engage in e-commerce, that lack thereof would not deter enterprises from implementing e-commerce strategy nor inhibit the diffusion of e-commerce after its initial uptake. Rather it 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. Thus, after an initial push on e-commerce adoption, governments should not interfere directly in private investments in e-commerce any more until there is a clear sign of industrial failure or market uncertainty and disturbance. Governments might rather take a more active role, in particular in addressing the lack of legal certainty and protection of e-commerce practice. Governments could put more efforts in laying out clear and solid policy, regulatory and technical foundations to ensure the trust and confidence among the B2B parties involved.

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