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Regional Adoption of Business-to-Business Electronic Commerce in China: Role of E-Readiness

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ABSTRACT: Adoption of B2B e-commerce is a powerful driver of economic success in developed and developing countries. However, adoption rates in developing countries lag far behind. This paper draws on the Perceived eReadiness Model and research on the influence of inter-organizational relationships and economic-cultural contexts to explain the importance of three factors—inter-organizational power dependence, cooperativeness, and regional economic-cultural differences—for achieving higher levels of Internet-based Electronic Data Interchange (EDI) in the developing country of China. We employ survey data to empirically test both the individual and joint influence of these factors. The findings suggest that beyond intra-organizational and external factors, managers and policy makers wanting to promote Internet-based EDI adoption in developing countries must also account for the inter-organizational relationships of firms and the economic and cultural circumstances of the regions in which they operate.

KEY WORDS AND PHRASES: B2B e-commerce adoption, Internet-based EDI, developing country, PERM, inter-organizational relationships, economic-cultural context.

Introduction

E-commerce is a primary engine of economic growth [44, 72, 103]. Business-to-business (B2B) markets have benefited most from e-commerce exchanges, approximately constituting nine to ten times the volume of the consumer market [72, 103]. Particularly Internet-based Electronic Data Interchange (EDI) provides great efficiencies for performing B2B transactions and is more affordable than other network alternatives [42].

However, while in the European Union two-thirds of all B2B transactions derive from private, rather than public, exchanges [72], companies in developing countries seem reluctant to adopt Internet-based EDI. According to China Internet Network Information Center's (CNNIC) latest survey, in China, only 19.5% of the companies with Internet access are engaged in private e-marketplace activities [15]. Although China has increased its involvement in global outsourcing and commerce and is expected to catch up to the US market by 2015 [93], the majority of sales revenue (\$9.5 billion in 2013 [9]) comes from B2B public exchanges. Exclusively facilitating public exchange, Alibaba.com now has 19 million small and medium-sized enterprises (SMEs) as registered users [85], with revenue of \$7.5 billion in 2013. Similarly, India's 40% yearly growth in B2B e-commerce is predominantly based on public, rather than private, exchanges, such as Internet-based EDI [2].

To improve understanding of how to promote the adoption of Internet-based EDI in developing countries, several organizational and environmental aspects are imperative. In addition to the intra-organizational aspects (e.g., awareness, resources) and external conditions (e.g., governmental support), the relatively limited legal protection and industrial standards in B2B exchanges and uneven regional developments in China [53] cause inter-organizational relationships and economic-cultural contexts to become primary drivers for the adoption of new technology [37, 60].

Current research on B2B e-commerce adoption, however, offers little guidance. Theoretical frameworks on EDI adoption (Internet based or not) such as Diffusion of

Innovation [DOI] model [80], the Technology–Organization–Environment model (TOE) [91], institutional theory [83], and the Technology Acceptance Model (TAM) [18] are almost exclusively developed and tested in advanced economies. Furthermore, while Molla and Licker's [66] Perceived eReadiness Model (PERM) offers a valuable framework to examine e-commerce adoption in developing countries [7, 88, 101], it does not take into account inter-organizational aspects or economic-cultural contexts [101].

A variety of research in information system and marketing, however, has found that inter-organizational relationships are important for organizational adoption behavior [14, 38]. Considerations of economic-cultural contexts are also important because, rather than being one collective unit, developing countries exhibit different developmental stages across regions [24, 44]. Finally, given that each company and its inter-organizational aspects are embedded in a particular region, insights into the combined influence of inter-organizational relationships and regional development may further enhance understanding of their overall impact on B2B e-commerce adoption [13, 16]. Thus, both a theoretical and practical need exists for a more in-depth understanding of the adoption of Internet-based EDI in the context of developing countries. This study contributes to the emerging but limited body of research on Internet-based EDI adoption in developing country by addressing three critical issues.

First, consistent with theorizing on inter-organizational relationships [14, 42], we propose a direct effect of power and cooperativeness perceptions, as distinct and valuable drivers to Internet-based EDI adoption. Inter-organizational relationships influence information systems adoption [14, 42] and is generally considered from a transaction cost [75] or marketing [34, 81] perspective. Both conceptualizations suggest the importance of incorporating the inter-organizational aspects as predictors of EDI adoption [14, 34]. Many factors are associated with the adoption of e-commerce in developing countries, such as awareness, resources, commitment, governance, and external environment [66, 67]. To

enhance applicability to the B2B context, we delineate and empirically assess the influence of inter-organizational relationships on Internet-based EDI adoption, in line with the Industrial Marketing and Purchasing Group's (IMP) Interaction model [34].

Second, the exclusively global, homogeneous view of “the developing country” in existing research may mask divergent economic developments and different cultural contexts within countries, and thus it inhibits a more comprehensive understanding of e-commerce adoption in such countries. Particularly in a rapidly developing country, such as China, uneven regional economic and cultural circumstances are inextricably intertwined [28]. Accordingly, we propose that economic-cultural context has an impact on the adoption of Internet-based EDI in the context of China.

Third, the regional economic-cultural context and inter-organizational relationships are often inherently inseparable and may reinforce each other in facilitating Internet-based EDI by firms in developing countries [8]. With significant differences amongst Chinese regions, especially in cultural and economic terms [13, 16], we evaluate the interaction effect of region context and inter-organizational relationships on Internet-based EDI adoption.

Conceptual Background

As one of the major forms of B2B e-commerce, both practitioners and academics have consistently viewed EDI as important and beneficial in inter-organizational communication. The emergence of the Internet further enhances the functions of EDI and increases its applicability [36]. However, even with its decades-long diffusion in various industries, benefits of EDI are still not consistently reported in the literature [70]. Various antecedents of its adoption are identified in existing research, extracting from different theoretical perspectives, with the actual adoption being measured in several different ways, such as intention to adopt, adoption decision, and infusion [69] (see Table 1). This results in

conflicting and sometimes insignificant effects within existing research findings [70]. Although EDI/e-business adoption studies have begun incorporating relational elements (e.g., power, trust), the evaluation of such element is hardly exhaustive, with the cooperativeness of the relationship in particular largely untouched [47, 87]. In addition, despite some initial recognition from researchers [90, 97, 106] about the necessity of incorporating the cultural context into EDI research, efforts are still limited [90].

(Please insert Table 1 here)

Molla and Licker [66, 67] developed the PERM specifically for examining e-commerce adoption in emerging economies. This model incorporates theories such as the DOI [80] and TOE [91] models to measure a firm's e-commerce adoption e-readiness on the basis of four imperatives: technological imperative, managerial imperative, organizational imperative, and environmental imperative [66, 67]. These four imperatives are then subdivided into eight intra-organizational and external factors within the domain of two constructs: (1) *Perceived Organizational eReadiness* (POE), which refers to awareness, business resource, human resource, commitment, and governance, and (2) *Perceived External eReadiness* (PEE) of the government, the market, and the support industries [66, 67]. Contrary to the other established e-commerce adoption conceptualizations, which are developed for and tested in advanced countries, the PERM is specifically designed to investigate the e-commerce adoption in developing countries [7, 66, 67, 88, 101] (see Table 2 for an overview).

(Please insert Table 2 here)

Using the PERM, previous research valuably highlights the important influence of intra-organizational and external factors on e-commerce adoption. There is, however, relative paucity of knowledge on how inter-organizational relationships and economic-cultural aspects may further explain e-commerce adoption in emerging economies in the context of

B2B markets. Chwelos et al. [14] and Roy et al. [81] emphasize that inter-organizational aspects pertaining to uncertainty, power, trust, and coordination within business relationships affect, or even supplant, intra-organizational and external factors to influence firms' new technology adoption behavior [46, 98]. Yet, while such research usefully suggests trading partners' pressures, relational norms, and trust and power as relevant influencers for B2B e-commerce adoption, Zakaria and Jandom [101] criticize that to date the scope of inter-organizational studies on B2B e-commerce adoption has been predominantly limited to developed economies.

Furthermore, according to House and Javidan [40], national borders might not be the best way to delineate economic-cultural boundaries, as subcultures do exist and diverge from each other [64]. For example, Schwartz [82] shows that cultural difference between different regions, such as Shanghai in Yangtze River Delta (YRD) and Guangzhou in Pearl River Delta (PRD), could be wider apart than that between the United States and Japan. The economic-cultural variation, which could lead to strong differences in external environments, is not captured in the PERM and is also neglected in research using the PERM. Most research assumes that all regions of a nation face the same "external" economic and cultural conditions [3, 23], which may well lead to erroneous results, especially in developing countries [55, 68]. Drawing on the PERM and contemporary theorizing on aspects shaping organizational behavior, we set out to conceptually integrate and empirically assess inter-organizational and regional economic-cultural factors that may, individually as well as jointly, further explain the adoption of Internet-based EDI.

Two scientific disciplines commonly investigate inter-organizational aspects influencing firms' technology adoption behaviors: (1) information systems research and (2) marketing research. Information systems research predominantly employs an economic view to explain technology adoption, applying transaction cost theory to examine the formation of

markets and organizational decision making. In line with this perspective, inter-organizational aspects influencing decisions to adopt new technology therefore solely derive from the perceived efficiencies of doing so [75, 87]. Researchers have recently criticized such a perspective as being “too narrow” [42], thus increasingly taking a broader view. Arguably taking a more holistic stance, research in marketing commonly applies a socio-political lens to examine inter-organizational relationships of technology adoption [75, 79, 87]. In this view, intangible relational aspects, in addition to mutual cost and benefit efficiencies [86], determine a firm’s adoption of inter-organizational systems. For example, Stern and Reve [87] show that the relative power dependence among channel members and the dominant sentiments between them (i.e., cooperation and/or conflict) explain their likelihood to adopt inter-organizational systems. Premkumar and Ramamurthy [75], summarizing research on EDI adoption, conclude that such relational aspects supersede all others in explaining organizational technology adoption behaviors; even in the absence of cost-efficiencies, firms still adopt inter-organizational systems because of their commitment to their business partners [75]. Accordingly, a plethora of marketing research has investigated relational characteristics of dyadic channel partner interactions and their implications for innovation and adoption initiatives (e.g., [33, 52]). Particularly the inter-organizational “atmosphere” [34], or the state of relative power or dependence and cooperation or conflict within a relational dyad, can be a primary cause for new technology adoption [81]. Thus, although the PERM importantly delineates intra-organizational and external aspects that influence e-commerce adoption, differences in the inter-organizational atmosphere may further explain firms’ e-readiness in a B2B setting.

Beyond inter-organizational aspects, the PERM posits several external factors likely to influence organizational e-readiness [106]. In developing countries, economic and cultural circumstances differ between regions and, as a result, lead to differences in companies’

readiness and ability to adopt new technologies [68]. The natural features of different regions (e.g., environmental conditions, resources, locations) and government policies induce uneven rather than homogeneous economic regional developments within the same country [25]. Furthermore, business cultures differ across regions [28]. For example, China has experienced uneven regional development since the “open and reform” policy in the late 1970s. Beyond its uneven regional development [13, 16], China’s regions strongly diverge in business culture and inter-organizational behaviors, which tend to be “localized, place-bound, culturally rooted, and socially embedded” [57]. Hall [35] suggests categorizing cultures into high and low contexts to understand basic differences in communication styles and cultural issues. His focus is not on macro issues (i.e., cultures on the national level) but on the micro behavior of individuals from different cultures. This focus complements Hofstede’s [38, 39] individualism and power-distance dimensions, which center on culture on a macro level. Understanding the implications of such uneven regional development and cultural differences between regions is pivotal on the agenda of scholarly inquiry in planning and policy making [57]. Accounting for regional differences, in terms of economic-cultural context, may thus shed further light on the significant influence of the external environment factors on organizations’ e-readiness as proposed in the PERM.

Finally, the relevance of regional economic-cultural differences for organizational e-readiness is evident in research on new technology adoption [90]. According to this research, an intricate interplay exists between the prominent business culture within a region and inter-organizational relational aspects [8]. Organizations that operate in regions characterized as high-context cultures exhibit greater power dependence [99]. Conversely, low-context cultures show the tendency of more cooperativeness and less conflict [99]. Burn [8] also concludes that the predominant regional culture affects the weight of inter-organizational aspects in corporate decision making on new technology adoption. We anticipate that

regional cultural differences not only influence organizational e-readiness directly but also modify the relative importance of inter-organizational aspects in developing countries. We next develop specific hypotheses about how the two inextricably intertwined aspects (inter-organizational relationships and economic-cultural context) are likely to influence organizational adoption of Internet-based EDI.

Hypotheses Development

Inter-Organizational Relationships

Inter-organizational aspects drive organizational evaluation and adoption likelihood of new technology [14, 70]. Previous studies suggest that inter-organizational power dependence [70, 75] influences organizational adoption of information systems in developed economies, such that greater (lesser) power dependence in a dyadic business relationship leads a company to more (less) readily adopt new technologies (e.g., Internet-based EDI) [14, 71]. In their research on EDI adoption, Chwelos et al. [14] show that the relative power of companies' trading partners is significantly related to the companies' likelihood to adopt new technology. For example, suppliers of Toyota, which have relatively less power within the business relationship, needed to adopt EDI to sustain the relationship. To continue supplying Toyota, these suppliers needed to comply with the information exchange criteria set out by the bigger player to stay in business. Accordingly, Huang et al. [42] suggest that power dependence on business partners may affect a company's Internet-based EDI adoption. Therefore, we hypothesize the following:

H1a: Greater inter-organizational power dependence increases companies' likelihood of adopting Internet-based EDI in developing countries.

In addition, the organizational readiness to adopt new technology depends on the quality of the dyadic relationship between trading partners, known as the state of conflict and

cooperation, reflected in terms of frequency of interaction, flow of communication, and overall satisfaction with the interaction [4]. In particular, Reve and Stern [79] show that cooperativeness and limited conflict within a dyadic relationship propel the adoption of inter-organizational information systems. Similarly, in their empirical research on Internet-based EDI adoption Huang et al. [42] state that commitment and cooperation among participants are equally essential for the frequent use of such systems. Research in marketing and supply chain management emphasizes that a good inter-organizational relationship is an important driver for inter-organizational system adoption [42, 75]. Conversely, relational conflict, especially dysfunctional conflict, has negative implications on the readiness to adopt new concepts and practices, because it inhibits the assessment and processing of new information [11]. Accordingly, we posit the following:

H1b: Greater inter-organizational cooperativeness increases companies' likelihood of adopting Internet-based EDI in developing countries.

Economic-Cultural Context

Organizations operating in more developed regions tend to adopt e-commerce faster [31]. In their research on e-commerce adoption rates, Gibbs et al. [30] show that companies in developed countries, such as the United States, exhibit a significantly greater readiness to adopt than companies operating in less developed countries (e.g., Brazil, Mexico). Importantly, these differences are attributable to economical and infrastructural but also cultural aspects leading to diverging adoption patterns not only across but also within countries [30, 90]. In China, companies in the PRD were the first to open trade with other external organizations. After subsequent heavy investments, PRD is now the most developed region within China. Beyond infrastructure developments, however, the continuous interaction with international trading partners has led the local business culture to become

more open and transparent than the traditional high-context Chinese culture [22]. Specifically, China's high-context business culture is typified by coded language, hidden rules, and *guanxi*, an insider social network in which standard professional routines and open communication give way to the more subtle management of interpersonal relationships, both within and across the trading partners [35, 39]. The YRD began the open and reform process slightly later, and although companies within this region are beginning to adopt modern technologies and business philosophies that embrace the free flow of information, the developmental stage has not progressed as far as that in the PRD. Finally, the West Region (WR) is the least developed region; it is situated in the inland area of China, in which development has been stagnant due to the central government's ladder-step development policy to develop the east regions first [25]. This unique situation renders it relatively limited in interactions with the outside world. Thus, the original high-context Chinese culture and *guanxi* still characterize the WR's local business practices. In addition, Elliott and Tam [24] show that different Chinese regions exhibit different figures on Hofstede's five cultural dimensions: Hong Kong in the Greater PRD is low in power distance but high in uncertainty avoidance, Shanghai in the YRD shows mostly middle-range figures on the five dimensions, and Chongqing in the WR is high in both long-term orientation and power distance but low in uncertainty avoidance. In line with the insights into the impact of regional development states on adoption of information systems [30], we propose that there are differences between the regions of China in adopting e-commerce as a result of both their developmental stages and cultural differences. Therefore, we hypothesize the following:

H2: The developmental stages of the Chinese regions influence companies' Internet-based EDI adoption; the higher the developmental stage, the more likely is the adoption of Internet-based EDI.

Joint Impact of Inter-Organizational Relationships and Regional Differences

The inherent inseparability of region (in terms of cultural and economic development) and inter-organizational relationships by companies in developing countries dictates an investigation of their joint effect, and previous research confirms an interplay between regional characteristics (e.g., low-context culture) and inter-organizational relationships for technology adoption [8, 54]. In particular, while power dependence generally has direct implications on companies' adoption behaviors [42], research suggests that the cultural context in which the companies operate can mitigate or alleviate the implications of relational ties on these behaviors. For example, Wang et al. [95] show that *renqing*, or the perceived need to reciprocate to a business partner, influences the implications of the Chinese collectivist cultural context on companies' long-term orientation in B2B relationships. Furthermore, exploring the implications of coercive power in supply chains within China's high-context culture, Yeung et al. [100] show that increased levels of coercive power have a direct positive influence on suppliers' integration in terms of information sharing and process coordination. Moreover, while high levels of cooperation between companies boost the likelihood of adopting e-commerce [75], this relationship also seems to depend on the cultural context in which the companies operate. Yen et al. [99] suggest that, particularly when working with Chinese companies, Western counterparts should use a more cooperative inter-personal communication style to enhance the Chinese companies' willingness to cooperate.

In addition to cultural differences, the regional developmental stage is similarly likely to moderate the influence of inter-organizational power dependence and cooperation levels within business relationships on e-commerce adoption. Specifically, Gibbs et al. [31] show that companies operating in less developed regional circumstances exhibit a greater likelihood to adopt new technology, depending on whether their trading partners insist on it.

Therefore, we hypothesize the following:

H3a: There is an interaction between the level of inter-organizational cooperativeness and the regional cultural context and economic development, such that higher levels of cooperativeness coupled with a low-context culture and more economically developed region lead to greater Internet-based EDI adoption.

H3b: There is an interaction between the level of inter-organizational power dependence and the regional cultural context and economic development, such that higher levels of power dependence coupled with a high-context culture and less economically developed region lead to greater Internet-based EDI adoption.

Research Method

Sample and Data Collection Procedure

We draw the sample for this research from the business directories across three regions (PRD, YRD, and the WR) within China published by China Telecom Ltd. The original list is in alphabetic order and compiled with information registered at the Bureau of Industry and Commerce. Using random systematic sampling, we counted every 10th company in the directory for inclusion in the sampling frame, until we reached 3,000 companies (1,000 in each region). We gathered the data by sending the survey out to the managing directors of the selected companies. A cover letter explained the key terms in the questionnaire and provided general guidance on answering the questions. We adopted a mixed method of e-mail, online survey, fax, telephone, and instant messenger to distribute the questionnaire. In general, research recognizes the application of a multi-modal survey as an effective way to overcome the possible drawbacks of single-mode surveys [6, 20, 62, 63]. Telephone calls were only employed for the purpose of obtaining initial permission from the companies to take part in the survey and follow-up efforts. We received 506 questionnaires, 445 of which were fully

completed (PRD: 141; YRD: 154; the WR: 150). Thus, response rates are 17.7%, 16.9%, and 16%, respectively, which are comparable to other survey response rates in B2B contexts [73]. Responses are from companies operating in both the services industry (49%) and the manufacturing industry (51%). Regarding firm size, the majority of the responses are from small (39%) and medium-sized (49%) enterprises, while 12% of the respondents are large enterprises.

We assess possible nonresponse bias in two ways. First, we conduct tests to compare companies that did and did not respond in terms of *Internet-based EDI* (I-EDI), which is the outcome variable of the study. In our survey, we asked respondents to choose the level of I-EDI that best describes them, ranging from “not connected to the Internet, no e-mail” to “integrated web, that is the web site is integrated with suppliers, customers and other back office systems allowing most of the business transactions to be conducted electronically.” The second level specified that the surveyed company would at least be “connected to the Internet with e-mail but no web site.” The results show that, overall, 87.1% of the companies in our data set have at least Internet and use e-mail (PRD: 91.4%; YRD: 86.2%; the WR: 83.7%). These numbers are comparable to a recent study conducted by CNNIC [15], which finds that the percentage of companies using the Internet and e-mail in China is 83.2% on average (PRD: 87.7%; YRD: 80.4%; the WR: 79.5%). Therefore, the Internet-based EDI adoption in our sample is slightly, but not significantly, higher across all three regions. Second, we compare the retained sample of 445 with respondents excluded from the analysis because of their failure to complete the survey, across the study constructs using a series of mean comparisons. These were not significant ($p > .05$). Although the response rate is fairly low, as is common in business surveys [19, 102] the two tests suggest that nonresponse bias is not a concern [102].

Measures and Operationalizations

We base our reflective measures on extant literature that has undergone significant rigor and scrutiny and adapt them to the context of our investigation. Regarding our dependent variable I-EDI, there is little consensus on measures of B2B e-commerce adoption levels, both in the general sense and in the specific case of Internet-based EDI. In general, EDI/e-business studies have measured the adoption from three different angles: intention to adopt (e.g., [14, 42, 89]) adoption process (e.g., [48, 66]) and EDI use and impact (e.g., [41, 51, 58, 97, 105, 106]). Studies on the intention to adopt have typically investigated firms that have not yet adopted EDI but are considering this option. In turn, studies measuring the adoption process have explored the stages of adoption the firm is undergoing, typically using the stage model of Kwon and Zmud [50] or subsequent adaptations thereof. This model argues that the adoption process consists of six stages: initiation, adoption, adaptation, acceptance, routinization, and infusion [50]. Daniel et al. [17] conduct a cluster analysis on firm's e-business activities, using a similar stage model that considers the different activities in sequential adoption phases. Finally, studies on EDI use and impact have evaluated the actual usage of EDI or e-business in a firm after adoption. The original measure was developed by Massetti and Zmud [61], who investigated seven case sites with a long and successful history of EDI use.

Our primary interest herein is to identify the stage at which the adoption process of Internet-based EDI takes place within a developing country, rather than a firm's intention to adopt Internet-based EDI (measured by the extent of internal and external business functions and activities supported by information technology/information systems [76, 77]), or the impact of the adoption (measured by the extent of using information technology/information systems in the firm [5, 10]). None of these measures take a process view of Internet-based EDI adoption [59]. For companies in developing countries, especially SMEs, use of all possible

aspects of Internet-based EDI is rather uncommon; it is more of an incremental exercise that takes a relatively long time to accomplish. Many researchers favor the stage models to examine the use of information systems in organizations over time. Various stage models that have been developed in the past [17, 59] form the basis of the dependent variable in the PERM. Rayport and Jaworski [78, 92] specify a stage model for B2B e-commerce that includes four stages: broadcast, or web page creation of primarily static information to customers, such as company-related information, products, and services; interact, or use of the Internet for interaction with customers, such as e-mails, customer surveys, and feedbacks; transact, or the use of the Internet to take, manage, and support transactions with customers, such as online ordering systems; and collaborate, or the use of the Internet to provide inter-organizational activities that the company and its trading partners can access and use. Turban et al. [92] adopt the same approach in their interpretation of Internet-based EDI adoption. Li et al. [56] develop a similar scale when examining Chinese international trade firms' utilization of Internet technologies, considering the specific role of such firms as the intermediary in the global supply chain. CNNIC [15] also adopts this scale in its annual survey of organizational Internet adoption in China, adapted from the International Telecommunications Union ICT Indicators.

Because the focus of this research is on EDI linked through the Internet, rather than the traditional value added network (VAN), the original dependent variable from the PERM is the most appropriate in its description of adoption levels, ranging from Level 1 "not connected to the Internet, no email," which indicates no EDI adoption/use, to Level 6 "integrated web, that is the web site is integrated with supplier, customers and other back office systems allowing most of the business transactions to be conducted electronically," which signifies full Internet-based EDI infusion [92].

We measured all our independent and control variables using Likert-type scales ranging from 1 (negative extreme) to 5 (positive extreme). For all three regions, we use identical measurement items. Table 3 presents all the scales used, the item loadings, and the principal literature sources. For the measures of PEE and POE, we use the scales developed by Molla and Licker [66]. While we created one composite measure for all External e-readiness factors (see Table 3), we left the original organizational factors as awareness ($Awareness_i$), human resource (HR_i), business resources (BR_i), and technical resources (TR_i). Finally, we created a composite measure, preparation, from both governance and commitment ($PREP_i$). This step was necessary because of the significantly high correlation between these two organizational factors. Owing to significant cross-loadings, we needed to exclude three questions regarding technical resources, two questions regarding business resources, and one question regarding the external environment (for an overview, see Table 3). We tested our constructs for reliability and validity. Confirmatory factor analysis using SmartPLS [32] examined the validity of the items and underlying constructs in the measurement model. The test of the measurement model demonstrated a good fit between the data and the proposed measurement model. Table 3 presents the various goodness-of-fit indicators.

(Please insert Table 3 here)

Consistent with the marketing literature on inter-organizational e-readiness, we surveyed each company's relationship with its main buyer in terms of power/dependence and conflict/cooperation [26, 34, 49, 96]. We needed to modify and translate the original question back into Chinese to suit the particular context of the study. Following Di Benedetto et al.'s [19] proposed method, we took several steps to overcome the potential misinterpretations of the translated version. Three Language experts and three managers in China pre-tested the instrument; the managers are bilingual and were interviewed about their views of the

comparability of the translated questionnaire to the original. Using this feedback, we made additional edits to avoid ambiguity and to increase clarity of meanings in the translated version. Finally, we used Adler's [1] suggested approach and had the final version back-translated by two fluent bilingual Chinese academics, to ensure that the trans-literal meaning was intact and to correct any discrepancies in translation. Since all respondents were managing directors they are highly likely to be able to read Mandarin.

To assess the reliability of the final version of the instrument, we tested consistency at the category level, which was reasonably good, with most categories having an overall Cronbach's alpha greater than 0.8 or at least close to 0.8 (see Table 3). This treatment occurred after the deletion of the problematic items. The only category that fell slightly short of this standard was HR (Human Resources). We then averaged the categories to form the variables in the regression models.

Company size, industry sector, and the educational level of the managing director serve as control variables for all models. Finally, as mentioned we distinguish three regions within China, which are distinctly different in terms of their economic developmental stage and cultural context. First, in the PRD, although it is less attached to the national center of the socialist economy, Guangdong is the most connected province to the outside capitalist world [57]. It is ranked first in gross domestic product, exports, and use of foreign capital investment in China [57]. Culture-wise, because of its close linkage to the international community, local business culture tends to be more rule based and transparent than heavily reliant on the traditional Chinese *guanxi* [60]. Second, while the PRD exemplifies the first two decades of economic development, the YRD is more prominent in its adoption of local entrepreneurship, with a bottom-up approach [12, 104]. This tendency renders firms in the YRD more independent than firms in other regions. With an influx of foreign direct investment, this region is increasingly entering the global scene, thus challenging the

traditional Chinese way of conducting business. Third, the WR is the most inland region with some of the highest poverty rates, largest concentrations of minorities, and least developed economic infrastructure [65]. Its lack of direct contact with global trade enables it to retain its traditional Chinese business culture within the region, where the *guanxi* philosophy pervades local business relationships.

Analysis and Results

To capture the influence of our explanatory variables on the e-commerce adoption of companies within China, we specified a hierarchical multivariate regression model. We used STATA12 to estimate the model, beginning with a null model (intercept only) for the level of Internet-based EDI adoption. We introduced the individual variables and covariates in Model 1. Finally, we added the interaction variables to estimate the full Model 2 of Internet-based EDI adoption. Table 4 outlines the descriptive statistics and correlations between levels of Internet-based EDI adoption, regions, the POE and PEE factors, inter-organizational power dependence and cooperativeness, and the control variables. The correlation matrix in Table 4 and the variance inflation factor scores indicate that multicollinearity is not a concern (Model 1: $VIF_{MAX} = 1.93$; Model 2: $VIF_{MAX} = 3.03$).

(Please insert Table 4 about here)

We define Model 2 as

$$I - EDI_i = \beta_{0i} + \beta_1 \cdot WR_i + \beta_2 \cdot PRD_i + \beta_3 \cdot PERM_i + \beta_4 \cdot IOP_i + \beta_5 \cdot IOC_i + \dots$$

where

- $I - EDI_i$ is the readiness to adopt *Internet-based EDI* by company i .

- WR_i represents the relatively high-context, least economically developed part of WR and PRD_i represents the relatively low-context, most economically developed part of PRD, for the hypothesized effect on regional differences.
- IOP_i and IOC_i represent the relative power dependence and cooperativeness in the inter-organizational relationship of company i , respectively, for the hypothesized effects on inter-organizational relationship.
- $WR_i * IOP_i$, $WR_i * IOC_i$, $PRD_i * IOP_i$, and $PRD_i * IOC_i$, respectively, represent the hypothesized interaction effects between region and inter-organizational relationship.
- PERM represents all factors of POE and PEE, respectively, for company i .
- C_i represents the control variables of the study (i.e., company size and educational level of the employees).
- ϵ_{cp} denotes the company-level error term. The coefficients $\beta_{0j}, \dots, \beta_{4j}$ are fixed terms that are estimated across companies.

Using the R-square change value and chi-square difference tests, we confirmed that both the explanatory and interaction variables added explanatory power to the final model (see Table 5, Models 1 and 2). We took all the standardized estimates we analyze next from these final models; the parameter estimates provide support for the majority of the hypotheses.

(Please insert Table 5 about here)

The results of Model 1, which does not include any interaction effects, reveal a significant, positive impact of inter-organizational cooperativeness (IOC) on a company's likelihood to adopt Internet-based EDI ($\beta_{IOC_i} = .23, p < .05$). Thus, we can confirm H1a. Inter-organizational power dependence (IOP) is only weakly significantly related to the

likelihood of a company to adopt Internet-based EDI ($\beta_{\text{IOPI}} = .14, p < .05$). Thus, H1b is supported; the more the power resides with a company's partner, the greater is the likelihood that it will adopt Internet-based EDI. Further we find partial support for H2, companies in the PRD, which is the most developed region in China and is characterized by a relatively low-context business culture, display a greater likelihood to adopt Internet-based EDI ($\beta_{\text{PRD}} = .701, p < .05$). Notably, the regional effect provides the largest unique explanation for the variance in Internet-based EDI adoption behavior (4.9% of variance). Conversely, there is no significant difference between companies in the WR and the YRD in their likelihood to adopt Internet-based EDI ($\beta_{\text{WR}} = .19, p = .12$).

Turning to the overall Model 2, which includes the interaction parameters, we find similar results as prior studies using the PERM. Specifically, we find almost no significant influence of a company's intra-organizational e-readiness factors on its likelihood to adopt Internet-based EDI. We fail to find a significant influence of awareness ($\beta_{\text{Awareness}} = -.04, p = .53$), human resources ($\beta_{\text{HR}} = .03, p = .59$), business resources ($\beta_{\text{BR}} = -.06, p = .38$), or technical resources ($\beta_{\text{TR}} = .05, p = .42$). The only intra-organizational factor that is significantly related to Internet-based EDI is our composite measure of a company's governance and commitment, preparation ($\beta_{\text{PREP}} = .28, p < .05$). Similar to other studies [52, 81], we fail to find a significant influence of PEE on companies' likelihood to adopt Internet-based EDI ($\beta_{\text{PEE}} = -.11, p = .12$). Because we already tested for regional differences in the same model, these external e-readiness aspects may not vary within the three regions sufficiently to ascertain a separate significant influence. Furthermore, in support of H3a, we find a significant interaction between inter-organizational cooperativeness (IOC) and the region in which a company operates. In particular, companies operating in the PRD that also engage in high levels of cooperativeness are significantly more likely to adopt Internet-based EDI ($\beta_{\text{IOC*PRD}} = .23, p < .10$), while their increasing power dependence on their partners does

not significantly increase their likelihood to adopt. Conversely, and in support of H3b, companies operating in the WR, the relatively least developed region and characterized by a high-context business culture, do adopt Internet-based EDI more readily if they are more dependent on their partners ($\beta_{IOP*WR} = .71, p < .05$). In this region, increasing levels of cooperativeness do not have a significant influence on the likelihood to adopt Internet-based EDI. The results of the control variables largely align with prior marketing research[99]; SMEs are less likely to adopt Internet-based EDI ($\beta_{Size_small} = -.32, p < .05$), and lower education levels further reduce the likelihood of Internet-based EDI adoption ($\beta_{POE} = -.18, p < .10$).

Discussion

Implications for Theory

The phenomenon of B2B e-commerce has stimulated a plethora of cross-disciplinary research, the majority of which has been geared to uncovering organizational and external aspects that may facilitate or hinder adoption [14, 21, 43, 45, 90]. With respect to B2B e-commerce adoption in developing countries, however, the progress of knowledge is limited because findings do not take into account inter-organizational relationships [101] or the unique economic-cultural contexts [55]. In this study, we set out to contribute to extant literature on Internet-based EDI adoption in developing countries by accounting for inter-organizational power dependence, cooperativeness, and regional economic-cultural differences and empirically testing these along with the PERM factors, which studies on developing countries have validated [88, 101]. Thus, we aimed to identify additional drivers and hindrances, beyond intra-organizational and external governmental aspects and supporting industries, to assist companies and policy makers in promoting Internet-based EDI adoption. Our study also contributes to extant marketing literature in three ways.

First, applying prior research on the inter-organizational relational aspects, we find that both power dependence and cooperativeness are significantly related to companies' Internet-based EDI adoption likelihood. We show that in China, companies that experience higher levels of power dependence have a greater tendency to adopt such technology. Arguably, and in line with previous research [14, 71], greater dependence on external partners almost forces companies to comply with and adopt their partners' systems and processes to sustain the business relationship. Such power dependence on partners by companies in developing countries thus increases the likelihood of their e-commerce adoption. We also show that higher levels of inter-organizational cooperativeness increase a company's adoption likelihood of Internet-based EDI. In line with marketing research highlighting the importance of high levels of cooperativeness between firms for their likelihood to adopt new technologies [81], our results confirm that higher levels of cooperation also lead to greater e-commerce adoption by companies in developing countries. Although the relative effect size does not suggest that the relational aspect of cooperativeness supersedes in explaining Internet-based EDI adoption behavior as Lee et al. [52] imply, the level of cooperativeness is almost as important as the POE factors outlined in the PERM [66, 67]. Beyond intra-organizational and external considerations, the adoption likelihood of Internet-based EDI by companies in developing countries is also heavily dependent on their inter-organizational relationships. Our incorporation of the inter-organizational factors could be a valuable addition to the PERM [66] to enhance the understanding of Internet-based EDI adoption.

Second, beyond organizational aspects, our study draws on the conceptualizations of differences in economic and cultural circumstances [68] to identify their implications for companies' readiness and ability to adopt Internet-based EDI. Although the PERM does account for governmental and support industries that, as part of the external factors, influence

e-readiness, further “external” economic and cultural conditions are commonly treated as universally homogeneous within a developing country [55]. However, especially in emerging economies such as China, great discrepancies exist in geographic areas in terms of economic development and business culture. We show that, overall, companies operating in the PRD are more likely to adopt e-commerce than those operating in either the YRD or the WR. In line with Gibbs et al. [30] and Thatcher et al. [90], we attribute these results not only to differences in economic development between these regions but also to cultural aspects. With their greater exposure to a Western business culture, companies in the PRD exhibit a relatively low-context business culture, which in turn enhances their likelihood of adoption as well [28, 60].

Third, we consider the joint implications of inter-organizational aspects and the regional circumstances under which companies operate. We find that in the PRD, companies are even more likely to adopt Internet-based EDI if they also experience high levels of cooperativeness with their business partners. Furthermore, although overall power dependence enhances the likelihood of Internet-based EDI adoption in China, the influence is greatest in the WR. We show that companies in the WR are particularly likely to adopt this technology if they also experience high power dependence on an external partner. This is in line with previous research that highlights the important interplay of cultural context and relational aspects on new technology adoption [8]. Our results confirm that while high levels of cooperativeness promote adoption, especially in regions with a relatively low-context culture, power dependence enhances the likelihood of adoption in regions characterized by a relatively high-context business culture.

The phenomenon of e-commerce adoption in emerging economies has stimulated research studies geared to uncovering the influence of POE and PEE in a B2B setting. In the process of empirically validating our hypothesized relationships, we include key factors from

previous research and the PERM and offer some corroboration of extant research findings. First, in contrast with previous research [14, 42], we find that organizational factors (e.g., awareness, business resource, human resource) do not significantly influence Internet-based EDI adoption. However, in line with these research studies, we find that commitment and governance collectively induce a greater likelihood that companies adopt e-commerce. In accordance with previous research, our findings reveal that organizational aspects remain a decisive adoption criterion, regardless of any other factors.

Second, in accordance with Thatcher et al. [90] but in contrast with Pearson and Grandon [74], we fail to find a significant impact of factors constituting the PEE in our study. Importantly, overall external regional conditions (economic and cultural) are still primary influencers of Internet-based EDI adoption. Yet accounting for the regions in which the companies operate, and meaningfully separating them according to economic and cultural contexts, renders the incremental impact of external factors related to governmental policies and support industries negligible. Our correlation table also shows some, though not a significant, degree of correlation between our regions and the external factors as proposed by the PERM. The additional consideration of external e-readiness factors therefore has limited value if regions in developing countries can be meaningfully separated.

Third, in line with Zhu and Kraemer [106], we find that smaller companies in developing countries are less likely to adopt Internet-based EDI. Zhu and Kraemer [106] discuss the limited resources of smaller companies that may simply make an extensive use of e-commerce too costly.

Fourth, there is a significant, positive relationship between the educational level of the employees of the company and the company's likelihood to adopt Internet-based EDI. Other studies have found similar results [58], and thus our findings re-confirm the importance of education for Internet-based EDI adoption.

Implications for Practice and Policy Making

With e-commerce advancing in every corner of the world, it is imperative to understand the usage of this technology in both developed and emerging economies to maximize its benefits. Developing countries have their unique set of problems associated with e-commerce adoption, while different marketplaces also present their own challenges to e-commerce initiatives, even within the same country. We consider four distinctive factors (inter-organizational, regional, organizational, and external) and our results suggest two ways companies and policy managers can enhance B2B e-commerce adoption in developing countries in the form of Internet-based EDI. First, this study offers insight into the importance of inter-organizational relationships for companies' adoption likelihood, which confirms rather than supplants intra-organizational factors proposed by the PERM [66]. Although more powerful business partners tend to act as one of the major driving forces for firms to adopt Internet-based EDI, the situation varies from region to region in terms of the level and nature of impact. Therefore, beyond maintaining a high level of interaction and trust, firms should also choose relational tactics wisely, taking into consideration the location of their partner firms and the cultural norms that might be involved in the process.

In the PRD, companies should focus on improving the cooperative relationship between relational partners based more on rules, which can be enhanced by increasing transparency in local business culture. Companies in the WR have many lessons to learn from the more advanced regions. However, they should not ignore the regional differences between the other two locations. Lacking the ability to attract foreign investment at the current stage, local companies need to find other ways of locating funds, if they value the possible benefits brought by B2B e-commerce initiatives. More collaborations with firms from more advanced regions could benefit local companies by introducing B2B e-commerce

through the extended supply chain and the interdependence within the network.

Second, beyond promoting the intra-organizational aspect, we advise policy makers to encourage inter-organizational relationships between organizations within the PRD and WR. Doing so should increase awareness and knowledge of e-commerce progress within the companies in the WR. Similar policies are applicable to developing countries characterized by diverging development stages.

Limitations and Suggestions for Further Research

Overall, our results are consistent with the propositions made by research on inter-organizational relational factors [34], intra-organizational factors [66], and external factors related to economic and cultural context [90]. However several limitations of our study provide worthwhile avenues for research. First, our examination was designed to facilitate a more holistic understanding of the factors influencing Internet-based EDI adoption likelihood and provide complementary and additive examination to the existing PERM factors.

However, more factors might explain companies' adoption behavior. For example, future studies could investigate buying power of the private e-market maker, the conditions and terms of trade (e.g., use of electronic interaction) that it dictates on its partners, its readiness to e-enable partners, and the partners' (sellers') perceived value of doing business with the buyer and doing so electronically. These additional factors might be equally important in affecting sellers' adoption decisions. While we employed multivariate ordinary least squares regression because it best serves our research purpose of uncovering the role of inter-organizational relations and regional differences in influencing Internet-based EDI adoption, further research could use structured equation modeling to add further insights by disclosing relationships among all factors included in the research. Such research may also further investigate whether survey non-responders are characteristically exhibiting lower adoption

rates. The Internet adoption rate of the companies in our sample is slightly, though not significantly, higher compared to the study conducted by CCNIC [15] which may be due to the consistently lower adoption rate of non-responders.

Finally, we needed to drop several items in constructing our constructs (see Table 3 for an overview); particularly questions about technical and business resources exhibited significant cross-loadings with other organizational factors. Furthermore, we found significantly high correlations between the external e-readiness factors and further significant correlations between the organizational commitment and governmental aspects. We therefore had to create composite measures for these factors to still account for them in the overall model, without violating the multicollinearity assumption. Although the PERM suggests that these are different factors and items, the reason we needed to construct our measures slightly differently and create these composite constructs may be due to the specific context of our study. Further research might valuably investigate the conditions under which these constructs overlap.

Conclusions

In conclusion, this study is based on a rich data set derived from surveying managing directors of business in three very different economic regions of China: the Pearl River Delta, Yangtze River Delta, and West region. Extending an existing model of perceived e-readiness, it provides further insights into the role and function of e-commerce in the larger area of economic development, particularly the significant influence of inter-organizational relationships and economic-cultural contexts on varying adoption levels of Internet-based EDI by business.

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Table 1. A Review of EDI Studies

Author(s)	Theory	Context	Factors							DV	
			T	O	E	IOP	IOC	EC	IOP*EC		IOC*EC
Kuan and Chau [48]	TOE	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					Binary measure: adopter or non-adopters (subscription + transaction)
Chwelos et al. [14]	TOE+DOI	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					Intent to adopt (use time as a threshold)
Chatterjee et al. [10]	Institutional theory	Developed		<input type="checkbox"/>							Level of web assimilation (usages in e-commerce activities and strategies)
Lee and Lim [51]	Inter-org relationships	Developed				<input type="checkbox"/>	<input type="checkbox"/>				EDI implementation: integration, utilization, and diversity
Xu et al. [97]	TOE	Developing & Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>			Extent of e-business usage in terms of breadth and depth
Zhu and Kraemer [106]	DOI+TOE	Developing & Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						E-Business usage: extent of e-business usage in terms of breadth and depth; E-Business value
Molla and Licker [66]	PERM	Developing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						Stage model: activities involved at different adoption stages
Zhu et al. [105]	TOE	Developing & Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>			Initiation: perceived e-business benefits; Adoption: usage for value chain activities; Routinization: usage to support value chain activities
Hsu et al. [41]	DOI+TOE (modified)	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					Routinization: diversity of e-business use and volume of e-business use.
Teo et al. [89]	TOE	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						Intention: the extent to which firms had considered or decided to use B2B e-business
Thatcher et al. [90]	DOI+TOE+ Institutional theory	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>			N/A
Huang et al. [42]	DOI	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						Intent to adopt (use time as a threshold)
Lin and Lin [58]	TOE	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					Internal integration and external diffusion
Sila [84]	TOE	Developed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					Extent of usage of 7 B2B ecommerce technologies

Notes: DOI, TOE, and PERM pertain to the theoretical lens of the study. The factors are split according to imperatives studied, T (Technological), O (Organizational) and (E) Environmental. IOP (Inter-organizational Power), IOC (Inter-organizational Cooperativeness) and EC (Economic-cultural) are the additional influencing factors we study. Finally, IOP*EC and IOC*EC are the interacting effects between Inter-organizational Power and Economic-cultural factor, as well as Inter-organizational Cooperativeness and Economic-cultural factor, that we investigate in this study.

Table 2. Relevant Studies Referring to PERM

Articles	Method	Context	Outcome Variable	Contributions
Wang and Ahmed [94]	Survey	Developed country	Percentage of total sales revenues generated via e-commerce	Evaluating moderating effect of family business strategic orientation on e-commerce adoption.
Alam [3]	Survey	Developing country	Level of usage of Internet for various business purposes	Confirming the importance of managers' perceptions of Internet adoption in SMEs.
Li et al. [56]	Survey	Developing country (China)	Level of IT usage for attracting customers, acquiring information, sharing information, and maintaining interactions with customers	Confirming the relevance of IT capability, relative advantage of e-business, learning orientation and inter-organizational dependence, a firm's ownership type in e-commerce adoption.
Ghobakhloo et al. [29]	Survey	Developing country	Frequency of selected e-commerce applications usages	Evaluating both initial and post-adoption in developing countries.
Zakaria and Janom [101]	Interview	Developing country	N/A	Further development on PERM by introducing the inter-organizational aspect on an individual basis
Boateng et al. [7]	Literature survey	Developing country	N/A	Develops a new, integrated model that explains how e-commerce can contribute to socio-economic development.
Sila [84]	Survey	Developed country	Taking the average score on the extent of firms' usage of seven B2B e-commerce technologies	Adds contextual variables to further strengthen the original TOE framework

Table 3. Constructs and Measures

Constructs and Measures (Scale Sources)	Outer Loadings	AVE	CR
Organizational e-readiness [66]		0.54	0.89
<i>Awareness</i>			
A1. Our organization is aware of the B2B e-commerce implementations of our partner organizations.	0.65		
A2. Our organization is aware of our competitors' B2B e-commerce and e-business implementations.	0.75		
A3. Our business recognizes the opportunities and threats enabled by B2B e-commerce.	0.77		
A4. Our organization understands B2B e-commerce business models that can be applicable to our business.	0.76		
A5. We understand the potential benefits of B2B e-commerce to our business.	0.76		
A6. Our organization has thought about whether or not B2B e-commerce has impacts on the way business is to be conducted in our industry.	0.68		
A7. Our organization has considered whether or not businesses in our industry that fail to adopt B2B e-commerce and e-business would be at a competitive disadvantage.	0.73		
<i>Human Resources</i>		0.70	0.82
HR1. Most of our employees are computer literate.	0.88		
HR2. Most of our employees have unrestricted access to computers.	0.79		
<i>Business Resources</i>		0.61	0.86
BR1. Our people are open and trusting with one another.	0.73		
BR2. Communication is very open in our organization.	0.84		
BR3. Our organization exhibits a culture of enterprise-wide information sharing.	0.83		
*BR4. We have a policy that encourages grass roots B2B e-commerce initiatives.			
BR5. Failure can be tolerated in our organization.	0.72		
*BR6. Our organization is capable of dealing with rapid changes.			
<i>Technical Resources</i>		0.64	0.84
TR1. We have sufficient experience with network based applications.	0.85		
TR2. We have sufficient business resources to implement B2B e-commerce.	0.83		
*TR3. Our organization is well computerized with LAN and WAN.			
*TR4. We have high bandwidth connectivity to the Internet.			
*TR5. Our existing systems are flexible.			
TR6. Our existing systems are customizable to our customers' needs.	0.72		
<i>Commitment and Governance (Preperation)</i>		0.61	0.95
C1. Our business has a clear vision on B2B e-commerce.	0.81		
C2. Our vision of B2B e-commerce activities is widely communicated and understood throughout our company.	0.82		
C3. Our B2B e-commerce initiatives have champions.	0.79		
C4. All our B2B e-commerce initiatives have champions.	0.79		
C5. Senior management champions our B2B e-commerce initiatives and implementations.	0.79		
G1. Roles, responsibilities and accountability are clearly defined within each B2B e-commerce Initiative.	0.75		
G2. B2B e-commerce accountability is extracted via on-going responsibility.	0.69		
G3. Decision-making authority has been clearly assigned for all	0.77		

B2B e-commerce initiatives.			
G4. We thoroughly analyze the possible changes to be caused in our organization, suppliers, partners, and customers as a result of each B2B e-commerce implementation.	0.77		
G5. We follow a systematic process for managing change issues as a result of B2B e-commerce implementations.	0.79		
G6. We define a business case for each e-commerce implementation or initiative.	0.78		
G7. We have clearly defined metrics for assessing the impact of our B2B e-commerce initiatives.	0.80		
G8. Our employees at all levels support our B2B e-commerce initiatives.	0.75		
Inter-Organizational e-readiness			
<i>Cooperation-Conflict</i> [26,34,49,96]		0.65	0.88
CC1. We believe that our buyers are ready to do business on the Internet.	0.65		
CC2. Our firm and the buyer regularly interact.	0.80		
CC3. There is an open communication between our firms.	0.91		
CC4. Overall, we are satisfied with the interaction with the buyer.	0.83		
<i>Power Dependence</i> [26,34,49,96]		0.56	0.86
PD1. We are committed to this buyer.	0.75		
PD2. We expect to be working with the buyer for some time.	0.69		
PD3. Our relationship with the buyer is a long-term partnership.	0.85		
PD4. Our firm is dependent on the sales and profits generated by the dealership with this buyer.	0.67		
PD5. We are willing to put more effort and investment in building our business with the buyer.	0.77		
External e-readiness [66]		0.57	0.90
GVeR1. We believe that there are effective laws to protect consumer privacy.	0.70		
GVeR2. We believe that there are effective laws to combat cyber crime.	0.72		
GVeR3. We believe that the legal environment is conducive to conduct business on the Internet.	0.73		
GVeR4. The government demonstrates strong commitment to promote B2B e-commerce.	0.73		
SIeR1. The telecommunication infrastructure is reliable and efficient to support B2B e-commerce and eBusiness.	0.78		
SIeR2. The technology infrastructure of commercial and financial institutions is capable of supporting B2B e-commerce transactions	0.81		
SIeR3. We feel that there is efficient and affordable support from the local IT.	0.79		
*SIeR4. Secure electronic transaction (SET) and/or secure electronic commerce environment (SCCE) services are easily available and affordable.			

Notes: All items were measured using 5-point scales anchored by 1 = “strongly disagree” and 5 = “strongly agree.”

The “Stop Criterion Changes” in Smart PLS (REF) indicates that the algorithm converged only after two iterations, so estimation is good [32]. All AVEs > 0.5 and CRs > 0.7.

Items with * were eliminated from the questions because of individual loading significantly lower than the 0.5 cut-off value.

Table 4. Non-standardized Descriptive Statistics and Correlation Matrix

	N	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
EAD	445	4.02	1.15	1.00														
PRDi	445	0.32	0.47	0.26	1.00													
WRi	445	0.34	0.47	-0.06	-0.49	1.00												
Edu_high (Ci)	445	0.03	0.16	0.05	-0.02	-0.03	1.00											
Edu_low (Ci)	445	0.43	0.50	-0.08	0.18	-0.10	-0.15	1.00										
Size_large (Ci)	445	0.12	0.33	0.03	-0.12	-0.04	-0.02	0.05	1.00									
Size_small (Ci)	445	0.38	0.49	-0.09	0.00	0.13	-0.02	-0.17	-0.30	1.00								
Awarenessi	445	3.94	0.69	0.27	0.19	0.00	-0.04	-0.12	0.01	0.10	0.73							
HRi	445	3.91	0.91	0.13	-0.03	-0.04	-0.03	-0.39	0.01	0.14	0.28	0.84						
BRi	445	3.78	0.74	0.17	-0.02	0.08	-0.06	-0.18	-0.01	0.21	0.35	0.39	0.78					
TRi	445	4.12	0.77	0.22	-0.02	0.06	-0.09	-0.19	0.05	0.05	0.36	0.32	0.44	0.80				
Prepi	445	3.43	0.79	0.34	0.08	0.02	0.02	-0.11	0.07	0.12	0.63	0.30	0.53	0.42	0.78			
PEEi	445	3.84	0.66	0.20	0.05	0.07	-0.13	-0.06	0.02	0.06	0.41	0.26	0.43	0.46	0.52	0.75		
IOCi	445	3.89	0.75	0.35	0.04	0.04	-0.04	-0.14	0.04	0.03	0.42	0.24	0.39	0.46	0.45	0.49	0.80	
IOPi	445	3.95	0.69	0.32	0.04	0.06	-0.11	-0.09	0.09	0.02	0.47	0.24	0.47	0.47	0.54	0.53	0.59	0.74

Notes: The square root of each construct's average variance extracted (on the diagonal where applicable) is consistently higher than its correlation with any other construct [27].

Table 5. Multiple Regression Analysis

Variables	Model 1		Model 2	
	B	Std. Error	B	Std. Error
(Constant)	3.92**	0.11	3.88**	0.11
Size_large (Ci)	-0.02	0.16	0.03	0.15
Size_small (Ci)	-0.32**	0.11	-0.32**	0.1
Education_high (Ci)	0.34	0.31	0.26	0.3
Education_low (Ci)	-0.18*	0.11	-0.15	0.11
PRDi	0.70**	0.13	0.73**	0.12
WRi	0.19	0.12	0.2	0.12
Awarenessi	-0.04	0.07	0.01	0.06
HRi	0.03	0.06	0.02	0.06
BRi	-0.06	0.06	-0.07	0.06
TRi	0.05	0.06	0.07	0.06
PREPi	0.28**	0.07	0.24**	0.07
PEEi	-0.11	0.07	-0.09	0.06
IOCi	0.23**	0.06	0.22**	0.1
IOPi	0.14**	0.07	-0.18*	0.1
WR*IOPi			0.71**	0.14
PRD*IOPi			0.17	0.15
WR*IOCi			-0.14	0.14
PRD*IOCi			0.23*	0.13
R-Squared				
N	445		445	

Notes: All variables are standardized, * $p < .10$ * and ** $p < .05$.

